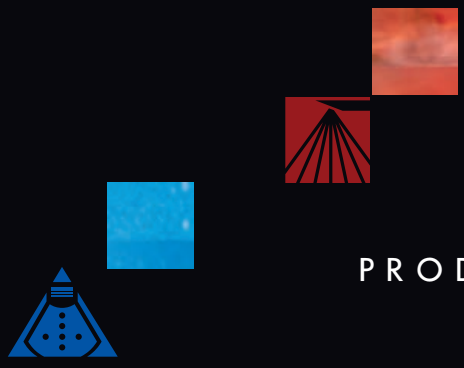
GAMMEX



PRODUCTS CATALOG

Gammex

LASER ALIGNMENT

DIAGNOSTIC RADIOLOGY

ULTRASOUND

MAMMOGRAPHY

RADIATION ONCOLOGY

LASER ALIGNMENT

CT Sim Robotic Laser Tracking Systems

GAMMEX A3000A AND A3100G

GAMMEX A3000A-PC-SYS 2 AND A3100G-PC-SYS 2

Gammex was the first company ever to bring lasers into the treatment and planning rooms for precision patient alignment.

Almost 40 years later Gammex is still leading the way with the Gammex A3000A and A3100G CT Sim Systems. Two diode sidewall lasers with a movable horizontal line and one overhead diode cross laser with a moveable sagittal line comprise the system. Any coordinate can be accomplished by using the movement in two dimensions with the lasers, and the CT couch height adjustment for the third dimension. All vital functions of the CT Sim system can be controlled by a remote pendant and through a PC in our -PC-SYS 2 systems.

Gammex is proud to boast zero drift on all of our systems. Our systems can currently read exported coordinates from treatment planning systems to allow for easy and accurate movement to the marked location. Our newest software is able to read data files from any treatment planning system currently on the market and read files that may already be integrated from other CT Sim system manufacturers.

Gammex was there in the beginning and we're leading the way into the future. In an industry where precision is a must, let Gammex light the way.

continued .....

A3000A, A3100G, A3000A-PC-SYS 2, A3100G-PC-SYS 2

LASER ALIGNMENT

continued from front...

A3000A and A3100G systems include:

- Three moving lasers (choice of red or green diode)
- CT Sim software package
- Hand-held pendant
- CT Sim alignment phantom
- Software manual, calibration kit, controller box and all necessary cabling

A3000A-PC-SYS 2 and A3100G-PC-SYS 2 systems include:

- All items listed with the A3000A and A3100G plus Gammex approved desktop computer, 17 in flat panel LCD monitor.

SPECIFICATIONS

Laser Beam Output

Power . . . . . <1.0 mW (each beam) Laser Class II
Range . . . . . 3 m
Line Width . . . . . <0.8 mm wide at 3.0 m
Line Length . . . . 1.0 m at 3.0 m
Drift . . . . . no measurable drift
Wavelength Red. . 6350 Å (635 nm) visible red
Wavelength Green 5320 Å (532 nm) visible green
Visibility . . . . . clearly visible even in strong ambient light

Laser Beam Adjustment

Length of travel . . . . . 70 cm
Accuracy of travel . . . . . ±0.5 mm at 3.0 m
Positioning accuracy . . . . . ±0.5 mm at 3.0 m

Laser Dimensions

Laser Unit (Moving Lasers) . . 112x21x9 cm (HWD) (44x8.25x3.5 in)
Power Module . . . 42x21x9 cm (HWD) (16.5x8.25x3.5 in)
Voltage requirements . . . 110/240 VAC (auto-select)

Certification

Complies with Center for Devices and Radiological Health regulations for Class II lasers and all CE requirements. (21 CFR 1040) (IEC 60825-1) (MDD 93/42/EEC).

Warranty

Lasers carry a one year warranty. Extended warranty available. Computer and peripherals carry the original manufacturer's warranty only.

Minimum Requirements - Computer

Gammex CT Sim Systems have specific hardware and software requirements. For ensured compatibility, Gammex recommends the purchase of the complete CT Sim system. The CT Sim software has been validated using the computer and flat screen monitor provided with the complete system. If the Gammex supplied computer and monitor are not used, Gammex cannot guarantee software's functionality and performance. Compatibility with user supplied computers is not warranted.

Call your Gammex sales representative for more information.

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CT Sim Robotic Laser Tracking Systems

GAMMEX A4000A AND A4100G

GAMMEX A4000A-PC-SYS 2 AND A4100G-PC-SYS 2

The Gammex A4000A and A4100G CT Sim Robotic Laser Tracking Systems consist of two fixed side-wall lasers and one overhead laser with a movable sagittal line. The sagittal laser provides precise position in one dimension (x axis) and relies on the CT scanner couch motion for positioning in the second and third dimensions (Y and Z axes). All vital features of the CT Sim Robotic Laser Tracking System can be controlled by a remote pendant, or by using the workstation in our PC-SYS 2 systems.

Gammex lasers accept export coordinates from the treatment planning systems, allowing easy and accurate movement for location marking. Your choice of Gammex Probe+ red diode or ProbeG green diode lasers can be used for the fixed sidewall lasers and feature a wide-view turret profile that allows mounting on angled walls. The ProbeG green laser provides enhanced contrast on various skin tones, and its unique design incorporates power stabilizing circuitry that extends diode life.

The Probe+ (red) and ProbeG (green) lasers that are integrated into the A4000A and A4100G respectively provide the precision optics and reliability you have come to expect from Gammex lasers. Both systems feature the quick and easy hand adjustments for alignment that come with our Probe lasers and set

continued .....

A4000A, A4100G, A4000A-PC-SYS 2, A4100G-PC-SYS 2

LASER ALIGNMENT

continued from front...

us apart from the competition. Gammex is proud to boast zero drift on all of our systems.Our newest software is able to read data files from any treatment planning system currently on the market and read files that may already be integrated from other CT Sim system manufacturers.

Gammex was there in the beginning and we're leading the way into the future. In an industry where precision is a must, let Gammex light the way.

A4000A and A4100G systems include:

- One moving laser (choice of red or green diode)
- Two fixed side-wall lasers (choice of red or green diode)
- CT Sim software package
- Hand-held pendant
- CT Sim alignment phantom
- Software manual, calibration kit, controller box and all necessary cabling

A4000A-PC-SYS 2 and A4100G-PC-SYS 2 include:

- All items listed with the A4000A and A4100G plus Gammex approved desktop computer, 17 in flat panel LCD monitor.

SPECIFICATIONS

Laser Beam Output
Power . . . . . <1.0 mW (each beam) Laser Class II
Range . . . . . 3 m
Line Width . . . . . <0.8 mm wide at 3.0 m
Line Length . . . . 1.0 m at 3.0 m
Drift . . . . . no measurable drift
Wavelength Red. . 6350 Å (635 nm) visible red Wavelength
Green . . . . . 5320 Å (532 nm) visible green
Visibility . . . . . visible even in strong ambient light

Laser Beam Adjustment
Length of travel . . 70 cm
Accuracy of travel ±0.5 mm at 3.0 m
Positioning accuracy . . . . . ±0.5 mm at 3.0 m

Laser Dimensions
Laser Unit (Moving). . . . . 112x21x9 cm (44x8.25x3.5 in) (HWD)
Probe+. . . . . 17.3x14x8 cm (6.8x5.5x3 in) (HWD)
ProbeG . . . . . 27x14x8 cm (10.6x5.5x3 in) (HWD)

Power Module . . . 42x21x9 cm (16.6x8.25x3.2 in) (HWD)
Voltage requirements . . . 110/240 VAC

Certification
Complies with Center for Devices and Radiological Health regulations for Class II lasers and all CE requirements. (21 CFR 1040) (IEC 60825-1) (MDD 93/42/EEC).

Warranty
Lasers carry a one year warranty. Extended warranty available. Computer and peripherals carry the original manufacturer's warranty only.

Minimum Requirements - Computer
Gammex CT Sim Systems have specific hardware and software requirements. For ensured compatibility, Gammex recommends the purchase of the complete CT Sim system. The CT Sim software has been validated using the computer and flat screen monitor provided with the complete system. If the Gammex supplied computer and monitor are not used, Gammex cannot guarantee software's functionality and performance. Compatibility with user supplied computers is not warranted. Call your Gammex sales representative for more information.

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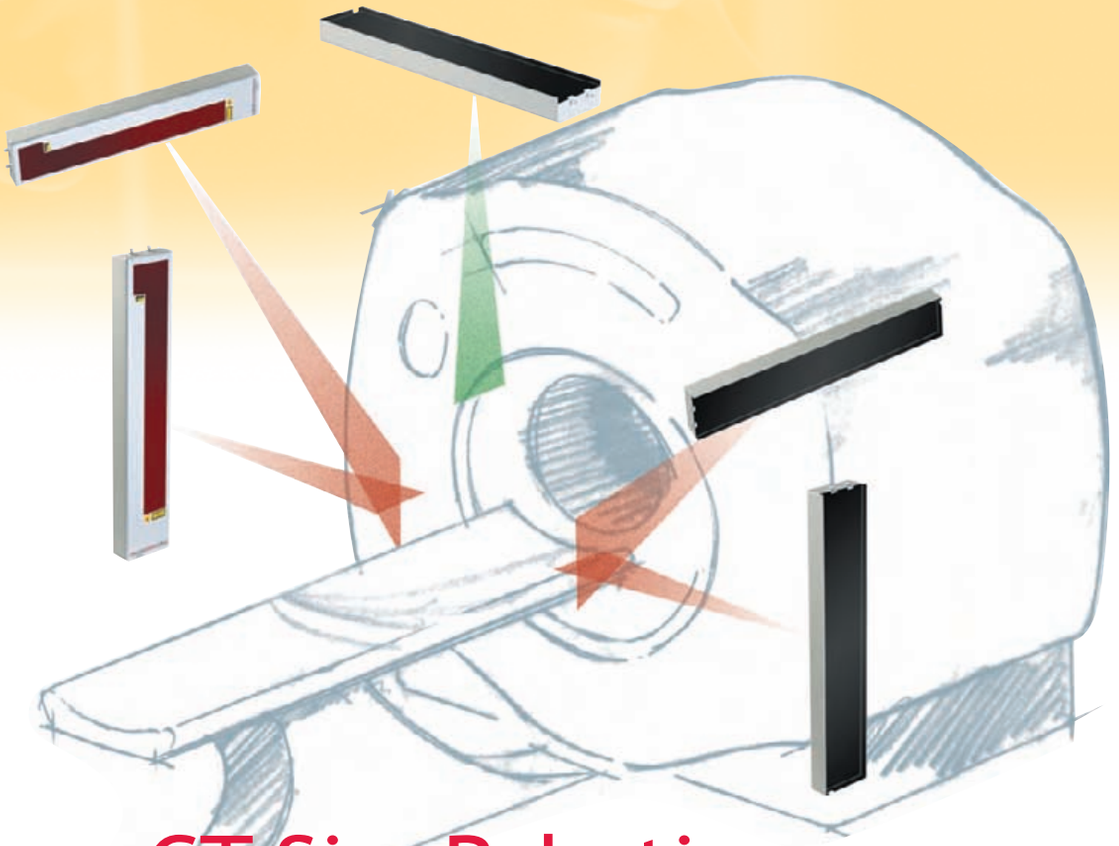

5-Arm CT Sim Robotic Laser Alignment System

GAMMEX A5000A-PC-SYS2

The Gammex 5-Arm CT Sim System brings a new level of alignment sophistication to medical radiation treatment centers.

Utilizing five moveable diode lasers, the Gammex system is capable of X, Y and Z coordinate alignment with the precision and accuracy typically seen for a three laser system. A green laser is used for the X axis to differentiate from the red lasers used at the Y and Z axes. Easy to use Windows® based software makes setup and operation fast and simple.

The Gammex 5-Arm CT Sim System pendant allows users to set up patient procedures from the couch side. The system can be used with a wide range of treatment planning systems. Upgrades for the existing Gammex 3-Arm systems to the Gammex 5-Arm CT Sim System are also available.

continued .....

ROBOTIC LASER ALIGNMENT SYSTEM

LASER ALIGNMENT

continued from front...

SPECIFICATIONS

Laser Beam Output

Power . . . . . <1.0 mW (each beam)
Laser Class . . . . . Class II
Line Width . . . . . <1.0 mm @ 3 m
Drift . . . . . No measurable drift
WaveLength . . . . 635 nm red diode
532 nm green diode
Visibility . . . . . Clearly visible in strong ambient light
Lasers . . . . . 4 moveable red diode lasers
1 moveable green diode laser
Configuration . . . XYZ coordinates, green laser used for X axis to differentiate from Y and Z axes laser lines.

Laser Beam Adjustment

Length of
Travel . . . . . 57 cm (green laser)
70 cm (red laser)
Position
Accuracy . . . . . ±0.5 mm @ 3 m

Certification

Complies with Center for Devices and Radiological Health regulations for Class II lasers and all CE requirements. (21 CFR 1040) (IEC 60825-1) (MDD 93/42/EEC)

Warranty

Lasers carry a one year warranty. Extended warranty available. Computer and peripherals carry the original manufacturer's warranty only.

Minimum Requirements - Computer

For ensured compatibility, Gammex recommends the purchase of the system complete with a Gammex supplied medical-grade computer. Compatibility with user supplied computer is not warranted. System hardware and software requires the following minimum hardware and software configuration:

- Microsoft Windows 2000®, XP®, or Windows Vista (SP1) operating system
- Intel 1 GHz microprocessor
- 1 GB free hard drive disk space
- 1 GB RAM
- Network Interface Card 10/100
- CD-Rom Drive
- 256 color, 800x600 display adapter
- 2 serial ports, Com1 and Com2

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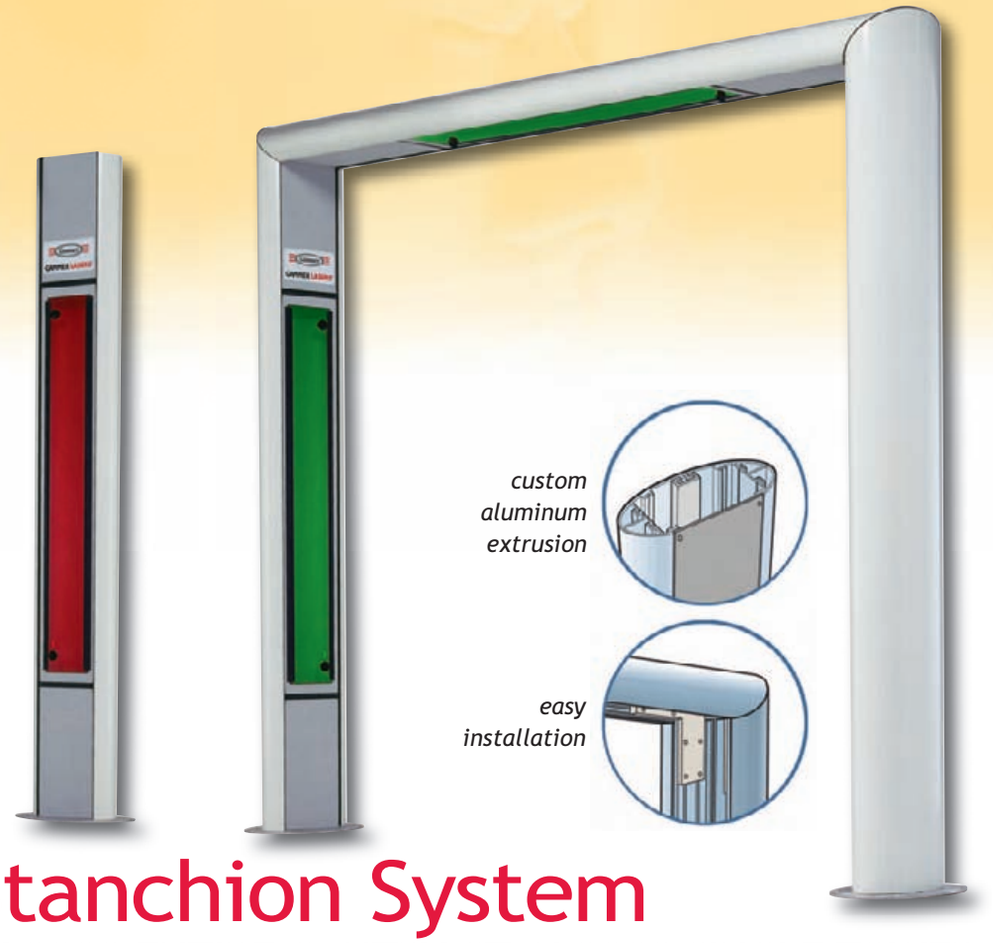


custom aluminum extrusion

easy installation

Laser Stanchion System

GAMMEX RACK 3000 ENTIRE GANTRY/STAN 3000 SINGLE TOWER (RED DIODE LASER)

GAMMEX RACK 3100 ENTIRE GANTRY/STAN 3100 SINGLE TOWER (GREEN DIODE LASER)

The versatile Gammex Laser Stanchion System minimizes room modifications and down-time. The stanchion simplifies the installation of patient positioning lasers for radiation oncology and CT simulation.

The stanchion system functions as an independent laser mounting system. The system can be installed without expensive room renovation and its height and length can be customized to meet specific needs. Since only one IEC power connection is required to operate multiple laser units, electrical modifications to an existing room are kept to minimum. Individual towers are also available.

Laser Stanchion System Features:

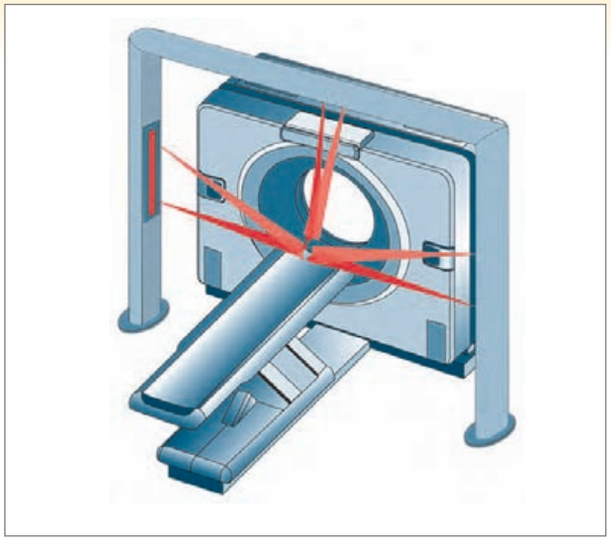
- Made from attractive, lightweight extruded aluminum for added strength and durability.
- Fits in with any décor.
- Several standard heights and widths are available; custom sizes can be provided.
- Stanchions are available as gantries and towers and support red or green diode lasers.
- Single entry point cable management.

continued .....

RACK 3000/STAN 3000, RACK 3100/STAN 3100

LASER ALIGNMENT

continued from front...



This illustration demonstrates the Gammex CT Sim Laser Tracking System installed using the Laser Stanchion Entire Gantry System in an integrated CT therapy simulation setting.

SPECIFICATIONS

Material . . . . . Extruded Aluminum

Standard Sizes
Towers. . . . . 6.5 ft (H)
Gantry. . . . . 7.5x12 ft (HxW)
Gantry. . . . . 8.5x14 ft (HxW)

Custom sizes available – please contact your Gammex sales representative

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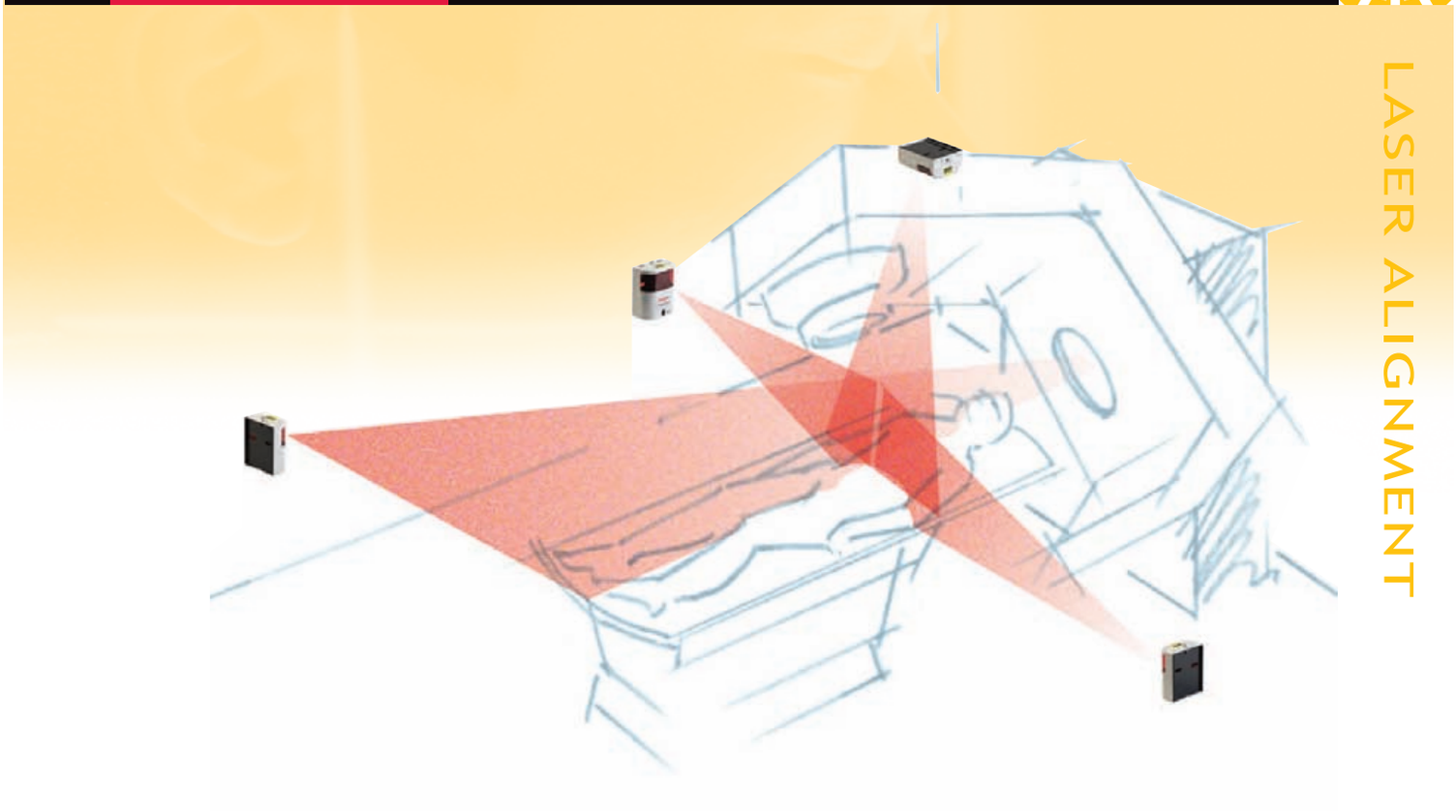

Ther-A-Cross "X" Laser Systems

The Ther-A-Cross "X" Laser Alignment System is a customer defined set of four lasers to provide a solution to your unique challenges in the work environment. The system consists of three crosshair lasers and one sagittal laser mounted on the walls and ceiling.

The system provides horizontal, transverse and sagittal beams of laser light that intersect to define isocenter. As a result, patient alignment is precise and positioning time is minimized. The systems are available in either red or green, using fixed or remote controlled lasers.

The Ther-A-Cross Laser "X" Alignment Systems provide the following benefits:

- Customer Defined Choice of Lasers
- Rapid and accurate patient positioning
- Turret design allows for a wide latitude of azimuth adjustment
- Optical adjustment easily accessible
- Virtually no drift
- -1 mm line @ 10 ft

continued .....

THER-A-CROSS "X" LASER SYSTEMS

LASER ALIGNMENT

continued from front...

SPECIFICATIONS

Gammex Fixed Laser Systems for Ther-A-Cross "X" Laser System Models

Exact-Align Red A790
(3) 1A475 Crosshair
(1) 1A618 Sagittal

Exact-Align Green A785
(3) 1A480 Crosshair
(1) 1A619 Sagittal

Probe Red Diode A800
(3) GLD-400 Crosshair
(1) GLD-200 Sagittal
Optional 110/220 Fused
Power Supply 67A400

Probe+ Red Diode A850
(3) GLD-450 Crosshair
(1) GLD-250 Sagittal
Optional 110/220
Power Supply 67A450CE

ProbeG Green Diode A860
(3) GLD-500 Crosshair
(1) GLD-300 Sagittal

Please call your Gammex representative for Remote Laser options.

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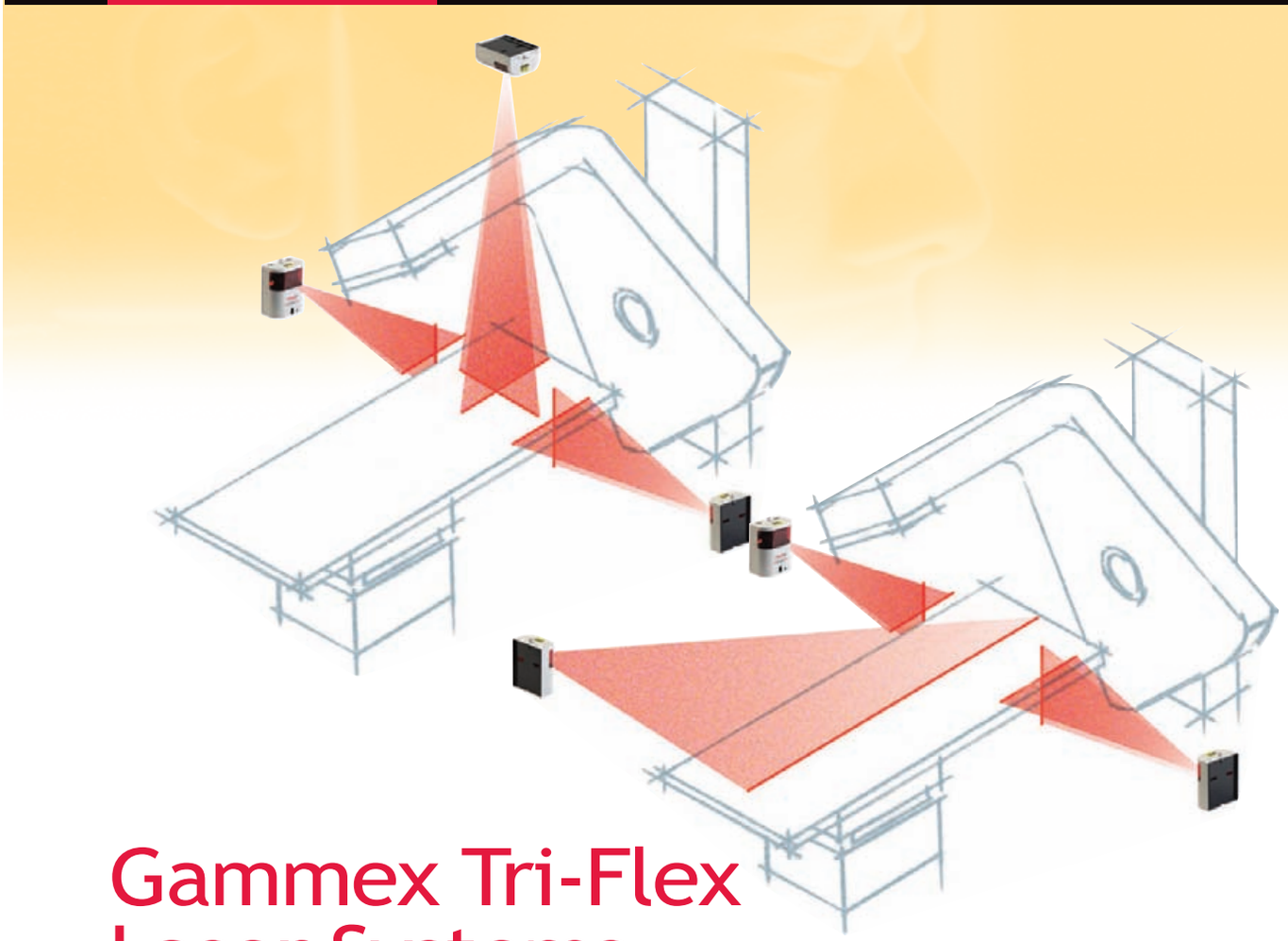

Gammex Tri-Flex Laser Systems

The Gammex Tri-Flex Laser System is the most flexible, efficient, and cost effective way to align the patient and define the treatment isocenter. No matter how the planning or treatment room is configured, the Tri-Flex Laser System can accommodate and give you the alignment that you need. The system consists of three lasers, configurable by the customer with remote or fixed lasers and is available in red and green.

The Tri-Flex System has two cross hair lasers positioned on the sidewalls and depending on the room, an overhead crosshair laser is placed on the ceiling or a single line sagittal laser is placed on the wall at the foot of the couch. The latter configuration allows for alignment when a crosshair laser cannot be placed directly over isocenter.

The Gammex Tri-Flex Laser System will give the most precise line and decrease your alignment time no matter what the shape of your treatment or planning room.

continued .....

GAMMEX TRI-FLEX LASER SYSTEMS

LASER ALIGNMENT

continued from front...

SPECIFICATIONS

Gammex Fixed Laser Systems for Tri-Flex Laser System Models

Exact-Align Red A895
(3) 1A475 Crosshair

Exact-Align Red A896
(2) 1A475 Crosshair
(1) 1A618 Sagittal

Exact-Align Green A898
(3) 1A480 Crosshair

Exact-Align Green A897
(2) 1A480 Crosshair
(1) 1A619 Sagittal

Probe Red Diode A900
(3) GLD-400 Crosshair

Probe Red Diode A901
(2) GLD-400 Crosshair
(1) GLD-200 Sagittal
Optional 110/220 Fused
Power Supply 67A400

Probe+ Red Diode A950
(3) GLD-450 Crosshair
Optional 110/220
Power Supply 67A450CE

Probe+ Red Diode A951
(2) GLD-450 Crosshair
(1) GLD-250 Sagittal
Optional 110/220
Power Supply 67A450CE

ProbeG Green Diode A960
(3) GLD-500 Crosshair

ProbeG Green Diode A961
(2) GLD-500 Crosshair
(1) GLD-300 Sagittal

Please call your Gammex representative for Remote Laser options.

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Fiber Optic Back Pointer Laser System

GAMMEX A176A AND A177A

The Gammex Fiber Optic Back Pointer defines the exit point of the radiation beam when used with Gammex therapy lasers. The Gammex Back Pointer projects a single line which intersects the side light, defining the exit point on the patient's body. This can save the patient and therapy center time, while ensuring the most accurate patient positioning possible. The A176A provides a standard line, and the A177A provides a longer line which is beneficial if the couch is moved up, losing the intersecting point.

Designed to be used with the Gammex Ther-A-Cross "X" or Tri-Flex wall mounted laser systems, the Fiber Optic Back Pointer can be adapted for use on all therapy equipment. With this fiber optic system, the laser generator can be mounted at any convenient location, even remote sites, but often inside the gantry of the therapy machine. The laser light is piped through a flexible fiber optic cable to a compact projection head that is easily mounted on or in the radiation therapy unit. Clearance is not a problem because of the small size of the output head. The cable and optical heads carry no electrical power and will not interfere with other equipment.

The optical head projection defines a plane containing the axis of rotation and the radiation source. The intersection of this plane and transverse plane (created by lateral and overhead lasers) is the radiation exit axis. The exit axis is quickly and easily defined with a Fiber Optic Back Pointer.

continued .....

continued from front...

SPECIFICATIONS

Fiber Optic Back Pointer A176A

System Components

One single beam output head
One laser generator
One fiber optic cable

Laser Beam Output

Power . . . . . Less than 1.0 mW
Range . . . . . Up to 3.05 m
Line Width . . . . . 1.0 mm @ 1.22 m
Drift . . . . . 0.12 mm @ 1.22 m maximum
WaveLength . . . . 6328 Å (632.8 nm) visible red
Visibility . . . . . Clearly visible in strong ambient light

Laser Beam Adjustment

Central ray . . . . . 50°

Output Head 34A111A

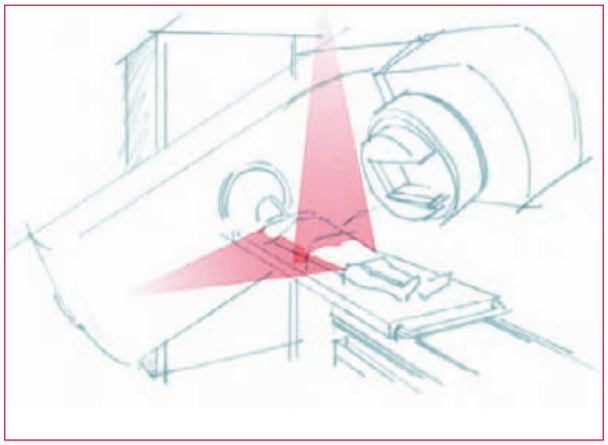
Length . . . . . 6.6 cm
Width . . . . . 5.8 cm
Depth . . . . . 1.6 cm
Weight . . . . . 85 g

Laser Generator 30C300A

Length . . . . . 31.0 cm
Width . . . . . 14.0 cm
Depth . . . . . 7.4 cm
Weight . . . . . 2.7 kg
Power
Requirements . . . 115 or 230 VAC, 50/60 Hz, 25 W

Fiber Optic Cable 30A116A

Length . . . . . 4.90 m is standard; Shorter or longer lengths available on request.
Diameter . . . . . 0.38 cm
Flexibility . . . . . Minimum bend radius 5.1 cm



Typical fiber optic back pointer installation

Fiber Optic Back Pointer A177A

Output Head 34A108A replaces 34A111A to provide a longer line.

Length . . . . . 6.6 cm
Width . . . . . 5.8 cm
Depth . . . . . 1.6 cm
Weight . . . . . 85 g

Certification

Complies with Center for Devices and Radiological Health regulations for Class II Lasers.

Warranty

Lasers carry a one year warranty.
Extended warranty available.

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Remote sold separately

Remote Positioning Lasers

GAMMEX FOCUS GLD-300-RC (SAGITTAL GREEN)
GAMMEX FOCUS GLD-500-RC (CROSSHAIR GREEN)
GAMMEX FOCUS GLD-250-RC (SAGITTAL RED)
GAMMEX FOCUS GLD-450-RC (CROSSHAIR RED)

The NEW Gammex Focus Remote Positioning Lasers provide physicists with the ability to remotely make fine adjustments without having to be in direct view of the lasers. This allows a single person to adjust up to five lasers with one intuitive, easy to use remote control.

The new system will allow a single person to control and fine tune overhead and sagittal lasers without the need for a ladder. The Gammex remote operation system relies on a state-of-the-art radio frequency (RF) technology that overcomes the line-of-sight problems encountered with infrared systems.

The Gammex Focus lasers come in both red and green, and provide the needed projection range in small, cramped and non-plumb operating environments. The superior RF technology employed in the lasers allow the Gammex Focus lasers to have the ability to be enclosed within walls and ceilings, providing more working space and a cleaner look in the operating environment.

continued .....

LASER ALIGNMENT

SPECIFICATIONS

Green GLD-300-RC Sagittal and GLD-500-RC Crosshair

Laser Beam Output:
Power . . . . . <1.0 mW (each beam)
Range . . . . . Up to 6.0 m
Line Width . . . . . <0.8 mm @ 3 m
Line Divergence
(Length). . . . . 15 - 17 degrees
Drift . . . . . 15 - 17 degrees
Wavelength . . . . 5350 A (532 nm) visible green
Visibility. . . . . Clearly visible in strong ambient light

Remote Laser Beam Adjustment:
Horizontal Range
of Vertical
Projection . . . . . ±2.5 degrees (±13 cm @ 3 m)
Vertical Range
of Horizontal
Projection . . . . . +2.0 degrees /- 6.0 degrees
(+10 cm / -31 cm @ 3 m)

Manual Laser Beam Adjustment:
Line Angle Adjustment
Range . . . . . ±180 degrees
Mounting . . . . . Turret adjustable to ±80 degrees

Laser Dimensions:
Height . . . . . 10.5 in / 27 cm
Width . . . . . 5.6 in / 14 cm
Depth . . . . . 4.7 in / 12 cm
Weight. . . . . 3.2 kg

Remote Receiver Dimensions:
Height . . . . . 4.0 in (8.7 in w/antenna)
10 cm (22 cm w/antenna)
Width . . . . . 5.5 in / 14 cm
Depth . . . . . 1.4 in / 4 cm

Universal Power Supply
12VDC power derived from
110 VAC - 242 VAC, 50 - 60Hz
(Various adapters included for International use)

Certification:
Complies with CDRH requirements for Class II lasers.

Warranty:
Lasers carry a one year warranty.
Extended warranty available.

Red GLD-250-RC Sagittal and GLD-450-RC Crosshair

Laser Beam Output:
Power . . . . . <1.0 mW (each beam)
Range . . . . . Up to 6.0 m
Line Width . . . . . <0.8 mm @ 3 m
Line Divergence
(Length). . . . . 15 - 17 degrees
Drift . . . . . 15 - 17 degrees
Wavelength . . . . 5350 A (532 nm) visible red
Visibility. . . . . Clearly visible in strong ambient light

Remote Laser Beam Adjustment:
Horizontal Range
of Vertical
Projection . . . . . ±2.5 degrees (±13 cm @ 3 m)
Vertical Range
of Horizontal
Projection . . . . . ±4.0 degrees (±21 cm @ 3 m)

Manual Laser Beam Adjustment:
Line Angle Adjustment
Range . . . . . ±180 degrees
Mounting . . . . . Turret adjustable to ±80 degrees

Laser Dimensions:
Height . . . . . 8.0 in / 20 cm
Width . . . . . 5.6 in / 14 cm
Depth . . . . . 4.7 in / 12 cm
Weight. . . . . 1.8 kg

Remote Transmitter Dimensions:
Length. . . . . 4.6 in / 12 cm
Width . . . . . 2.9 in / 7 cm
Depth . . . . . 1.0 in / 3 cm

Universal Power Supply
12 VDC power derived from
110 VAC - 242 VAC, 50 - 60 Hz
(Various adapters included for International use)

Certification:
Complies with CDRH requirements for Class II lasers.

Warranty:
Lasers carry a one year warranty.
Extended warranty available.

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ProbeG Diode Lasers

GAMMEX GLD 300 SAGITTAL

GAMMEX GLD 500 CROSSHAIR

The Gammex ProbeG green diode laser is designed to ensure precise patient positioning during CT simulation and radiation therapy. The ProbeG provides enhanced contrast on various skin tones.

Projected green light is "absorbed" thereby minimizing line diffusion which, in turn, creates crisper lines. ProbeG lasers have less than 0.8 mm line width projected at a distance of three meters. This high quality fine line allows precision positioning in all situations.

The ProbeG laser's unique mechanical design makes it easy to use and maintain. Most fine laser controls are performed by simply raising the hinged cover and making the desired adjustment. No laser line drift is visible after initial adjustment.

The laser is shielded to reduce radiation exposure to the diode and incorporates novel power stabilizing circuitry to extend diode life.

ProbeG optics and mounting holes match Probe, Probe+ and Gammex HeNe lasers to allow easy retrofit mounting.

continued .....

GLD 300 SAGITTAL, GLD 500 CROSSHAIR

LASER ALIGNMENT

SPECIFICATIONS

Laser Beam Output
Power . . . . . <1.0 mW (each beam)
Range . . . . . Up to 6.0 m
Line Width . . . . . <0.8 mm @ 3 m
Line Divergence
Length) . . . . . 15-17°
Drift . . . . . No measurable drift
WaveLength . . . . 5320 Å (532 nm) visible green
Visibility . . . . . Clearly visible in strong ambient light

Laser Beam Adjustment
Horizontal Range
of Vertical
Projection . . . . . 330 cm @ 3 m
Vertical Range
of Horizontal
Projection . . . . . Plus 100 cm /minus 300 cm @ 3 m
Line angle adjustment
range . . . . . ±180 degrees
Mounting . . . . . Turret adjustable to ±45°

Laser Dimensions
Length. . . . . 27.0 cm (10.6 in)
Width . . . . . 14.0 cm (5.5 in)
Depth . . . . . 8.0 cm (3.1 in)
Weight. . . . . 3.2 kg (7.0 lbs)

Universal Power Supply
Power
Requirements . . . 110 VAC – 220 VAC, 50 - 60 Hz, 0.4 A
Laser unit includes various adapters for U.S. and international use.

Certification
Complies with Center for Devices and Radiological Health regulations for Class II Lasers.

Warranty
Lasers carry a one year warranty.
Extended warranty available.

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Probe+ Diode Lasers

GAMMEX GLD 250 SAGITTAL

GAMMEX GLD 450 CROSSHAIR

The Gammex Probe+ lasers are designed with a 160 degree turret rotation. Often, existing architectural configurations limit sites from installing traditional lasers, but with the Gammex Probe+ difficult room designs are no problem. Our unique and proprietary thermal design of the Probe+ series ensure users of no visible “drift”. Vertical and horizontal adjustments allow for angular and planar movement making the Probe+ system easy to install.

The Probe+ laser alignment systems use a 635 nm wave length laser light and built-in controls to vary the light intensity. Most of the diode products currently available for patient alignment are in the 650 to 670 nm range. Because of the optical response of the human eye, the Probe+ line is perceived as four times as bright as the 670 nm, and two times as bright as the 650 nm. The 635 nm yields essentially the same brightness that you can obtain with our helium neon (HeNe) lasers. The Probe+ also allows a variable intensity control that allows you to adjust the laser brightness based on the room lighting conditions.

Another benefit Gammex lasers offer is a protective shielding for the electronics and especially the diode. This enables our lasers to last longer and perform better than other similar lasers on the market. The

continued .....

GLD 250 SAGITTAL, GLD 450 CROSSHAIR

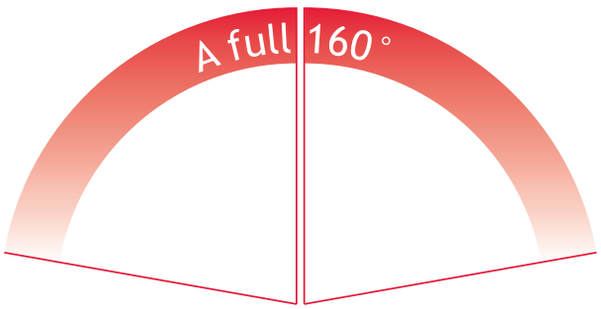
LASER ALIGNMENT

continued from front

Probe+ series also have the same width base plate as the Exact-Align system so it can be retrofitted to existing turret laser installations with no modifications. This makes conversion from the HeNe systems to the Diode systems cost friendly and easy.

The Probe+ diode laser has a 0.5 mm line at a distance of 2 meters. Complete documentation on laser beam profile is included with each Probe+ diode alignment system.

The standard Probe+ Diode laser utilizes an external power supply adaptable for international use. The Probe+ Diode laser system is easy to repair and maintain.



The Probe+ Diode Laser can be adjusted a full 160° to accommodate the most challenging room installations

SPECIFICATIONS

Laser Beam Output
Power . . . . . 0.5 mW (each beam)
Range . . . . . Up to 6.0 m
Line Width . . . . . <0.5 mm @ 2 m
Line Divergence
(Length). . . . . 15-17°
Drift . . . . . No measurable drift
WaveLength . . . . 6350 Å (635 nm) visible red
Visibility . . . . . Clearly visible in strong ambient light

Laser Beam Adjustment
Horizontal Range of Vertical Projection . . . . . 330.2 cm @ 3.05 m
Vertical Range of Horizontal Projection . . . . . Plus 100 cm /minus 300 cm @ 3 m
Line angle adjustment range . . . . . ±180 degrees
Mounting . . . . . Turret adjustable to ±80°

Laser Dimensions
Length. . . . . 17.3 cm (6.75 in)
Width . . . . . 14.0 cm (5.5 in)
Depth . . . . . 8.0 cm (3 in)
Weight. . . . . 1.8 kg (4 lbs)
Power Requirements . . . 12 VDC, 300 mA

Universal Power Supply
Power Requirements . . . 110 VAC - 220 VAC, 50 - 60 Hz, 0.4 A
Laser unit includes various adapters for U.S. and international use.

Certification
Complies with Center for Devices and Radiological Health regulations for Class II Lasers.

Warranty
Lasers carry a one year warranty.
Extended warranty available.

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Probe Diode Lasers

GAMMEX GLD 200 SAGITTAL

GAMMEX GLD 400 CROSSHAIR

The Probe diode laser offers an alternative technology to the standard HeNe lasers.

The Probe meets all of the specifications of the Exact-Align turret laser. This means that all of the existing features of the turret laser are now available in this more convenient and compact size. It also has the same width base plate as the Exact-Align system so it can be retrofitted to existing turret laser installations with no modifications. This makes conversion from the HeNe systems to the Diode systems cost friendly and easy.

Most of the diode products currently available for patient alignment are in the 650 to 670 nm range. The Gammex Probe diode laser utilizes a 635 nm diode. Because of the optical response of the human eye, the Probe line is perceived as four times as bright as the 670 nm and two times as bright as the 650 nm. The 635 nm yields essentially the same brightness that you can obtain with our helium neon (HeNe) lasers.

Another benefit Gammex lasers offer is a protective shielding for the electronics and especially the diode. This enables our lasers to last longer and perform better than other similar lasers on the market. The Probe also features a variable intensity control that allows you to adjust the laser brightness based on the room lighting conditions. The Probe Diode laser is provided with a 110 VAC to 12 VDC power supply.

continued .....

GLD 200 SAGITTAL, GLD 400 CROSSHAIR

LASER ALIGNMENT

SPECIFICATIONS

Laser Beam Output

Power . . . . . <0.5 mW (each beam)
Range . . . . . Up to 6.0 m (20 ft)
Line Width . . . . . <1.0 mm @ 3 m
Line Length . . . . >0.61 m @ 3 m
Drift . . . . . No measurable drift
WaveLength . . . . 6350 Å (635 nm) visible red
Visibility . . . . . Clearly visible in strong ambient light
Intensity . . . . . User adjustable to desired levels

Laser Beam Adjustment

Horizontal Range of Vertical Projection . . . . . 330.2 cm (130 in) @ 3.05 m (10 ft)
Vertical Range of Horizontal Projection . . . . . Plus 102 cm/minus 305 cm @ 3.05 m
Line angle adjustment range . . . . . ±180 degrees
Mounting . . . . . Turret adjustable to ±45°

Laser Dimensions

Length. . . . . 16.51 cm (6.5 in)
Width . . . . . 13.7 cm (5.4 in)
Depth . . . . . 7.3 cm (2.9 in)
Weight. . . . . 1.8 kg (4 lbs)

Power Requirements . . . 12 VDC, 300 mA
Optional Power Supply . . . 110/220 V (67A400CE)

Certification

Complies with Center for Devices and Radiological Health regulations for Class II Lasers.

Warranty

Lasers carry a one year warranty.
Extended warranty available.

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EXACT-ALIGN HeNe Lasers

GAMMEX 1A475 CROSSHAIR AND 1A618 SAGITTAL RED
GAMMEX 1A480 CROSSHAIR AND 1A619 SAGITTAL GREEN

The Gammex Exact-Align Helium Neon (HeNe) turret lasers are the standard for patient positioning. The turret design allows for a line angulation capability of ±45° which means that the lasers can be mounted at an angle to the patient couch if necessary without requiring angle brackets. This direct wall mounting provides for greater stability of the laser. Optical adjustments are easily accessible.

The red turret style lasers project at 628.8 nm wavelength which is highly visible in normal lighting conditions. The green turret style lasers project at 543.5 nm wavelength which is visible on any skin tone. The high quality fine line of the green lasers also proves useful in situations such as stereotactic radiosurgery where precision positioning is critical. The green light is “absorbed” into the skin which minimizes the “spattering” effect thereby maintaining the thinnest line available.

continued .....

GAMMEX 1A475,1A618,1A480,1A619

LASER ALIGNMENT

continued from front...

SPECIFICATIONS

Laser Beam Output

Power . . . . . <0.2 mW (each beam, green only); <1.0 mW (each beam, red only)
Spot Size . . . . . 1.2 mm (0.05 in) diameter @ 3.05 m (10 ft)
Range . . . . . Up to 9.10 m (30 ft)
Line Width . . . . . <1.0 mm (0.04 in) @ 3.05 m (10 ft)
Drift . . . . . 0.25 mm (0.01 in) @ 3.05 m (10 ft) maximum
Wave Length. . . . 543.5 nm visible green
628.8 nm visible red
Visibility . . . . . Clearly visible in strong ambient light

Laser Beam Adjustment

Horizontal Range of Vertical Projection
Spot or Line . . . . 330.2 cm (±130 in) @ 3.05 m (10 ft)

Vertical Range of Horizontal Projection
Spot or Line . . . . +102.0 cm -305.0 cm (+40 in -120 in) @ 3.05 m (10 ft)
Line angle adjustment range . . . . . ±180 degrees
Mounting . . . . . Turret adjustable to ±45° walls

Laser

Length. . . . . 43.0 cm (16.9 in)
Width . . . . . 13.7 cm (5.4 in)
Depth . . . . . 7.9 cm (3.12 in)
Weight. . . . . 4.5 kg (10 lbs)
Power Requirements . . . 115 or 230 VAC, 50/60 Hz, 25 W

Certification

Complies with Center for Devices and Radiological Health regulations for Class II Lasers.

Warranty

Lasers carry a one year warranty.
Extended warranty available.

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LASER ALIGNMENT

DIAGNOSTIC RADIOLOGY

ACR CT Accreditation Phantom

GAMMEX 464

The Gammex 464 ACR CT Phantom is designed to be an integral part of the American College of Radiology (ACR) CT Accreditation Program. This voluntary program provides physicians with an opportunity for a comprehensive peer review of their CT facility, personnel qualifications, image quality and quality assurance programs. CT accreditation encourages patient's confidence and demonstrates your commitment to quality healthcare to payers, regulatory agencies and employers. The ACR CT Accreditation Phantom can be used for initial QA assessment and routine monthly QA testing to help ensure that patients are receiving the lowest possible CT dose.

Solid Water® construction makes for a convenient, physically stable test device that provides reproducible results over time. The phantom consists of four modules designed to examine a broad range of scanner parameters. It features white scribed markings on the axial, coronal and sagittal axis, and HEAD, FOOT and TOP markings to ensure proper alignment.

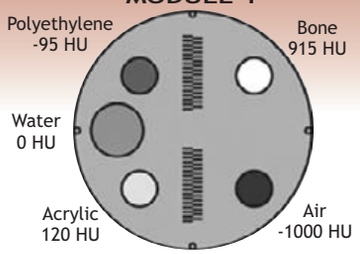
The optional phantom base, Gammex 464-STND (shown above with the phantom) provides stability, makes alignment easier and features built-in leveling devices.

continued .....

464 PHANTOM

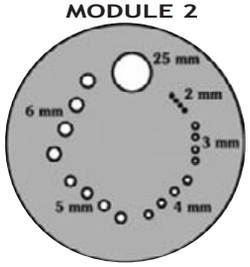
DIAGNOSTIC RADIOLOGY

MODULE 1



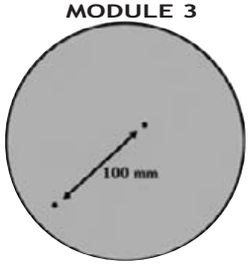
Positioning and alignment, CT number accuracy and slice thickness.

MODULE 2



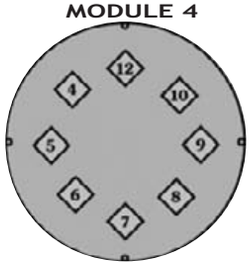
Low contrast resolution. Features a series of cylinders with different diameters, all at 0.6% (6 HU) difference from the background material.

MODULE 3



CT number uniformity assessment.
Includes two small targets for testing inplane distance measurement accuracy.

MODULE 4



High contrast (spatial) resolution.
Contains eight high contrast resolution patterns of 4, 5, 6, 7, 8, 9, 10, and 12 line pairs per cm.

SPECIFICATIONS

Phantom Construction

Matrix material . . Solid Water®, 0 ±5 HU
Length. . . . . 16 cm (6.30 in)
Diameter . . . . . 20 cm (7.88 in)
Weight. . . . . 5.3 kg (11.75 lbs)

Imbedded Test Objects

Water equivalent linearity rod . . . . Solid Water®, 0 HU

Bone equivalent linearity rod . . . . 915 HU Bone tissue equivalent material

Acrylic linearity rod . . . . . Cast acrylic

Polyethylene linearity rod . . . . Low density polyethylene

Low contrast module matrix . . Ciba Geigy CB4 epoxy or equivalent

Low contrast rods Ciba Geigy CB4 epoxy (density adjusted to yield 6 ±0.5 HU difference) or equivalent

Tungsten carbide beads . . . . . 0.011 in diameter grade 25 tungsten carbide beads

Line pair material. . . . . 6061 Aluminum and Polystyrene

Steel beads . . . . 1.00 mm grade 25 chrome steel balls

Intra-module homogeneity. . . . The mean ROI values within any module, test objects excluded, can differ by no more than 2 HU.

Intra-phantom homogeneity, modules 1, 3 & 4 . The average CT number of a module must meet the requirements of 0 ±5 HU.

Optional Phantom Stand Available
Optional Hard and Soft Cases Available

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Automated CT Software for the Gammex 464 ACR Accreditation Phantom

GAMMEX 464-ACTS

The NEW Gammex 464-ACTS Automated CT Software provides automated data analysis for the ACR accreditation CT Phantom 464. Physicists who have a responsibility for obtaining or maintaining ACR accreditation for one or more CT scanners will appreciate the time savings provided by the new software.

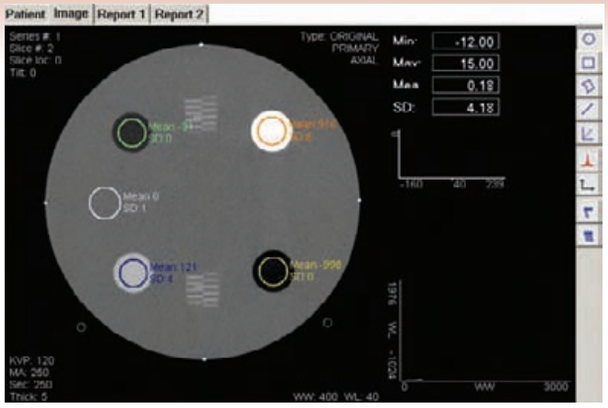
The 464-ACTS software will help medical physicists to significantly reduce their time spent analyzing the results of the scan, while providing excellent Region of Interest (ROI) positioning precision. All results are available in report form, enabling the physicist to simplify and speed up the quality control process.

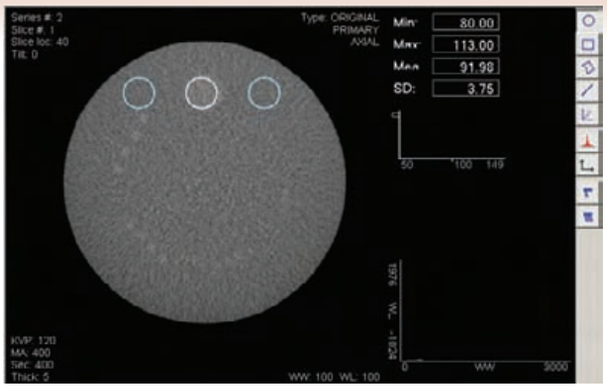
Image Analysis is provided for the following:

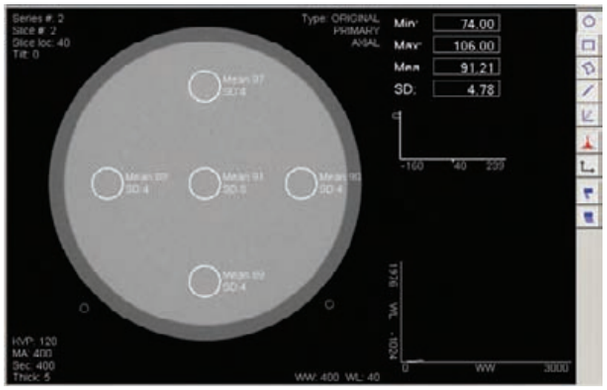
- Slice Thickness
- Measured CT numbers:
  - Polyethylene
  - Bone mimicking material
  - Water mimicking material
  - Acrylic
  - Air
- Low Contrast Resolution
- CT number uniformity and accuracy
- Distance accuracy
- High contrast resolution

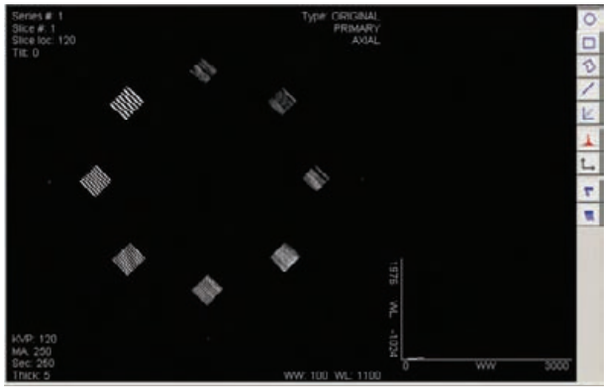
GAMMEX 464-ACTS

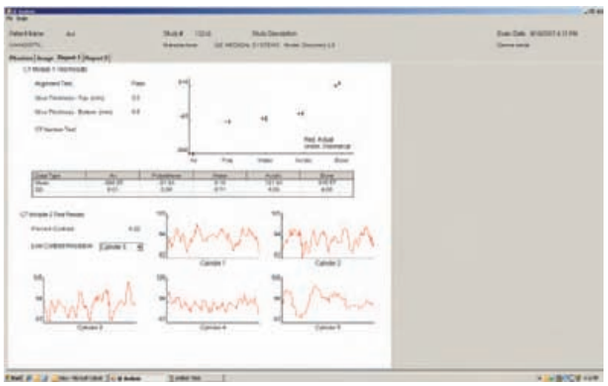
DIAGNOSTIC RADIOLOGY











SPECIFICATIONS

MINIMUM HARDWARE REQUIREMENTS
Microsoft Windows XP Operating System
Clean Install
Service Pack 2
Intel Pentium-based 1 GHz microprocessor
1 GB free hard drive space
1 GB RAM
CD-ROM Drive
32 bit Color
1280x1024 screen resolution

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Neonatal Chest Phantom

GAMMEX 610

The NEW Gammex 610 Neonatal Chest Phantom is designed for routine quality assurance monitoring of computed and digital radiography systems. Because the phantom replicates both the anatomic structure and the tissue attenuation characteristics of a real neonate, the phantom can be imaged using clinical protocols resulting in a test of the entire imaging chain, including image processing parameters.

The Gammex 610 is the first anthropomorphic neonatal phantom that sufficiently represents a 1-2 kg neonate in its transmission characteristics, histogram, physical size and structure. As such, it can be imaged using the appropriate clinical parameters to provide a measure of image consistency over time. The phantom also contains clinically relevant image quality challenges for resolution and noise in the form of a lung with simulated pneumothorax with pleural thickening, and a lung with simulated hyaline membrane disease.

The Gammex 610 Neonatal Chest Phantom answers a recognized need by both international and national standards groups such as IPEM and AAPM for a comprehensive quality assurance program for computed and digital radiography addressing the two major concerns of *patient exposure* and *image quality*.

Patient exposure is a concern because computed and digital radiographic equipment will scale the over exposed images to the proper optical density. The result, often referred to as “Dose Creep” is especially relevant in pediatric imaging where some patients are radiographed several times per day.

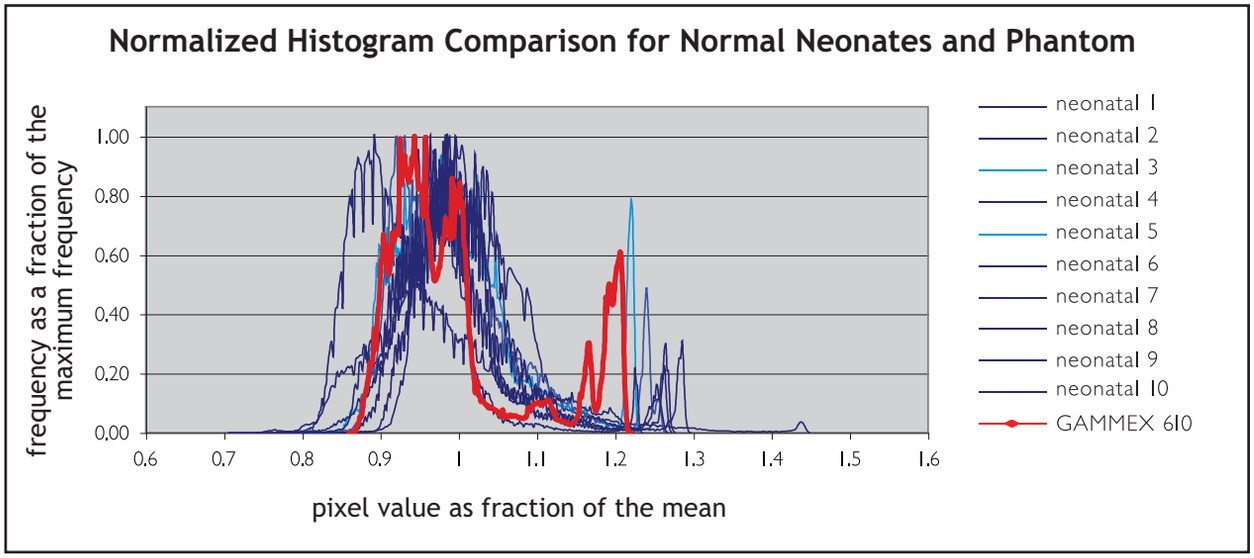
continued .....

610 PHANTOM

DIAGNOSTIC RADIOLOGY

continued from front...

Evaluation of *image quality* is complicated by the way in which computed and digital radiographic systems use a-priori knowledge of anatomy being radiographed to process and display the image. Image quality can be degraded through improper parameter selection. The effect of parameter selection on image quality can only be assessed by using a phantom that replicates the human anatomy. The Gammex 610 phantom is specially suited as a tool for establishing the lowest possible exposure level that still maintains diagnostic image quality.



SPECIFICATIONS

Size. . . . . Approx. 100x100x54 mm
Weight. . . . . Approx. 500 grams
Composition . . . . (Tissue Equivalent Materials);
Air, Muscle, Normal Lung,
Hyaline Membrane Lung, Bone

Lungs Included

#1 - Hyaline Membrane Disease: Pneumothorax
#2 - Hyaline Membrane Disease
Texture: No Pneumothorax
#3 - Normal Texture: Pneumothorax
#4 - Normal Texture: No Pneumothorax

Gammex 610 Phantom comes with a custom carrying case.

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Radiographic Survey Phantom

GAMMEX 170NJ

The Gammex 170NJ phantom provides a simple and reproducible test tool for inter-facility surveys and intra-department comparison of radiographic systems. For routine quality control, the phantom images provide a rapid assessment of high contrast resolution, low contrast detectability, radiographic exposure consistency as well as radiation light-field alignment and collimation accuracy. The phantom is designed for use in three ranges of clinical settings: extremity (no copper plates) in the range of 60 kVp, abdomen or lumbar spine (with 2.4 mm Cu plate) in the range of 75 kVp, and chest (with 2.0 mm Cu plate) in the range of 120 kVp.

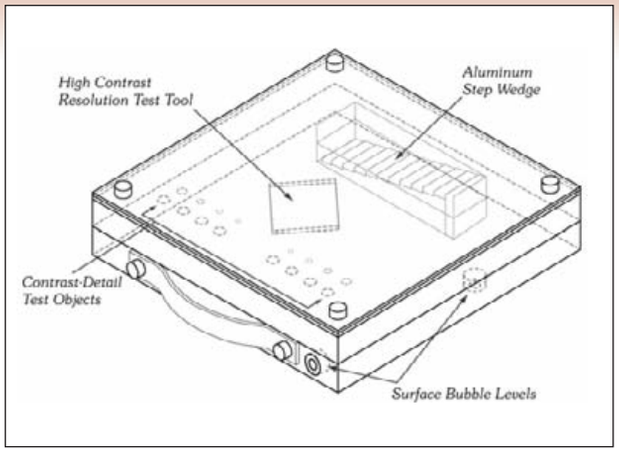
Specified for use by health physicists performing routine inspection, the Gammex 170NJ is designed with features to optimize portability and ease of use. Each phantom is equipped with a carrying strap, tripod mounting assembly and built-in levels for quick set up, and orientation in the variety of clinical settings encountered by inspection teams and consultants.

continued .....

GAMMEX 170NJ

DIAGNOSTIC RADIOLOGY

continued from front...



SPECIFICATIONS

Phantom Base Material

(2) . . . . . acrylic blocks 3.9x3.9x.78 cm (10x10x2 in) assembled
(1) . . . . . 2.0 mm Cu plate, 3.9x3.9 cm (10x10 in)
(1) . . . . . 2.4 mm Cu plate, 3.9x3.9 cm (10x10 in)

Imbedded Test Objects

Gammex 117 Aluminum step wedge
11 steps; Dimensions: 5.5x1.5x1.37 in,
step depth 0.5 in, step height 0.125 in

High contrast resolution test tool
20 line pairs from 0.6 lp/mm to 10 lp/mm

Contrast-detail test objects
Eight holes of 0.375 in diameter with decreasing depths of: 0.006, 0.009, 0.013, 0.018, 0.025, 0.035, 0.049, 0.068 in
Tolerance ±0.0020 in
Two sets of four holes of 0.068 in depth with decreasing diameters of: 0.2, 0.15, 0.1, 0.08 in
Tolerance ±0.0020 in

Alignment and Orientation Markers
Four corner markers for light field alignment
Top edge lead reference line for film orientation
Point alignment marker, 0.08 in diameter, 0.75 in deep
Top and front surface bubble levels
Ergonomic Features
Carrying strap
Thread for tripod mounting
Thumb screw fasteners for attaching copper attenuation plates.

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Radiographic Contrast/Detail Phantom

GAMMEX 1151

Determine the threshold contrast characteristics and monitor performance of a radiographic or fluoroscopic system and monitor performance on a routine basis with the Gammex 1151 Contrast/Detail Phantom.

The Gammex 1151 is an aluminum plate with a 10x10 matrix of holes. All of the holes in a given row have a constant depth. All of the holes in a given column have a constant diameter. A ten-point contrast-detail curve is constructed by observing the shallowest depth hole that can be seen for each hole diameter.

SPECIFICATIONS

Construction . . . . 6061 Aluminum
Hole Depth . . . . . 0.13 to 2.29 mm
Hole Diameter. . . 0.58 to 7.93 mm
Size. . . . . 18x18x1.3 cm
Weight. . . . . 1.0 kg

GAMMEX 1151

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Head/Body CT Phantom

GAMMEX 461A

The Gammex 461A Head/Body CT Phantom provides a set of tools for evaluating CT image quality. The main modules are constructed of Solid Water®. This permits testing without the difficulties of filling phantoms with water. The set of standard inserts is sufficient for many users. The Gammex 461A comes complete with a custom carrying case.

Features Include:

- Head Module of a uniform disc of Solid Water® Material
- Ring of Bone mimicking material that mounts around the head module
- Body scanning module, body annulus is mounted on the head module.
- The head has 5 tapered cavities which accept tapered inserts and the body annulus ring has 4 cavities, providing a total of 9 test positions.

GAMMEX 461A

DIAGNOSTIC RADIOLOGY

SPECIFICATIONS

Phantom Construction Solid Water® Material

Inserts Included:

(9) . . . . . Uniform Solid Water® inserts for measurement of Noise, CT Number, and Uniformity
(1) . . . . . Edge/Contrast Scale Response
(1) . . . . . Spatial Resolution (1.50 to 0.4 mm at 100% contrast)
(1) . . . . . Low Contrast Detectability (0.6%)
(1 . . . . . Alignment Artifact (Aluminum Pin)
(4) . . . . . Alignment, Slice Thickness, Phantom Position
(2) . . . . . Slice Thickness and Sensitivity Profile 2:1 Slope (26.6° Slope)
(2) . . . . . Beam Hardening Artifact (Simulated Bone)
(6) . . . . . Linearity
Case Size . . . . . 70x41x22 cm (24x16x8 in)
Weight. . . . . 16.2 kg (35.7 lbs)

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kV Meter

GAMMEX 245

Accuracy and convenience in one small package. The very compact Gammex 245 simplifies the determination of actual kV for radiographic, fluoroscopic, and mammographic x-ray systems. This highly accurate meter can be used for a wide range of energies and will store up to ten readings. A remote LCD display makes fluoroscopic readings easy to obtain. The meter can also be connected to an oscilloscope to monitor waveforms.

Features of the Gammex 245:

- Radiographic, Fluoroscopic, and Mammographic noninvasive measurement modes
- Dual methods of kVp measurements available in a single radiographic or mammographic exposure: (1) the average of kV peaks, (2) effective kVp
- Use of patented Quadcell detector and autogain circuitry for unparalled accuracy in kVp measurements over a wide range of measurement conditions: orientation, positioning, angulation, and x-ray intensity have little effect on measurement results
- Measurements of kVp can be accurately performed over an x-ray intensity dynamic range of 5000:1 at any specific kV
- Internal correction factors for mammographic target/filter combinations
- Automatic resetting for each exposure
- Large LCD display
- Compact size that fits in your hand

GAMMEX 245

DIAGNOSTIC RADIOLOGY

SPECIFICATIONS

Kilovoltage
Displayed Range. . . . 22 kV - 200 kV

Calibrated Range
Radiographic . . . . . 50 - 140 kV
Mammographic . . . . 25 - 35 kV

Accuracy
Radiographic . . . . . ±2% or 1 kV
Mammographic . . . . ±(1 kV + 2%)

Reproducibility
Radiographic . . . . . ±0.5 kV
Mammographic . . . . ±0.3 kV
Resolution. . . . . 0.1 kV

Minimum Exposure Requirements
Radiographic . . . . . 25 mA, 60 kVp @ 60 cm (24 in)
Fluoroscopic . . . . . 3 mA, 80 kVp @ 45 cm (18 in)
Mammographic . . . . 80 mA, 24 kVp @ 64 cm (25 in)
Required Exposures . One
Remote LED Display . 1 m cable
Analog Output . . . . . BNC connector
Power . . . . . 9 V alkaline battery (included)
Size . . . . . 5x10x19 cm (2x4x7.5 in)
Weight . . . . . 0.55 kg (1.2 lbs)
Target/Filter
Combinations . . . . . Mo/Mo, Mo/Rh, Mo/Al, Mo/Pd, W/Al, Rh/Rh, Ro/Al

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Dual-Range mAs Meter

GAMMEX MA0396

The Digital mAs Meter is an accurate, low-cost instrument that allows service personnel and biomedical engineers to check and adjust the mA settings of x-ray generators. This easy-to-use device is calibrated directly in mAs, thereby avoiding the calculations required with more complicated (and expensive) calibration equipment. The Dual-Range mAs Meter Gammex MA0396 is very sensitive – it can measure increments of 0.1 mAs. It has a low range of 0 to 199.9 mAs; and a high range of 0 to 1999 mAs.

This meter excels in calibrating the high-current, short-time station where a conventional mAs meter is precluded by tube ratings. This instrument can be used (after verification of generator timing accuracy) to set all mA stations and verify that photo-timing error does not exceed the limits of good practice.

To use, simply connect the cable to the x-ray generator and make the required exposure. The mAs reading appears instantaneously on the 4 digit LCD. A display indicator warns of the need for battery replacement. The small size and light weight make it convenient to carry around in a pocket or tool kit.
Note: This is an invasive test which requires connection to the generator circuit.

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SPECIFICATIONS

Range	0 to 199.9 mAs (“+” overrange indicator above 160 mAs) 0 to 1999 mAs (“+” overrange indicator above 1600 mAs)
Accuracy	± 2% of reading, ±0.2 mAs
Drift	Zero
Display	4 Digit LCD
Input	25 to 1000 mA
Operating Temperature	15 to 30° C (50 to 100° F)
Input Jack	Uses two banana jacks
Accessories Supplied	24 inches of cable with banana plugs on one end and insulated alligator clips on the other
Controls	Power (ON/OFF), Range (high-low), Reset
Power	Single 9 V Alkaline Battery (included)
Size	3.5x8.9x16.8 cm (1.4x3.5x6.6 in)
Weight	198 g (7 oz)

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Digital kV, Dose and Time Meter

GAMMEX 330

The Gammex 330 Digital kV, Dose and Time Meter is a test device for quality control and acceptance testing in radiographic, mammographic and fluoroscopic x-ray systems. The multipurpose design enables the user to measure kVp, dose and irradiation time.

The meter features built-in auto-start, auto-stop, auto-range and a display reading that automatically rotates by 180° depending on the orientation of the device to accommodate both radiographic or fluoroscopic applications.

Features of the Gammex 330:

- Measures kVp, dose and time non-invasively
- Includes display of the quantity PPV (practical peak voltage) according to IEC 61676
- Compact and light-weight
- Easy-to-read LC Display
- Can be used for both acceptance testing and routine quality control

GAMMEX 330

DIAGNOSTIC RADIOLOGY

SPECIFICATIONS

Tube voltage

Selectable calculations	PPV, max kVp, mean kVp
Measuring range	40 - 150 kV, 22 - 40 kV (MAM)
Dose	50 µGy – 50 Gy; 150 µGy – 150 Gy (MAM)
Time	0.3 ms – 999 s
Digital resolution	0.1 kV
Accuracy	±1 % or ±1.0 kV; ±0.7kV (MAM)
Interface	RS232 and analog kV waveform
Power Supply	4 NiMH batteries (AA)
Dimensions	45x95x155 mm (HWD) (1.75x3.75x6 in)
Weight	approx. 770 g (1.7 lbs) without batteries

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Pen Dosimeter

GAMMEX DR1897

The Gammex DR1897 Pen Dosimeter is a low-energy, direct-reading radiation-measuring device made with special low-density walls that permit the penetration and detection of diagnostic x-ray energies. The pen size instrument contains an electrometer and an ionization chamber.

To read the integrated exposure, the user looks through the dosimeter eyepiece while pointing the unit toward any external light source. The exposure is determined by the position of a hairline fiber against a graduated scale. A Dosimeter Charger is used to re-zero the dosimeter and can also be used to read the integrated exposure.

SPECIFICATIONS

Energy Response

Radiation Detected	Gamma, x-ray from 20 keV to 2 MeV
Ranges	0 to 200 mR
Energy Response	160 keV to 2 MeV: ±10%; 40 keV to 160 keV: +20%, -10%: 20 keV to 40 keV: +20%, -30%
Accuracy	Within ±10% of true exposure
Rate Response	Dose rate independent for gamma and x-ray
Electrical Leakage	Less than 0.5% of full scale for 24 hours at 50°C
Relative Humidity	Up to 90%
Detector	Fiber electrometer mounted in an electrically conducting plastic ion chamber

Material

Detector Housing	Very low permeability plastics; hermetically sealed
Clip	Glass fiber-filled, high-strength plastic

Dimensions

Size	1.5x12.4 cm (ØxL) (0.6x4.5 in)
Weight	0.03 kg (0.06 lb)

GAMMEX DR1897

DIAGNOSTIC RADIOLOGY

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Dosimeter Charger

GAMMEX DR 0427

The Gammex DR 0427 is a transistorized unit with a power supply that "zeros" all direct-reading dosimeters and can also be used to read the integrated exposure. One standard 1.5 V "D" cell battery permits thousands of operations. A safety spring in the charging socket prevents damage from excessive pressure on the dosimeter. A protective cap keeps the socket free of dust and moisture when not in use.

SPECIFICATIONS

Voltage Supplied . 180 to 240 V
Power . . . . . 1.5 V "D" Battery
Size. . . . . 7.6x10x10 cm (HxDxW) (3x4x4 in)
Weight. . . . . 0.45 kg (1 lb)

GAMMEX DR 0427

DIAGNOSTIC RADIOLOGY

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Radiographic/ Fluoroscopic Kit

GAMMEX 184D

The Gammex Rad/Fluoro Kit contains the necessary test instruments for doing routine quality control tests of radiographic, fluoroscopic and tomographic x-ray units. Each test tool within the kit is designed to evaluate one of the many important imaging parameters within the x-ray system.

Instructions for all the tools are bound in a hard cover binder for easy location and availability. The instructions are “cookbook” easy so that personnel will find the procedures easy to perform and understand. The user will be able to immediately begin recording data on the sample quality control forms that are included with the instructions.

All products included in this kit are explained in detail throughout this catalog.

GAMMEX 184D

DIAGNOSTIC RADIOLOGY

SPECIFICATIONS

The Gammex 184D Kit includes:

Gammex 330	Digital kVp Meter
Gammex 112B	Focal Spot Test Tool
Gammex 115A	Half Value Layer Attenuator Set
Gammex 117	Radiographic Aluminum Stepwedge
Gammex 132	Tomographic Test Tool
Gammex 141	High Contrast Resolution Test Tool
Gammex 143D	Film/Screen Contact Test Tool
Gammex 144	Grid Alignment Test Tool
Gammex 151	Low Contrast Resolution Test Tool
Gammex 161B	Collimator Test Tool
Gammex 162A	Beam Alignment Test Tool
Gammex 587	*"Quality Management for Radiographic Imaging"*
Gammex 781A	Quality Assurance Handbook
Gammex 090	Tape Measure
Gammex 080B	Foam Lined Hard Carrying Case

Size. . . . . 20.3x61x41.9 cm (8x24x16.5 in)
Weight. . . . . Approx. 25 kg (55 lbs)

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Processor QC Kit

GAMMEX 185D

Quality assurance in radiology begins with the film processor. The processor is the single most influential source of problems in the diagnostic imaging department. To test all the parameters of the processor, Gammex provides the Gammex 185D Processor Quality Control Kit.

Included in this kit are a Portable Blue/Green Sensitometer, Portable Densitometer, Digital Thermometer, Fixer Retention Test kit and the text book “Film Processing in Medical Imaging”. With these tools, daily processor quality control can be completed and early detection of possible problems can be caught before they lead to poor quality films or expensive repairs.

SPECIFICATIONS

The Gammex 185D includes:

Gammex MA0025	Densitometer
Gammex MA5034	Sensitometer
Gammex TM-99A	Digital Thermometer
Gammex 081A	Foam Lined Hard Carrying Case
Gammex 583	Book - “Film Processing in Medical Imaging”
Gammex 166B	Fixer Retention Test Kit

Size. . . . . 44.5x18.4x35.6 cm (17.5x7.25x14 in)
Weight. . . . . Approx. 7 kg (15.5 lbs)

Optional Gammex 185D(HV) Kit contains a Portable Densitometer with 200 VAC charger.

GAMMEX 185D

DIAGNOSTIC RADIOLOGY

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Universal Test Stand

GAMMEX 175

The Gammex 175 Universal Test Stand can be used to perform a variety of quality control tests for mammographic and radiographic x-ray systems. The height of the tower is easy to adjust and the cassette holder accommodates a variety of film cassette sizes.

Ideal for measuring focal spot size with a slit camera or star resolution pattern, the Universal Test Stand also includes a number of inserts used to define magnification and simplify alignment of the x-ray system. Half Value Layer measurements can also be performed using the Gammex 175.

The Universal Test Stand consists of the following:

- Base
- Telescoping Platform
- Shim Tool
- Slit Camera Mounting Insert
- Gunsight Alignment Tool Insert
- Magnification Insert
- Half Value Layer Top Plate
- 8.75x8.75 cm Intensifying Screen
- 15.25x30.5 cm lead vinyl/rubber face shield
- Carrying Case

GAMMEX 175

DIAGNOSTIC RADIOLOGY

SPECIFICATIONS

Dimensions . . . . . 26.7x22.2 cm at base
(10.5x8.75 in)
11.1x11.1 cm at top (4.4x4.4 in)
Height . . . . . adjustable from 36.2 cm to 66.0 cm
(14.3 to 20 in)
Weight. . . . . 4.2 kg (9.3 lbs)

Options
12X Comparator w/case
50X Pocket Microscope w/scale
Star Test Patterns

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MAMMOGRAPHY
RADIATION ONCOLOGY

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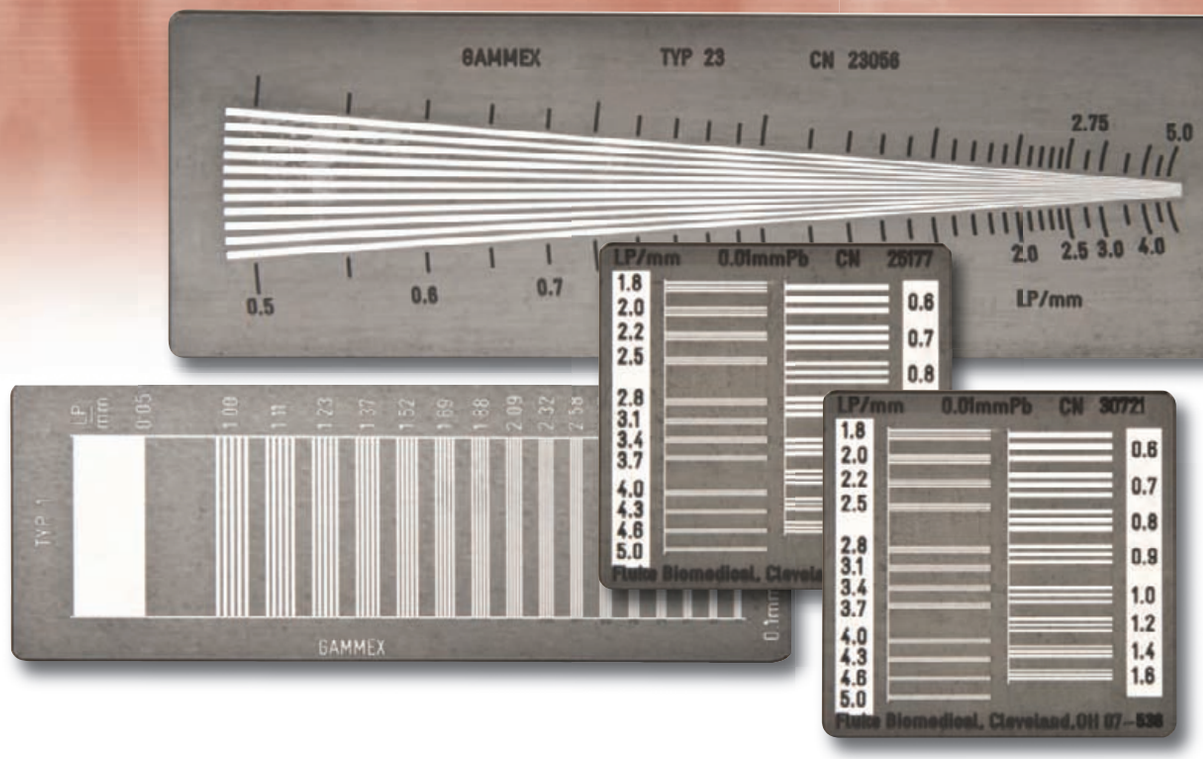


Precision Test Patterns

GAMMEX MA0436, GAMMEX MA0437, GAMMEX MA0438, GAMMEX MA0439, GAMMEX MA0647 *(not shown)*

Precision test patterns provide an easy means of measuring the resolution and modulation transfer function of x-ray systems. They are compatible with all x-ray machines and are widely used by radiology equipment manufacturers.

Resolution in lp/mm of a mammographic system is an objective means of monitoring image quality. The Mammographic Gold Line Pair Resolution Test Pattern Gammex MA0647 from Gammex provides 5 to 20 lp/mm resolution in 17 segments. The pattern is constructed of a gold-nickel alloy. This construction provides high contrast resolution patterns in the mammographic energy range. The wafer is equivalent to 25 microns of lead or 2.6 mm of aluminum at 20 KeV. Overall size is 10 mm by 25 mm.

The resolution patterns all have specific applications. Group test patterns have varying numbers of line pair groups, with radiopaque numbers to indicate the resolution (in lp/mm) of each group.

Resolution Patterns

	A	B	C	D
MA0436	0.5 to 5.0	16	0.10	110x40
MA0437	0.5 to 5.0	1	0.10	157x50
MA0438	0.6 to 5.0	20	0.01	50x50
MA0439	0.6 to 5.0	20	0.10	50x50
MA0647	5.0 to 20	17	*	10x25

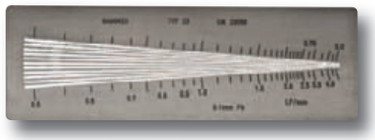
A = Range of Resolution in lp/mm
B = Number of Groups or Sectors
C = Lead Foil Thickness in m
D = Dimensions in mm
* = Gold nickel alloy equivalent to 25 microns of lead

GAMMEX MA0647, MA0436, MA0437, MA0438, MA0439

DIAGNOSTIC RADIOLOGY

SPECIFICATIONS

Gammex MA0436
0.5 to 5.0 lp/mm
Sixteen Groups
Size. . . . . 110x40 mm (4.3x1.6 in)
Weight. . . . . 9 g (0.3 oz)



Gammex MA0437
0.5 to 5.0 lp/mm
One Sector
Size. . . . . 157x50 mm (6.2x1.9 in)
Weight. . . . . 9 g (0.3 oz)

Gammex MA0438 and Gammex MA0439
0.6 to 5.0 lp/mm
Twenty Groups
Size: . . . . . 50x50 mm (1.9x1.9 in)
Weight: . . . . . 9 g (0.3 oz)

Gammex MA0647 (not shown)
5 to 20 lp/mm
Seventeen Segments
Size: . . . . . 10x25 mm (4x10 in)
Weight: . . . . . 3 g (1 oz)

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Half Value Layer Attenuator Set

GAMMEX 115A

Determining the Half Value Layer (HVL) of the x-ray beam is the standard method

for specifying the quality of the x-ray beam. For a given kVp, a measurement of the HVL gives information on the total filtration in the x-ray beam. Too little filtration results in unnecessary radiation to the patient and too high of a HVL may require increased kVp and mAs, increasing tube loading and reducing tube life.

Gammex 115A Half Value Layer Attenuator Set contains nine sheets of 1100 Aluminum Alloy ranging in thicknesses from 0.1 to 2.0 mm. For your convenience these sheets come in a plastic storage case to help maintain flatness and for ease of storage and transportation.

SPECIFICATIONS

Construction . . . . 1100 Aluminum Alloy (99.0% Pure)
Size. . . . . 10x10 cm (4x4 in)
Weight. . . . . 0.2 kg (0.4 lbs)
Nine Individual Aluminum Sheets
Thickness
(1) . . . . . 2.0 mm
(2) . . . . . 1.0 mm
(2) . . . . . 0.5 mm
(1) . . . . . 0.2 mm
(3) . . . . . 0.1 mm

GAMMEX 115A

DIAGNOSTIC RADIOLOGY

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Half Value Layer Attenuator Set

GAMMEX 115H

Ultra high purity aluminum has proven to provide more accurate measures

of half value layer in mammography than aluminum alloys. While the aluminum supplied in the 115A is appropriate for testing non-mammographic systems, it is insufficiently pure for accurate testing of mammographic systems.

The Gammex 115H Half Value Layer Attenuator Set provides the needed substrate purity for accurate MQSA HVL compliance. The set consists of six 10x10x0.1 mm sheets of 99.99% pure aluminum, and includes a plastic storage case to protect and help maintain flatness of the filters.

SPECIFICATIONS

Construction . . . . 99.99% Pure Aluminum
Size. . . . . 10x10 cm (4x4 in)
Weight. . . . . 0.09 kg (0.2 lbs)

Six Individual Aluminum Sheets
Thickness . . . . . 0.1 mm

GAMMEX 115H

DIAGNOSTIC RADIOLOGY

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Pure Copper Half Value Layer Attenuator Set

GAMMEX 116

Regulatory test protocols for fluoroscopic systems increasingly specify copper attenuators to simulate heavier patients. When doing these tests, it is often useful to apply additional copper to drive the systems to maximum output. Copper filters are still used for specifying the Half Value Layer (HVL) of x-ray beams generated between 140 and 400 kVp.

The Gammex 116 Pure Copper Half Value Layer Attenuator Set is comprised of nine sheets, 10x10 cm in thicknesses ranging from 0.1 mm to 2.0 mm.
A plastic storage case is provided to protect and to help maintain flatness of the filters.

SPECIFICATIONS

Construction . . . . Pure copper
Size. . . . . 10x10 cm (4x4 in)
Weight. . . . . 0.55 kg (1.1 lbs)

Nine Individual Copper Sheets
Thickness
(1) . . . . . 2.0 mm
(2) . . . . . 1.0 mm
(1) . . . . . 0.5 mm
(1) . . . . . 0.25 mm
(4) . . . . . 0.1 mm

GAMMEX 116

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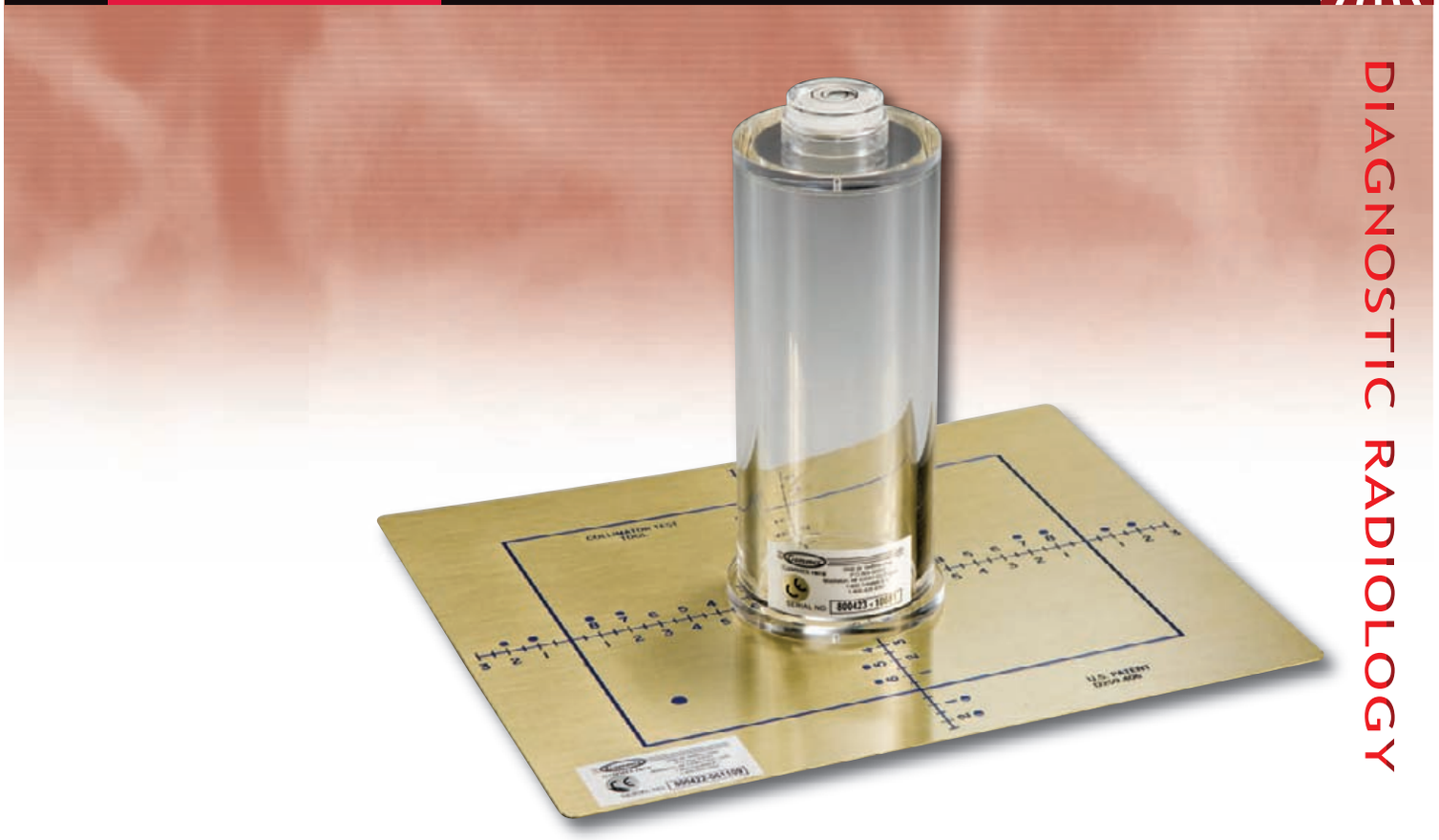

Collimator and Beam Alignment Test Tools

GAMMEX 161B AND GAMMEX 162A

Evaluate collimator light field and x-ray field congruence plus ensure accurate x-ray beam alignment. The Gammex 161B Collimator Test Tool is designed to evaluate the collimator light field and x-ray field congruence according to the Center of Devices and Radiological Health (CDRH) specifications. The Gammex 161B is constructed of brass so that centimeter etchings on its surface can give a direct ruled dimension on the radiograph with a normal x-ray exposure. The collimator test tool is calibrated to show misalignments to within 0.5 cm.

The Gammex 162A Beam Alignment Test Tool provides a simple test of the x-ray beams alignment. When used with the Collimator Test Tool, x-ray beam misalignments of 1% and 2% can be visualized without the need for measuring or calculating. The test instrument is constructed of a plastic cylinder 16 cm (6.3 in) high with two steel balls, one at each end. The steel balls are located directly above one another so that, when level and everything is in alignment, they will be superimposed on the radiograph. A bubble level is included so that accurate tests can be performed with ease.

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GAMMEX 161B AND GAMMEX 162A

DIAGNOSTIC RADIOLOGY

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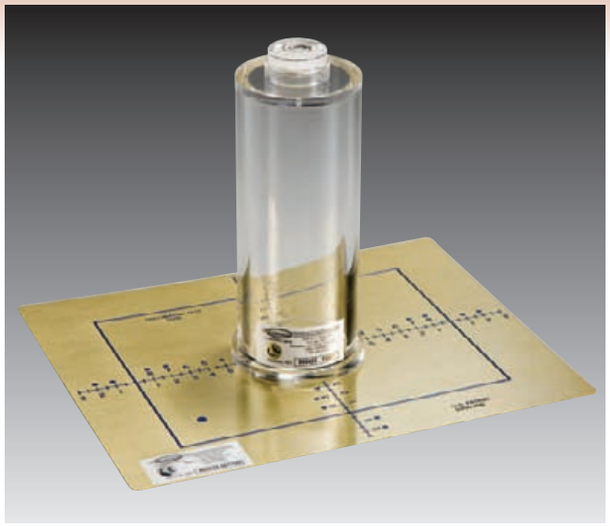

SPECIFICATIONS

Gammex 161B Collimator Test Tool
Construction . . . . Etched Brass
Dimensions . . . . . 20x25 cm (8x10 in)
Weight. . . . . 200 g (6.2 oz)

Gammex 162A Beam Alignment Test Tool
Construction . . . . Acrylic Cylinder
Dimensions
Height . . . . . 16 cm (6.3 in)
Diameter . . . . . 7 cm (2.8 in)
Weight. . . . . 260 g (9.2 oz)

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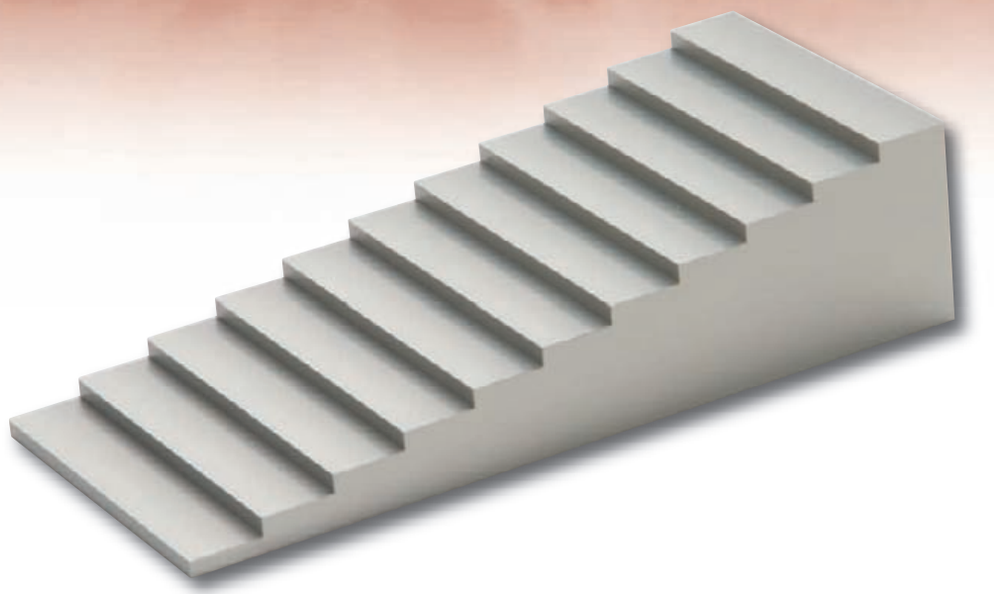

Radiographic Aluminum Stepwedge

GAMMEX 117

The aluminum stepwedge is the standard tool for evaluating the dynamic range

(latitude) of a digital or film-screen imaging system. This wedge provides 11 steps in 3.2 mm increments. The number of distinguishable steps represents the dynamic range of the system. Images may be evaluated visually or by using a densitometer.

The Gammex 117 Stepwedge provides a useful means of comparing the characteristic curve of various film/screen combinations, mAs reciprocity, and if done very carefully, sensitometry.

Note: To increase accuracy when evaluating film-screen systems, a sensitometric pattern should be placed on the film immediately before processing

SPECIFICATIONS

Construction	6061 Aluminum Alloy
Steps	Eleven (11) steps, 3.2 mm high and 12.7 mm deep
Dimensions	14x6 cm (5.5x2.4 in)
Weight	450 g

GAMMEX 117

DIAGNOSTIC RADIOLOGY

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Grid Alignment Test Tool

GAMMEX 144

Improves alignment of the radiographic grid and central ray of the x-ray tube

and provides increased image contrast, improved shading in image density, and can reduce unnecessarily increased patient dosage. Problems can occur when the x-ray tube's alignment indicators (light/detents) are misadjusted. Additional problems occur if the x-ray tube is tilted or the grid is installed upside down.

The Gammex 144 Grid Alignment Test Tool is designed to test proper grid alignment with respect to the central ray of the x-ray tube. Regular quality control testing can help detect misalignments before they present a patient safety issue.

SPECIFICATIONS

Construction
Three Lead Blockers with Precise Hole Locations

Size. . . . . 9x23.5 cm (3.5x9 in)
One large, Two small
Weight. . . . . 0.7 kg (1.5 lbs)

GAMMEX 144

DIAGNOSTIC RADIOLOGY

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High Contrast Resolution Test Tools

GAMMEX 141 AND 141H

An important measure of your fluoroscopy system is its high contrast resolution. This test is used to assess the resolving power of your system and can be done easily with the Gammex 141 and 141H High Contrast Resolution Test Tools. Both the 141 and 141H consist of eight patterns of copper wire mesh in a pie shape. Each is labeled with lead numbers for easy visualization.

The difference between the 141 and the 141H is the mesh. The 141 is used for standard radiographic systems with resolutions between 16 and 60 mesh. The 141H is designed and recommended for systems with high resolution such as those used in cardiology suites, where resolution is between 60 and 150 mesh.

SPECIFICATIONS

Gammex 141
Geometric Progression . . 2 1/3
Construction . . . . . White Plastic (outside)
Eight Wire Mesh
Patterns (inside) . . . . . 16 to 60 mesh
Dimensions . . . . . 18x18x1 cm (7x7x0.4 in)
Weight . . . . . 113 g (4 oz)

Gammex 141H
Geometric Progression . . 2 1/3
Construction . . . . . White Plastic (outside)
Eight Wire Mesh
Patterns (inside) . . . . . 60 to 150 mesh
Dimensions . . . . . 18x18x1 cm (7x7x0.4 in)
Weight . . . . . 113 g (4 oz)

GAMMEX 141 AND 141H

DIAGNOSTIC RADIOLOGY

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Fluoroscopic Dose Rate and Low Contrast Resolution Test Tool Kit

GAMMEX 151

Comply with regulatory requirements for QA testing of fluoroscopic output and low contrast response with the Gammex 151 Low Contrast Resolution Test Tool Kit provides the test tools needed to comply with these requirements.

Low contrast performance in fluoroscopic units is crucial in making the right diagnosis in patients. Gammex has supplied the 151 Low contrast Resolution Test Tool to assure that your fluoroscopic system is working at maximum efficiency. Besides its elegant design, what sets the Gammex 151 apart from others is its ability to measure the automatic brightness stabilizer, maximum entrance exposure rate at the table top, and the phototimer performance of the spot film device.

Because of its ease of use and flexible design, our Low Contrast Resolution Test Tool can achieve accurate low contrast readings within the 2% range. By using the Gammex 151 in conjunction with our High Contrast Resolution Test Tool (Model 141 and 141H) you can insure that your fluoroscopic system is working at

continued .....

GAMMEX 151

DIAGNOSTIC RADIOLOGY

continued from front...

optimal efficiency and effectiveness. The components of the Gammex 151 Kit can also be used to test aspects of the performance of digital and analog spot-film devices, radiographic automatic exposure control functions, as well as digital angiography and digital cine-angiography.

SPECIFICATIONS

Construction	Two Aluminum Blocks, (1) Lead Blocker, (1) Aluminum Resolution Plate
Dimensions	18x18x4.5 cm (7x7x1.8 in)
Weight	4 kg (8.8 lbs)

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Tomographic Test Tool

GAMMEX 132

The Gammex 132 Tomographic Test Tool is designed to test the imaging capabilities of the tomographic x-ray system. Used in conjunction with other Gammex test instruments for measuring radiation output (i.e., kV meters, dosimeters, timers) a complete test of the tomographic x-ray system can be performed.

Features of the Gammex 132:

- Determine the location of the cut plane
- Determine the thickness of the cut
- Test the overall resolution in the cut plane
- Test the x-ray exposure uniformity
- Determine the path of the beam during exposure, for both linear and multi-directional units

SPECIFICATIONS

Construction
Six 9 cm Acrylic Discs

(1) . . . . . Resolution Disc
(1) . . . . . Position/Thickness Disc
(1) . . . . . Uniformity/Beam Path Disc
(3) . . . . . Acrylic Spacers 1, 2 and 4 cm

Size. . . . . 10x9 cm diameter
(4x3.5 in diameter)
Weight. . . . . 0.9 kg (2 lbs)

GAMMEX 132

DIAGNOSTIC RADIOLOGY

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Film/Screen Contact Test Tools

GAMMEX 142D AND GAMMEX 143D

Good film-screen contact across the entire area of the screen is needed for quality diagnosis. Routine testing of all of the cassettes in the department detects areas of poor film-screen contact as part of the QA process before blurred areas interfere with patient care. Such testing is often a regulatory requirement.

The Gammex 142D and 143D film-screen contact tools can test cassettes of any size up to 14x17 inches. The 142D is wire mesh, and the 143D is perforated brass. Both are enclosed in a protective cover.

SPECIFICATIONS

142D

Construction . . . . Wire Mesh Screen (3 lines/cm) enclosed in plastic
Size. . . . . 37x44.5 cm (14.5x17.5 in)
Weight. . . . . 2.2 kg (4.9 lbs)

143D

Construction . . . . Perforated Brass with 2.4 mm (3/32 in) holes spaced 4 mm (5/32 in) center to center
Size. . . . . 37x44.5 cm (14.5x17.5 in)
Weight. . . . . 2.8 kg (6.2 lbs)

NOTE: The Gammex 143D is the International Electrical Commission (IEC) and British standard film screen test tool.

GAMMEX 142D AND GAMMEX 143D

DIAGNOSTIC RADIOLOGY

ULTRASOUND

MAMMOGRAPHY

RADIATION ONCOLOGY

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Focal Spot Test Tool

GAMMEX 112B

The focal spot size of an X-ray tube is a key factor in determining system resolution. The smaller the focal spot size, the sharper the image at high geometric magnification.

The Gammex 112B Focal Spot Test Tool consists of six groups of bar patterns with spacing decreasing in 16% steps from 0.84 lp/mm (line pairs per millimeter) to 5.66 lp/mm. The test pattern is mounted on the top of a 16 cm acrylic cylinder.

The test tool works by forming a magnified image of the precision bar pattern. The cylinder provides accurate and reproducible target-to-image receptor spacing. The visually observed limiting resolution can be simply converted into an effective focal spot size. This process is simpler than the use of an IEC slit camera and can be easier to interpret than a star pattern.

SPECIFICATIONS

Construction	Six inch acrylic cylinder with a 12 group bar pattern target mounted on top
Resolution	0.84 to 5.66 lp/mm
Size	16.5x7.6 cm diameter (6.5x3 in diameter)
Weight	329 g (11.6 oz)

GAMMEX 112B

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Star Test Patterns

GAMMEX MA0021, MA0431, MA0054 *(not shown)*

The Gammex MA0021, MA0431 and MA0054 Star Test Patterns can provide the needed tools to help determine focal spot size by observing the regions of blurring which occur when the pattern is radiographed by an x-ray source of finite dimensions. Radiation from different areas of the focal spot will cause a periodic blurring of the pattern due to the penumbra effects. Knowledge of the geometric factors and the distance from the center of the pattern to the region where blurring occurs will permit the calculation of the focal spot size.

SPECIFICATIONS

A = Angle of Single Line within a Sector
B = Number and Size of Patterned Sectors
C = Focal Spot Size Measured

	A	B	C
MA0021	0.5°	4-15°	0.1-0.3 mm
MA0431	0.5°	1-360°	0.1-0.3 mm
MA0054	0.5°	4-45°	0.1-0.3 mm

Lead Foil Thickness in Millimeters: 0.05
Diameter in Millimeters: 55

GAMMEX MA0021, MA0431, MA0054

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Digital Thermometer

GAMMEX TM-99A

Minor shifts in developer temperature can have a detrimental effect on the film contrast and density. In order to achieve and maintain appropriate film speed, film contrast and film fog levels, the developer temperature must be monitored on a regular basis. To maintain this temperature a high quality, accurate thermometer must be used, such as the Gammex TM-99A.

This thermometer, with its fast acting probe, degrees Celsius or Fahrenheit and low battery indication is the perfect choice for all processor quality control procedures.

SPECIFICATIONS

Range	-40 to 150° C (-40 to 302° F)
Accuracy	±0.2° F from -40 to 100° F; ±2% from 100 to 300° F
Power	9 V Alkaline Battery (included)
Size	3x7.5x18 cm (1.2x3x7 in)
Weight	255 g (9 oz)

GAMMEX TM-99A

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Fixer Retention Test Kit

GAMMEX 166B

Residual fixer on processed films over time can turn films brown. This browning deteriorates the image, making the films useless for comparison. To monitor the amount of residual fixer, Gammex provides the Fixer Retention Test Kit Gammex 166B. The kit contains residual hypo test solution and a hypo estimator test strip. A drop of solution is placed on the emulsion side of a freshly processed film. After waiting two minutes, the area where the solution has dried is compared to the hypo estimator. Residual hypo in the film should be 0.02 grams per square meter.

SPECIFICATIONS

Residual Hypo Test Solution	2 fluid ounces
Hypo Estimator Test Strip	Four stain densities
Size	3x11x5.5 cm (1.25x4.5x2 in)
Weight	184 g (2.8 oz)

GAMMEX 166

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Portable Densitometer

GAMMEX MA0025

Designed to meet today's demanding needs, the Gammex MA0025 Densitometer is portable, light weight, reliable and highly accurate. The Gammex MA0025 delivers impressive performance characteristics; a 0-4.0 optical density measuring range and an accuracy of ±0.02 optical density. These rigid standards plus its rugged construction make the Gammex MA0025 ideal for field and hospital use alike. In addition, it comes with its own carrying case, certified stepwedge, and low battery indicator. A battery eliminator to accommodate AC power is also included.

SPECIFICATIONS

Range	0 to 4.0 Optical Density
Accuracy	±0.02 Density
Reproducibility	±0.01 Density
Warm-up Time	None
Measuring Area	2 mm dia. and 1 mm dia.
Power Supply	Four rechargeable AA Nicad Batteries, 4.8 V total rated at 600 mAh (included)
Battery Charger	SE 30-45 (115 VAC) or SE 30-46 (230 VAC) 50 to 60 Hz
Charge Time	Approx. 14 hrs.
Size	5.08x7.46x17.8 cm (2x2.9x7 in)
Weight	0.7 kg (1.5 lbs)

Certified Stepwedge included

GAMMEX MA0025

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DIAGNOSTIC RADIOLOGY

Portable Blue/Green Sensitometer

GAMMEX MA5034

Sensitometry is the single most effective way to test the processor operation and consistency. For day to day processor quality control, the Gammex MA5034 Sensitometer provides a versatile, reliable, and highly accurate test. With its 21 step light modulator, a full range of densities can be tested with a single piece of film. The Gammex MA5034 is useful for all types of film, from sensitive x-ray film to roll or cine film. It can test either blue sensitive or green sensitive film. To expose the film simply close the cover and listen for the tone.

SPECIFICATIONS

Time Stability . . . ±0.02 Log Exposure per Year
Reproducibility . . ±0.04 Log Exposure
Power . . . . . 9 V Alkaline Battery (included)
Warm-up Time . . None
Blue Color Peak
Wavelength . . . . 460 nm ±10 nm
Green Color Peak
Wavelength . . . . 510 nm ±10 nm
Size. . . . . 3.8x7.6x17.8 cm (1.5x3x7 in)
Weight. . . . . 0.57 kg (1.25 lbs)

GAMMEX MA5034

DIAGNOSTIC RADIOLOGY

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LASER ALIGNMENT

DIAGNOSTIC RADIOLOGY

ULTRASOUND

Benefits of Gammex Tissue Mimicking Phantoms

QUALITY

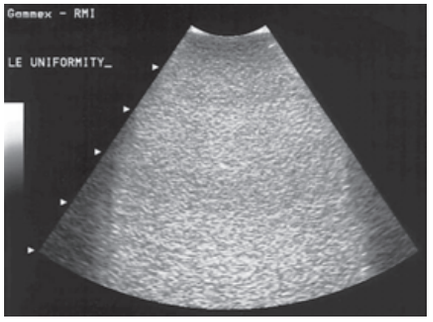
Gammex ultrasound phantoms are recognized as the standard for quality and performance in the ultrasound labs of hospitals, clinics and ultrasound equipment manufacturers. Sophisticated technology in Tissue Mimicking (TM) phantoms meets the requirements of all current quality assurance recommendations. Our phantoms offer convenient, easy to use features which provide an objective baseline needed to detect minor changes and monitor the overall performance of imaging equipment. You can use the same settings for phantom imaging as you would for patients in any clinical situation. Gammex prides itself on high quality products with reproducible results. Uniformity, accurate attenuation, echogenicity and speed of sound make our phantoms the best instrument for assuring the integrity of your ultrasound systems. Image quality indicators measure the system's performance characteristics that affect the diagnostic value of the ultrasound image.

DESIGN

The Gammex design for ultrasound phantoms is based on sound scientific principle. Targets in each phantom are spaced to meet specific sonographic requirements, and are developed using recommendations by the American Institute of Ultrasound in Medicine (AIUM), the National Council on Radiation Protection (NCRP), and the American Association of Physicists in Medicine (AAPM). These designs increase operator convenience and testing reliability while decreasing costs.

TISSUE MIMICKING GEL

The heart of a phantom is the tissue mimicking material. Our tissue mimicking material has the same attenuation, speed of sound, and nonlinear parameter (B/A) as human soft tissue, with uniform scatter distribution that yields a smoother background. Gammex tissue mimicking gels are fully compatible with the latest in tissue harmonics equipment and technology. The tissue-like attenuation and echogenicity of tissue mimicking phantoms allows the testing of ultrasound systems using actual clinical settings. TM phantoms provide attenuation consistent with soft tissue over a wide range of transducer frequencies and system configurations. These characteristics provide accurate ultrasound measurements for better image quality tests of all ultrasound scanning systems. Gammex phantoms also feature a composite film scanning surface that has improved transmission properties so more of the ultrasonic beam can be transmitted and received.



BENEFITS OF GAMMEX TISSUE MIMICKING PHANTOMS

ULTRASOUND

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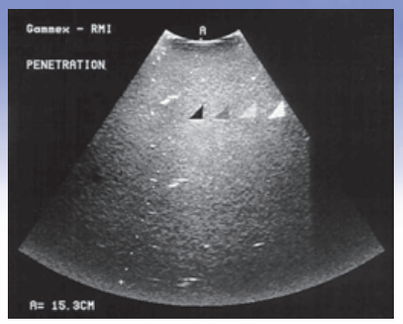
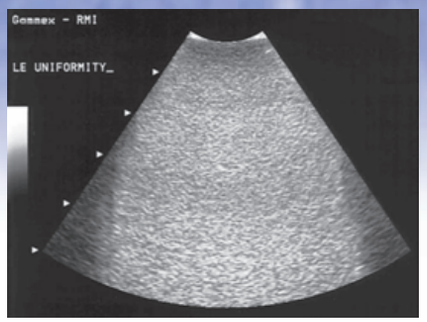
B-Mode Image Quality Indicators



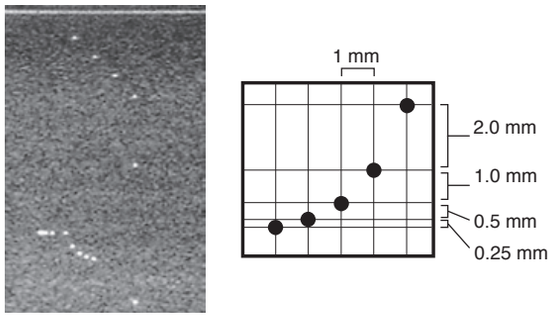


DEPTH OF PENETRATION

The point at which usable tissue information disappears or maximum depth of penetration is reached can be defined simply as how far one can "see" into the phantom. Equipment sensitivity and noise determines the deepest echo signal which can be detected and clearly displayed.

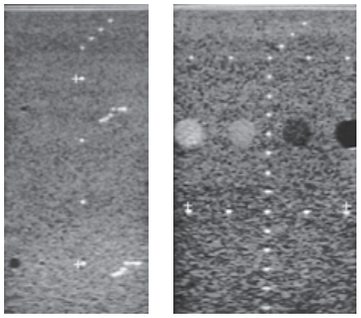
IMAGE UNIFORMITY

Ultrasound systems can produce various image artifacts and non-uniformities which in some cases mask variations in tissue texture. Common non-uniformities are horizontal bands in the image caused by inadequate handling of transitions between focal zones or vertical bands. This indicates inactive or damaged transducer elements.



AXIAL RESOLUTION

Axial resolution describes the scanner's ability to detect and clearly display closely spaced objects that lie on the beam's axis. Using pin targets of decreased vertical spacing, the system's axial resolution is determined by locating the two resolvable pins with the smallest separation.



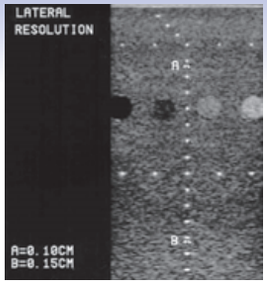
DISTANCE ACCURACY

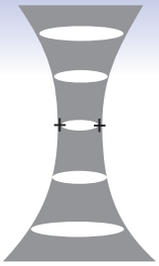
Vertical and horizontal distance measurement errors can easily go unnoticed on clinical images.Distance accuracy as a quality indicator is determined by comparing the measured distance between selected pin targets in the phantom with the known distance.

continued .....

B-MODE IMAGE QUALITY INDICATORS

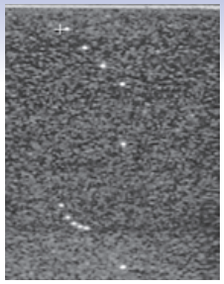
continued from front...

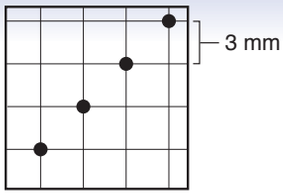




LATERAL RESOLUTION

Lateral resolution is the distinction of small adjacent structures perpendicular to the beam's major axis. The lateral resolution is measured indirectly by measuring the width of pin targets at depths corresponding to the transducer's near, mid, and far field ranges.

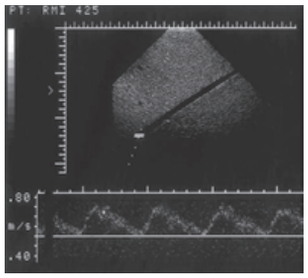




DEAD ZONE

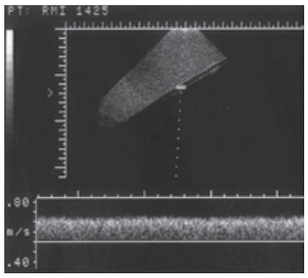
The dead or "ring down" zone is the portion of the image directly under the transducer where image detail is missing or distorted. The depth of an instrument's dead zone is determined by identifying the shallowest pin target that can be clearly visualized.

Doppler Ultrasound Quality Indicators Using a Doppler Flow System



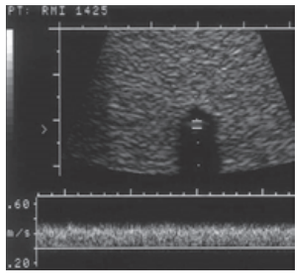
DEPTH OF PENETRATION

Using Doppler signals within a specified frequency range, the displayed image illustrates the weakest echo signal detectable above electronic noise. Again, an indication of how far you can "see" into patient tissue.



DIRECTIONAL DISCRIMINATION

By forming Doppler signals into two different electrical channels, 90° out of phase, flow away from or toward the transducer is determined. Inadequate discrimination between channels appears as bi-directional even though flow is in one direction.



REGISTRATION OF FLOW

Registration indicates the position accuracy of the sample volume cursor of a Doppler image. The strongest and highest velocity signal is expected at the center of the vessel. When the sample volume position is inaccurate on Doppler images, the strongest signal is off-center.

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Ultrasound Phantom Comparison

Phantom	Axial and Lateral Resolution Targets	Vertical Distance Calibration	Horizontal Distance Calibration	Anechoic Cysts	Depth of Penetration	Water Dam	Cylindrical Greyscale Targets	Triangular Greyscale Targets	Dead Zone Targets	Elevational Resolution Targets	Small Parts	Doppler Flow	Dual Attenuation	Notes
403 LE	●	●	●	●	●	●			●					Convertible Water Dam
403GS LE	●	●	●	●	●	●	●		●					Convertible Water Dam
404 LE	●	●	●	●	●	●			●		●			Convertible Water Dam
404GS LE	●	●	●	●	●	●	●		●		●			Convertible Water Dam
405GSX LE	●	●	●	●	●	●		●	●					Convertible Water Dam
406 LE	●	●	●	●	●	●							●	Convertible Water Dam
408 LE	●	●	●	●	●	●				●				Stationary Water Dam State-of-the-art Spherical Lesions
1425A LE	●	●	●	●	●	●						●		Stationary Water Dam Constant and Pulsatile Flow Modes
1430 LE	●	●	●	●	●	●	●		●		●	●		Stationary Water Dam Constant and Pulsatile Flow Modes

LE Tissue Mimicking Material - This gel is very uniform in appearance and has a nonlinear parameter (B/A) which matches human liver tissue almost exactly. LE Series phantoms are ideal for B-mode, Doppler and Tissue Harmonic Imaging systems.

Axial and Lateral Resolution Targets - Groups of nylon monofiliments for testing the axial and lateral resolution of ultrasound systems.

Vertical and Horizontal Distance Calibration - For checking the accuracy of the electronic calipers.

Anechoic Cysts - The three different diameters represent blood vessels in human tissue and are useful for basic imaging tests.

Water Dam - Enables water to be used as a coupling medium. Convertible water dams allow the user to move the dam out of the way in order to use gel as a coupling medium.

Greyscale Targets - These enable the user to determine how well their scanner can differentiate between different contrast densities. Choose from either the standard cylindrical targets or triangular targets. Cylindrical targets are ideal for basic scanning configurations, while the more challenging triangular targets are designed for testing high resolution scanners.

Doppler Flow - For testing ultrasound systems with Doppler capabilities. Flow choices include constant and pulsatile modes with calculated velocities.

Dead Zone Targets - These targets are used for measuring the depth of the scan head's "dead zone".

Composite Film Scanning Surface - A new material which prevents desiccation and has improved transmission characteristics.

ULTRASOUND PHANTOM COMPARISON

ULTRASOUND

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Dual Attenuation Phantom

GAMMEX 406 LE

The Gammex 406 LE Dual Attenuation Phantom gives you the benefit of having two phantoms in one with background attenuations of 0.5 and 0.7 dB/cm/MHz in a side-by-side configuration. Quality control tests over a wide range of frequencies can be performed quickly and easily, providing a comprehensive profile of the scanner's overall image quality – all with a single phantom.

The 406 LE phantom is a highly effective instrument for demonstrating superior image quality while challenging high performance ultrasound systems. The phantom incorporates our Tissue Mimicking gel which provides a smoother background texture, and a composite film scanning surface that has improved transmission properties so more of the ultrasonic beam can be transmitted and received.

With extended target depths to 16 cm, this phantom provides greater scanner and transducer performance tests of resolution, depth of penetration and electronic caliper measurements. Extra pin targets are ideal for testing high frequency transducers which are designed to image the first few centimeters of human tissue. Resolution patterns and all vertical and horizontal targets are constructed of 0.1 mm nylon fiber. Three sets of axial resolution targets at 3, 8 and 14 cm, and spaced at 2.0, 1.0, 0.5 and 0.25 mm, make this phantom extremely effective for demonstrating high resolution detail and challenge the ultrasound system's resolution

continued .....

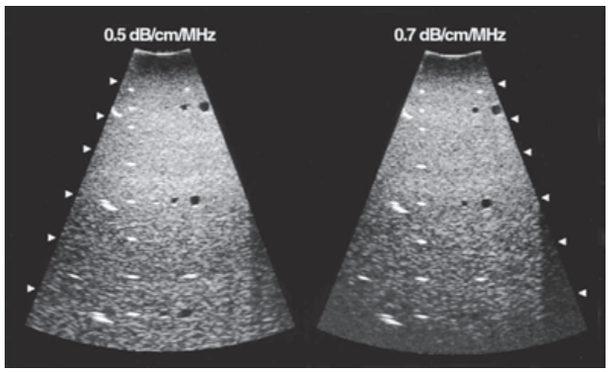
GAMMEX 406 LE

ULTRASOUND

continued from front...

capability. Scatter-free cylinders of 2, 4 and 6 mm diameter are embedded in the phantom representing blood vessels in human tissue

Optional accessories for the Gammex line of Ultrasound phantoms include Soft Foam-Lined Carrying Case, Rigid Case, or the Precision Ultrasound Transducer Guide.



This ultrasound image demonstrates the 0.5 (left) and the 0.7 (right) dB/cm/MHz attenuation phantoms contained in the Gammex 406 LE Dual Attenuation phantom.

SPECIFICATIONS

High Resolution Tissue Mimicking Gel
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.5 and 0.7 ±0.05 dB/cm/MHz

Targets
Anechoic Cysts
Diameters . . . . . 2, 4 and 6 mm
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.05 ±0.01 dB/cm/MHz

Pin Targets
Diameter of
nylon lines . . . . . 0.1 mm (0.004 in)
Vertical spacing. . 10 mm at 2 to 4 cm deep;
20 mm at 4 to 16 cm deep
Horizontal
spacing . . . . . 30 mm at 2 and 12 cm deep;
additional pins spaced at
20 mm in 2 cm set
Axial resolution . . 3, 3 and 14 cm

Construction
Scanning
surface . . . . . Composite Film
Walls . . . . . Extruded ABS
Dimensions . . . . . 23.2x8.25x18.5 cm
(9.25x3.25 7.25 in)
Weight. . . . . 2.8 kg (6 lbs 5 oz)
All acoustic measurements at 4.5 MHz, 22°C

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Spherical Lesion Phantom

GAMMEX 408 LE

Ultrasound imagine quality in three dimensions: Axial, lateral and elevational.

The Spherical Lesion Phantom Gammex 408 LE provides a unique way of testing resolution performance of ultrasound scanners. The Spherical Lesion Phantom contains 2 mm and 4 mm diameter tissue mimicking spherical lesions which lie in a single plane at the center of the phantom. Axial, lateral and elevational resolution are accounted for simultaneously and equally for all types of ultrasound systems and configurations. In the 2 mm section, there are 105 anechoic spheres at 0.5 cm depth intervals and in the 4 mm section there are 211 anechoic spheres at 0.75 cm depth intervals.

The Spherical Lesion Phantom Gammex 408 LE incorporates our Tissue Mimicking (TM) gel which provides a smoother background texture than conventional tissue mimmicking gels. The Gammex gel allows production of lesions with negligible echogenicity while producing no distal enhancement or shadowing inherent with other gel forms. The TM gel is also optimized for use with tissue harmonics imaging technology.

In addition, the Gammex 408 LE has a new composite film scanning surface that has improved transmission properties so more of the ultrasonic beam can be transmitted and received.

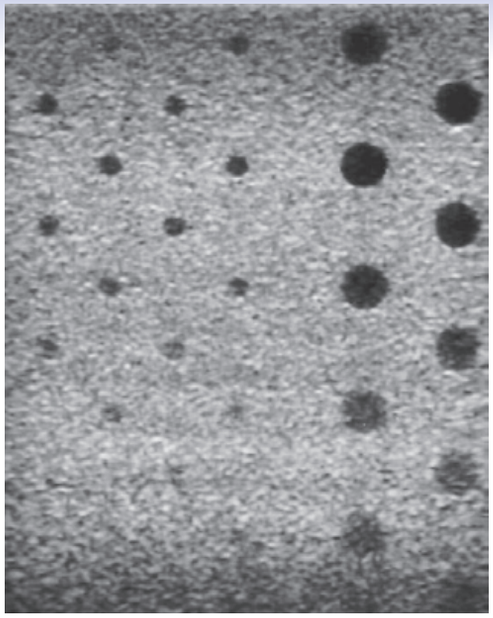
Optional accessories for the Gammex line of Ultrasound phantoms include Soft Foam-Lined Carrying Case, Rigid Case, or the Precision Ultrasound Transducer Guide.

continued .....

GAMMEX 408 LE

ULTRASOUND

continued from front...



This ultrasound image demonstrates the anechoic spheres contained in the Spherical Lesion Phantom Gammex 408 LE. Note the well defined 2 mm and 4 mm targets.

SPECIFICATIONS

High Resolution Tissue Mimicking Gel
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Anechoic Spherical Lesions
Size. . . . . 4 mm in a plane 0.5 to 16 cm
2 mm in a plane 0.5 to 10.5 cm
Contrast. . . . . -30 dB relative to background

Construction
Scanning
surface . . . . . Composite Film
Walls. . . . . Extruded ABS
Dimensions. . . . . 23.2x8.25x18.5 cm
(9.25x3.25x7.25 in)
Weight. . . . . 2.8 kg (6 lbs 5 oz)
All acoustic measurements at 4.5 MHz, 22°C

MAMMOGRAPHY

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Precision Resolution Grey Scale Phantom

GAMMEX 405GSX LE

Advanced tissue mimicking gel and grey scale targets are designed for the exacting standards of todays high-resolution ultrasound systems. The Precision Resolution Grey Scale Phantom 405GSX LE incorporates our new Tissue Mimicking (TM) gel which provides a smoother background texture than conventional tissue mimicking gels.

Gammex TM gels are fully compatible with the latest in tissue harmonics equipment and technology. The phantom can be scanned using normal control settings and ensures that the performance measured closely approximates the scanner's performance in a clinical examination. In addition, the phantom has a new composite film scanning surface that has improved transmission properties so more of the ultrasound beam can be transmitted and received.

The 405GSX LE contains all of the quality indicators for performing evaluations of axial resolution, lateral resolution, dead zone cyst imaging, vertical and horizontal distance accuracy and image uniformity. The Precision Resolution Grey Scale Phantom also contains triangular grey scale targets which test the resolution of today's high-performance ultrasound scanners. Unique to the 405GSX LE are two horizontal cross fibers located in the middle of the phantom. These fibers help the user align the transducer and can be used as a reference "marker" to ensure that QA tests are consistently performed on the same scan slice.

continued .....

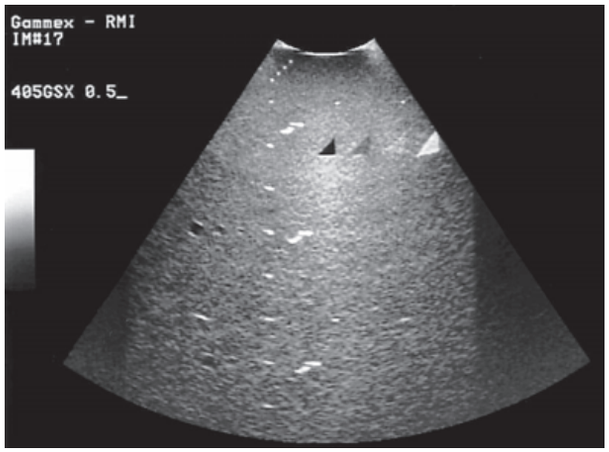
GAMMEX 405GSX LE

ULTRASOUND

continued from front...

When both fibers are illuminated, the user can be certain the transducer is exactly perpendicular to the scanning surface.

Optional accessories for the Gammex line of Ultrasound phantoms include Soft Foam-Lined Carrying Case, Rigid Case, or the Precision Ultrasound Transducer Guide.



This ultrasound image demonstrates a scan of the Precision Resolution Grey Scale Phantom 405GSX LE. Note the triangular grey scale targets specifically designed to test high-resolution scanners

SPECIFICATIONS

Targets Configuration
Anechoic Cysts
Diameters . . . . . 2, 4 and 6 mm
Placement . . . . . 3, 8 and 14 cm deep
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Grey Scale Targets
Dimensions . . . . . 9.5x9.5x10.9 mm
Placement . . . . . 4 cm deep
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation
coefficient . . . . . same as background
Contrast. . . . . low scatter, -6dB, +6dB;
high scatter relative to background

Pin Targets
Diameter . . . . . 0.1 mm (0.004 in)
Vertical spacing. . 20 mm at 2-16 cm deep
Horizontal
spacing . . . . . 30 mm at 2 and 12 cm deep
Construction
Scanning
surface . . . . . Composite Film
Walls. . . . . Extruded ABS
Dimensions. . . . . 23.2x8.25x18.5 cm
(9.25x3.25x7.25 in)
Weight. . . . . 2.8 kg (6 lbs 5 oz)
All acoustic measurements at 4.5 MHz, 22°C

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Precision Small Parts Grey Scale Phantoms

GAMMEX 404GS LE AND 404 LE

The Precision Small Parts Grey Scale Phantom 404GS LE provides advanced technology for measuring image quality of small parts and intra-cavity ultrasound scanning systems. With added grey scale targets this small parts phantom also measures contrast, temporal resolution and system linearity. *The 404 LE has the same general target layout and specifications as the 404GS LE but does not include grey scale targets.*

This phantom incorporates our new Tissue Mimicking (TM) gel which provides a smoother background texture and a new composite film scanning surface that has improved transmission properties so more of the ultrasonic beam can be transmitted and received.

Unique to the Gammex 404GS LE are closely spaced pin targets ideal for testing a range of high frequency transducers. Resolution patterns and all vertical and horizontal targets are made of 0.1 mm nylon fibers for better detail definition and spatial resolution.

Three grey scale targets of -6 dB, +6 dB and high scatter relative to the background material are included in the 404GS LE.

continued .....

GAMMEX 404GS LE AND 404 LE

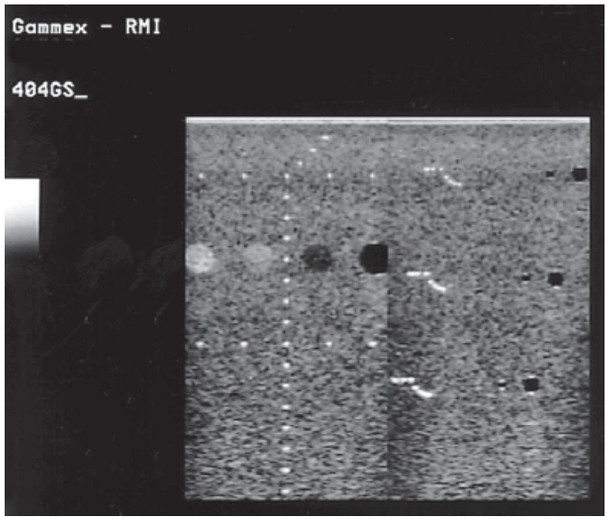
ULTRASOUND

continued from front...

The Gammex 404GS LE provides the sonographer with the following features:

- Axial and lateral resolution targets at 1, 3.5 and 6 cm for precise resolution measurements
- Low scatter cysts of 1, 2, 4 and 7 mm diameters to evaluate system noise and distortion
- 7 mm grey scale targets of -6 dB, +6 dB and high scatter relative to background material
- Attenuation coefficients of 0.5 or 0.7 dB/cm/MHz
- Convertible water dam for gel or water coupled scanning
- Integral cover to protect scanning surface
- Durable ergonomic design for handling ease

Optional accessories for the Gammex line of Ultrasound phantoms include Soft Foam-Lined Carrying Case, Rigid Case, or the Precision Ultrasound Transducer Guide.



This ultrasound image demonstrates a linear scan of the Precision Small Parts Grey Scale Phantom 404GS LE in split screen mode.

SPECIFICATIONS

High Resolution Tissue Mimicking Gel
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Targets
Anechoic Cysts
Diameters . . . . . 1, 2, 4 and 7 mm
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.05 ±0.01 dB/cm/MHz

Grey Scale Targets
Contrast. . . . . -6, +6 and +12 dB relative to background
Diameter . . . . . 7 mm
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Pin Targets
Diameter of nylon lines . . . . . 0.1 mm (0.004 in)
Vertical spacing. . 5 mm at 1 to 9 cm deep
Horizontal spacing . . . . . 10 mm at 1 and 5 cm deep

Construction
Scanning surface . . . . . Composite Film
Walls. . . . . Extruded ABS
Dimensions. . . . . 15.2x8.25x18.5 cm (6x3.25x7.25 in)
Weight. . . . . 1.8 kg (4 lbs)
All acoustic measurements at 4.5 MHz, 22°C

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Precision Multi-Purpose Phantoms

GAMMEX 403GS LE AND 403 LE

The Precision Multi-Purpose Grey Scale Phantom Gammex 403GS LE offers new advanced technology for measuring the image quality of high resolution ultrasound systems. Grey scale targets are provided for monitoring contrast and temporal resolution, distinguishing different intensities of brightness and border delineation capabilities of the ultrasound system. The Gammex 403 LE has the same general target layout and specifications as the 403GS LE but does not include grey scale targets.

The Gammex 403GS LE offers carefully placed targets to measure resolution, depth of penetration and electronic caliper distance accuracy. Axial resolution pin spacing patterns are small, offering better axial resolution tests. The resolution patterns as well as all vertical and horizontal targets are constructed of 0.1 mm nylon fibers for better detail definition and spatial resolution. Grey scale targets are set at -6 dB, +6 dB with high scatter relative to the background material and with attenuation properties equivalent to the Tissue Mimicking (TM) material. A 10 mm anechoic cyst is also provided to evaluate system noise and geometric distortion.

The 403GS LE and 403 LE phantoms incorporate our new Tissue Mimicking (TM) gel which provides a smoother background texture than conventional tissue mimicking gels. This gel reduces the backscatter that is inherent in other TM gels and is fully compatible with the latest in tissue harmonics equipment and

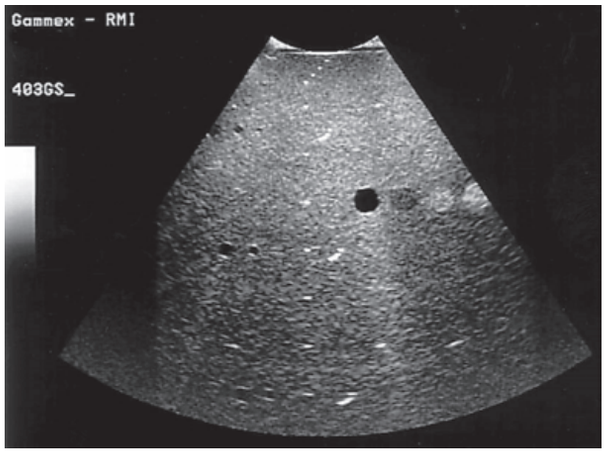
continued .....

GAMMEX 403GS LE AND 403 LE

ULTRASOUND

continued from front...

technology. The 403GS LE also has a composite film scanning surface that has improved transmission properties so more of the ultrasonic beam can be transmitted and received.



This ultrasound image demonstrates a sector scan of the Precision Multi-Purpose Grey Scale Phantom Gammex 403GS LE.

The Gammex 403GS LE features:

- Axial and lateral resolution targets at depths of 3, 8 and 14 cm for precise resolution measurements of any ultrasound system
- Anechoic cysts of 2, 4 and 6 mm diameter
- -6 dB, +6 dB and high scatter grey scale targets
- Convertible water dam for gel or water coupled scanning
- Integral cover to protect scanning surface
- Durable ergonomic design for ease of handling
- Available in 0.5 and 0.7 dB/cm/MHz attenuation

Optional accessories for the Gammex line of Ultrasound phantoms include Soft Foam-Lined Carrying Case, Rigid Case, or the Precision Ultrasound Transducer Guide.

SPECIFICATIONS

Tissue Mimicking Material
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Targets
Anechoic Cysts
Diameters . . . . . 2, 4, 6 and 10 mm
Speed of sound . . 1540 ±10 m/s at 22°C
Attenuation . . . . 0.05 ±0.01 dB/cm/MHz

Grey Scale Targets
Contrast. . . . . -6, +6 and +12dB relative to background
Diameter . . . . . 10 mm
Speed of sound . . 1540 ±10 m/s at 22°C same as background

Pin Targets
Diameter of nylon lines . . . . . 0.1 mm (0.004 in)
Vertical spacing. . 20 mm at 2 to 16 cm deep
Horizontal spacing . . . . . 30 mm at 2 and 12 cm deep
Axial resolution . . 3, 8 and 14 cm

Construction
Scanning surface . . . . . Composite Film
Walls. . . . . Extruded ABS
Dimensions . . . . . 23.2x8.25x18.5 cm (9.25x3.25x7.25 in)
Weight. . . . . 2.8 kg (6 lbs 2.5 oz)
All acoustic measurements at 4.5 MHz, 22°C

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Doppler Flow System

GAMMEX 1425A LE

The Gammex 1425A LE Doppler Flow System tests both Doppler and B-mode ultrasound systems using one uniquely designed unit. Gammex combines its low echo matrix with strategically placed line reflectors and anechoic cyst targets at 2, 4, and 6 mm depths. Two 5 mm vessels are incorporated into the system to meet with FDA Doppler sensitivity recommendations. One vessel is parallel to the scan plan at 2 cm, replicating a carotid artery. The other vessel descends 45 degrees from the surface to test Doppler sensitivity and to train different scanner techniques. All of this is combined with a flow controller with microprocessor that has a range of 1 to 12.5 ml/sec within 3% FS accuracy. You can access five programmable test programs and five preset pulse flow patterns with the easy-to-use display panel. This allows for accurate reproducible testing time after time.

By combining the flow system, phantom, and electronic flow controller into a self-contained dual purpose Doppler Flow System, the Gammex 1425A LE is an excellent instrument for performing a multitude of functions. Scanner selection, quality control testing, training, and research can all be performed using this multi-faceted ultrasound tool.

continued .....

GAMMEX 1425A LE

ULTRASOUND

continued from front...

All of the following quality indicators can be measured in real time:

- Maximum signal penetration
- Channel isolation or directional discrimination
- Registration accuracy of duplex sample gates and similarities between B-mode and color flow images
- Flow rate readout accuracy for various angles, beam directions and operating modes

The Gammex 1425A LE is not only one of the most versatile dual-purpose systems available, but it's completely portable as well. This makes our Doppler Flow System a must-have for your ultrasound quality control.

SPECIFICATIONS

Tissue Mimicking Material
Speed of sound . . 1540 ±10 m/s
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Targets
Cyst speed
of sound. . . . . 1540 ±10 m/s
Cyst attenuation. . 0.05 ±0.01 dB/cm/MHz
Diameter of
nylon lines . . . . . 0.1 mm (0.004 in)
Size tolerance. . . ±5%
Location
tolerance . . . . . ±0.1 mm (0.004 in)

Vessels
Size. . . . . 5 mm diameter
Location . . . . . 2 cm below surface;
2 to 16 cm at 40° angle

Blood Mimicking Fluid
Density . . . . . 1.03 g/cc
Speed of sound . . 1550 ±10 m/sec
Scatter size . . . . 4.7 micrometers average

Electronic Flow Control System
Constant
flow mode . . . . . 1 to 12.5 ml/sec ±3%
Calculated
velocities . . . . . 10-110 cm/sec
Pulsatile
flow mode . . . . . 5 programmed waveforms

Container Size. . . 40.6x24.8x40 cm
(16x9.75x15.75 in)
Weight. . . . . 10.4 kg (23 lbs)
All acoustic measurements at 4.5 MHz, 22°C

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Mini-Doppler Flow System

GAMMEX1430 LE

The 1430 LE is designed to provide a sonographer with advanced design features that allow for both Doppler and B-Mode ultrasound system tests in one unit. This product consists of the flow system, phantom, and electric flow controller meter.

The B-Mode Phantom component of the 1430 LE is based on our 404GS LE model that provides advanced technology for measuring image quality on small parts and intra-cavity ultrasound scanning systems. With added grey scale targets this small parts phantom also measures contrast, temporal resolution and system linearity. The phantom incorporates the Gammex Tissue Mimicking gel which provides a smoother background texture and composite film scanning surface that has improved transmission properties.

Unique to the 404GS LE phantom are the closely spaced pin targets. By spacing them closer together, our targets are ideal for testing a range of high frequency transducers. Resolution patterns and all vertical and horizontal pins are made of 0.1 mm nylon fibers for better detail definition and spatial resolution. Three grey scale targets of -6 dB, +6 dB and +12 dB relative to the background material are included. A series of anechoic cysts with diameters of 1, 2, 4 and 7 mm permit easy evaluation of system noise and distortion parameters.

continued .....

GAMMEX 1430 LE

ULTRASOUND

continued from front...

Two 4 mm vessels are incorporated into the system to meet with FDA Doppler sensitivity recommendations. One vessel is parallel to the scan plan at 2 cm, and the other vessel descends 35 degrees from the surface and is used for measuring Doppler sensitivity and for developing scanner techniques.

This self-contained system provides a broad range of available flow rates and test objects. The enhanced microprocessor-based flow controller meter produces accurate flow rates from 1 to 17 ml/sec corresponding to 0 to 174 cm/sec measurable velocities with a 1% full scale (FS) accuracy.

The 1430 LE provides a realistic test medium for assessing:

- Maximum signal penetration
- Channel isolation of directional discrimination
- Registration accuracy of duplex sample gates and similarities between B-Mode and color flow images.
- Flow rate readout accuracy

The Gammex 1430 LE is an all-in-one portable system powered by a built-in LI-ion rechargeable battery. The universal charger is included with the system.

SPECIFICATIONS

Tissue Mimicking Material
Speed of Sound . . 1540 ±10 m/s
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Grey Scale Targets
Contrast . . . . . -6, +6, and +12 dB relative to background
Diameter . . . . . 7 mm
Speed of Sound . . 1540 ±10 m/s
Attenuation . . . . 0.5 or 0.7 ±0.05 dB/cm/MHz

Anechoic Cysts
Diameters . . . . . 1, 2, 4, and 7 mm
Speed of Sound . . 1540 ±10 m/s
Attenuation . . . . 0.05 ±0.01 dB/cm/MHz

Blood Mimicking Fluid
Density . . . . . 1.03 g/cc
Speed of Sound . . 1550 ±10 m/sec
Scatter Size . . . . 4.7 micron average

Vessels
Size. . . . . 4 mm inside diameter
Location . . . . . horizontal 2 cm below surface; diagonal at 35 degrees from 1.5 cm below surface

Electronic Flow Control System
Measurable
Velocities . . . . . 0-174 cm/sec
Pulsatile
Flow Mode . . . . . preprogrammed for 0.25-2 seconds/pulse

Pin Targets
Diameter of
nylon lines . . . . . 0.1 mm (0.004 in)
Vertical Spacing. . 5 mm at 1 cm to 9 cm deep
Horizontal
Spacing . . . . . 10 mm at 1 cm and 5 cm deep

Container Construction
Size. . . . . 22.9x15.9x21.9 cm (9x6.25x8.625 in)
Weight. . . . . 4.4 kg (9.5 lbs)
AC input voltage . 110 VAC – 240 VAC, 50 – 60 Hz
Battery . . . . . LI-ion, rechargeable, universal charger and plugs included
All acoustic measurements at 4.5 MHz, 22° C

Gammex

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Precision Ultrasound Transducer Guide

GAMMEX 419 TG

The NEW Gammex 419 TG Precision Ultrasound Transducer Guide allows the sonographer to be able to place the ultrasound transducer on the Gammex LE phantoms in exactly the same position each time it is used. In this way, the resultant images may be compared to each other making the QA task much more accurate and meaningful.

The Gammex 419 TG Guide fits over the top of Gammex model 403, 404, 405, 406 and 408 phantoms and allows for easy positioning in order to achieve repeatable results every time.

The Gammex 419 TG provides following features:

- Works with Gammex 403GS LE, 403 LE, 404GS LE, 404 LE, 405GSX LE, 406 LE and 408 LE phantoms
- Universal – holds ultrasound transducers from any manufacturer
- Designed for use with water or water-based gels
- Positional scale markings enable precise positioning of transducer for measurement repeatability

SPECIFICATIONS

Dimensions . . . . . 20.3x12.7x7.6 cm (8x5x3 in)
Weight. . . . . Approx. 0.8 kg (1.7 lbs)

GAMMEX 419 TG

ULTRASOUND

MAMMOGRAPHY

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Foam Lined Hard Carrying Case

GAMMEX 082B

The Gammex 082B is a rigid plastic carrying case that is designed to carry and protect your ultrasound phantom. The durable rigid case is lined with foam on the inside for added protection. The case is lockable.

SPECIFICATIONS

Construction . . . . Rigid Plastic with foam insert
Size. . . . . 43x33x19 cm (17x13x7.5 in)

GAMMEX 082B

ULTRASOUND

MAMMOGRAPHY

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Soft Carrying Case with Strap

GAMMEX 083

The Gammex 083 Soft Carrying Case is designed to protect and transport your ultrasound phantom. The foam-lined case is lightweight and durable, with enough room for a bottle of scanning gel. The case has an adjustable shoulder strap and an outside pocket which is perfect for storing the user guide or other valuable documents.

SPECIFICATIONS

Construction	Black Cordura with front pocket and shoulder strap
Size	25x33x9 cm (10x13x3.5 in)

GAMMEX 083

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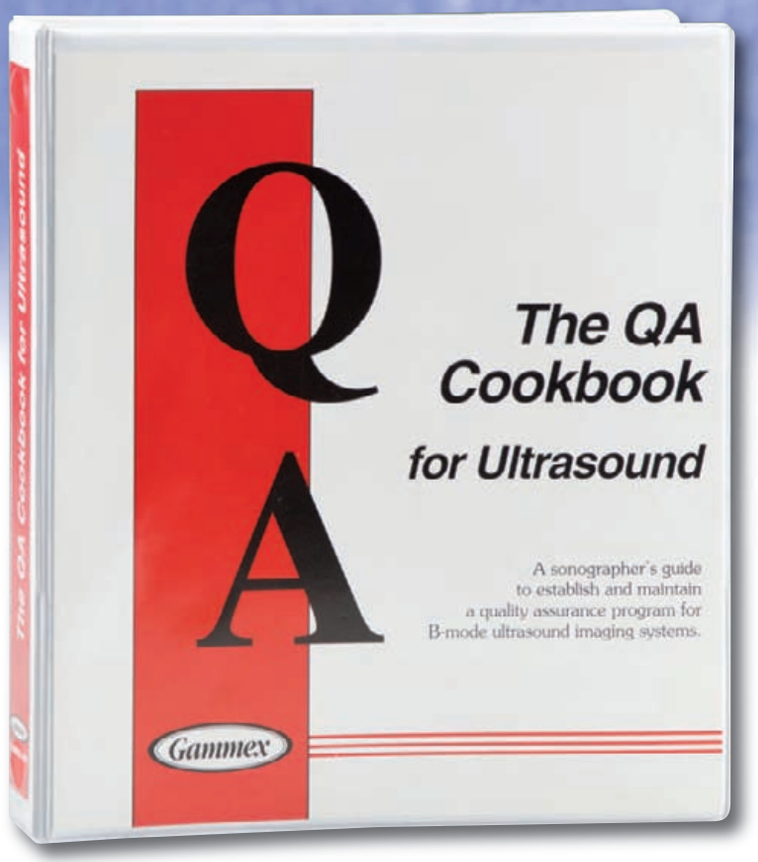

Quality Assurance Cookbook for Ultrasound

GAMMEX 585

The Gammex 585 Quality Assurance Cookbook for Ultrasound is a guide to establishing, maintaining and recording a quality assurance program for ultrasound scanners. The information contained in this cookbook will help sonographers perform and achieve a consistent level of image quality. The QA Cookbook is included with all Gammex Ultrasound phantoms (except Doppler), or may be purchased separately. It is available in either hardback binder, or CD-Rom.

SPECIFICATIONS

GAMMEX 585 Index:

- Basic Quality Concepts
- Establishing a Quality Assurance Program
- Image Quality Measurement Procedures
- Using the Image Quality Test Data Appendix

GAMMEX 585

ULTRASOUND

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LASER ALIGNMENT

DIAGNOSTIC RADIOLOGY

ULTRASOUND

MAMMOGRAPHY

Mammographic Accreditation Phantom

GAMMEX 156

The Gammex 156 Mammographic Accreditation Phantom has been the #1 phantom listed by the ACR since the start of the MQSA program in 1994. The Gammex 156 provides the physical standard baseline for assuring the quality of the images produced by your mammographic system.

The phantom simulates the x-ray attenuation of a 4.2 cm slab of compressed human breast composed of 50% adipose tissue and 50% glandular tissue. Target objects in the phantom are of known size, shape, and density. These represent the different structures or malignancies found when imaging the breast. Image quality and system sensitivity is evaluated using these targets and following ACR/MQSA guidelines. The 156 is also an excellent tool to help identify artifacts due to grids, filters, film-processing (for film-screen systems), as well as those produced by digital mammography systems.

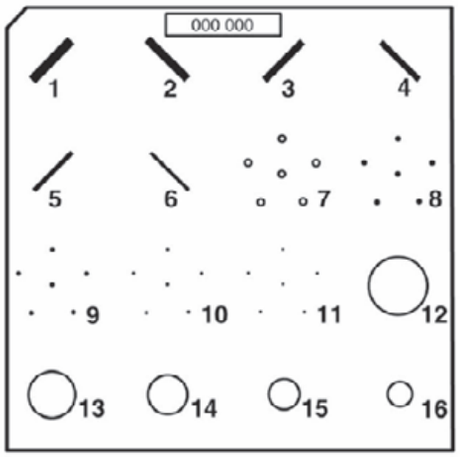
Routine use of the Gammex 156 Mammographic Accreditation Phantom helps detect many imaging changes that degrade image quality before they affect clinical results.

The phantom consists of a precision wax insert containing the test objects. The insert is protected by an external acrylic shell. The combination of these materials provides the simulation of a 4.2 cm thick 50%/50% breast. A reference contact radiograph of the insert is included. This provides information on the location

continued .....

continued from front...

and orientation of the test objects in the individual phantom. An acrylic test disk provides the test step needed to measure density differences.



Target layout of the Gammex 156

SPECIFICATIONS

Phantom Body

Material . . . . . Acrylic
Phantom
Dimensions . . . . . 4.5x10.2x10.8 cm (HWD)
(1.75x4x4.25 in)
Acrylic Base . . . . 3.3 cm (1.3 in) thick
Cover . . . . . 0.3 cm (0.12 in) thick
Acrylic Disk. . . . . 4 mm thick x 1 cm diameter

Test Objects . . . . Nylon fibrils (1.56, 1.12, 0.89, 0.75, 0.54 and 0.40 mm nylon fibers)
Simulated micro-
calcifications . . . (0.54, 0.40, 0.32, 0.24 and 0.16 mm specks)
Tumor-like
masses. . . . . (2.00, 1.00, 0.75, 0.50, 0.25 mm)

Included is a film, which is a contact image of the wax insert of your Gammex 156.

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Stereotactic Mammographic Accreditation Phantom

GAMMEX 156D

The Gammex 156D Stereotactic Mammographic Accreditation Phantom is used for monitoring digital mammography systems currently used for stereotactic biopsy and localization. The phantom is accredited by the ACR with the added benefit of Gammex Quality Standards achieved over our 30 years of serving the Mammography industry.

The phantom is 4.4 cm, and is made up of a 7 mm wax insert that contains 12 sets of test objects, with a 3.4 cm acrylic base and a 3 mm cover.

Together, this approximates a 4.2 cm compressed breast of 50% glandular and 50% adipose composition. The 5x5 cm wax insert contains simulated micro-calcifications in the form of aluminum oxide (Al2O3) specks, four different size nylon fibers to simulate fibrous structures, and four different size lens-shaped masses to simulate tumors.

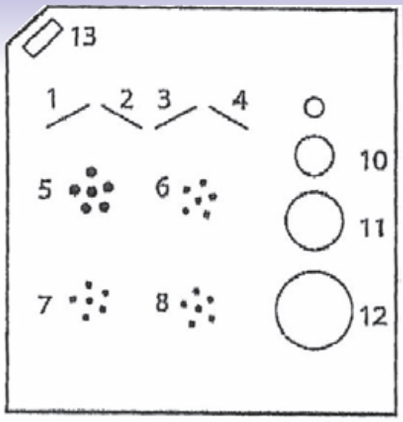
The Gammex 156D phantom will adequately challenge both the digital imaging and stereotactic systems capabilities.

continued ...

GAMMEX 156D

MAMMOGRAPHY

continued from front...



Target layout of the Gammex 156D

SPECIFICATIONS

Fibril Structure Objects
0.93 mm . . . . . nylon fiber
0.74 mm . . . . . nylon fiber
0.54 mm . . . . . nylon fiber
0.40 mm . . . . . nylon fiber

Micro-calcification Objects
0.54 mm . . . . . Al2O3 speck
0.32 mm . . . . . Al2O3 speck
0.24 mm . . . . . Al2O3 speck
0.20 mm . . . . . Al2O3 speck

Tumor-like Masses Objects
1.00 mm . . . . . (thickness) mass
0.75 mm . . . . . (thickness) mass
0.50 mm . . . . . (thickness) mass
0.25 mm . . . . . (thickness) mass

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Stereotactic Breast Biopsy Phantom

GAMMEX 164A

The phantom provides a good representation of breast tissue, thereby making it close to a real-life learning experience.

The automated stereotactic breast biopsy procedure depends on several variables for accurate needle placement. Use of the Gammex 164A provides technologists and physicians with the training needed to be confident in performing stereotactic procedures.

The phantom is made of a clear gel encased in a soft vinyl for easy compression and a skin-like resistance to needle insertion. Embedded in the gel are 20 to 25 radiopaque lesions ranging in size from 2 to 5 mm. The 3 and 5 mm gel lesions are used for practicing core biopsies and the 2 mm liquid lesions allow for the practice of fine needle aspiration and tests the accuracy of the biopsy system and the operator.

SPECIFICATIONS

Construction . . . . Gel with attenuation properties similar to breast tissue.
Outer casing . . . . Vinyl
Radiopaque
Lesions . . . . . 2 to 5 mm
Solid Gel for core biopsy
Liquid dye for fine needle aspiration
Compressible within biopsy instrument

GAMMEX 164A

MAMMOGRAPHY

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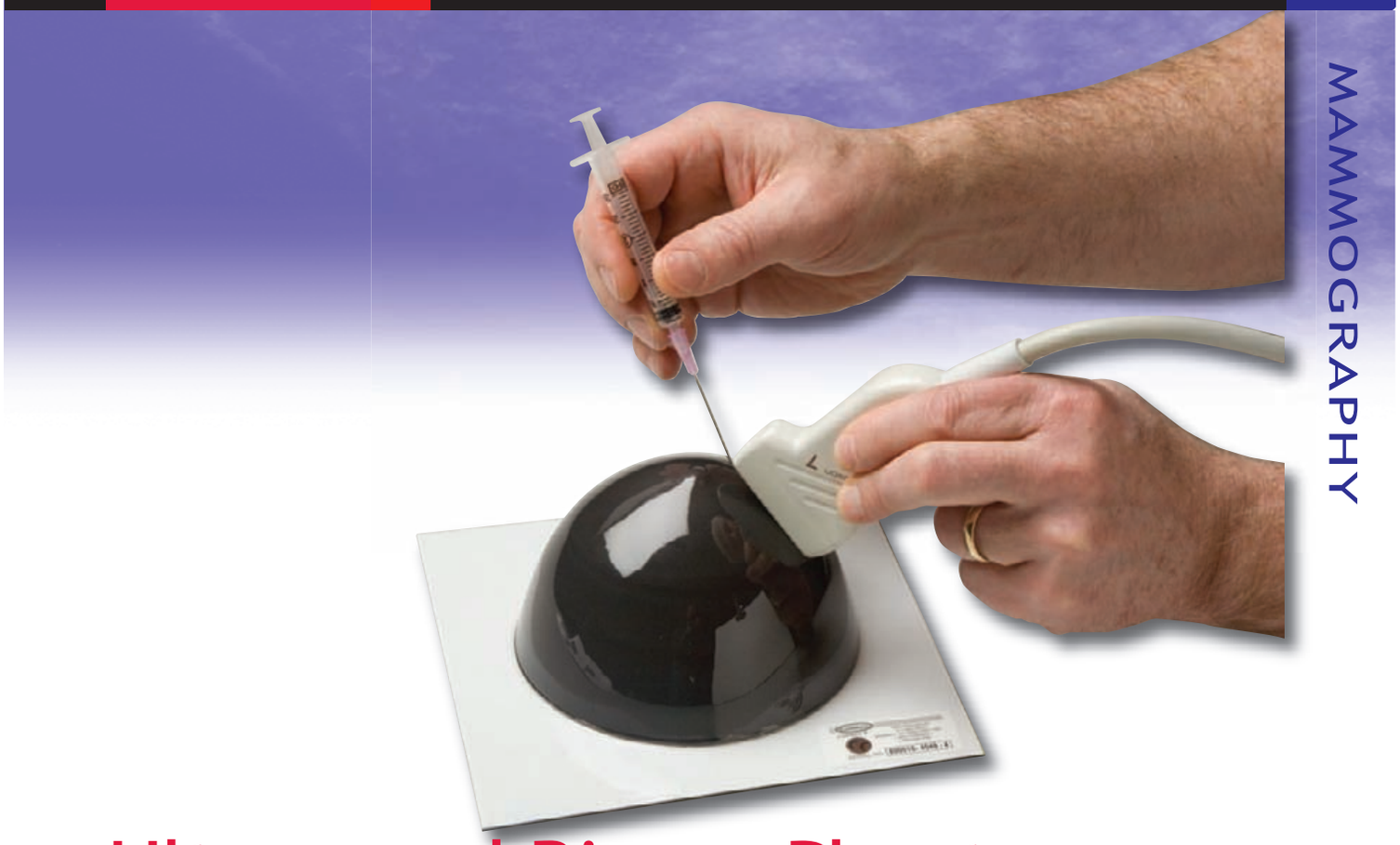

Ultrasound Biopsy Phantom

GAMMEX 429

The same eye and hand coordination skills required to perform ultrasound-guided biopsies of other organs can be learned using this phantom. The use of ultrasound-guided needle biopsy to diagnose the form and structure of lesions is growing worldwide. The Gammex 429 Ultrasound Biopsy Phantom simulates the look and feel of a human breast.

The ultrasonic appearance of the Gammex 429 is similar to soft tissue to allow the use of normal scanner control settings. Embedded in the phantom are 11 test objects on three different levels, allowing you to practice identification, aspiration and biopsy procedures on cysts, high-contrast and low-contrast lesions. There are three fluid-filled cysts, four high contrast lesions and four low contrast lesions. The material in the solid lesions are colored to differentiate them from the surrounding tissue. This provides the user with immediate feedback on the success of the core biopsy. With this variety and number of lesions, most users become proficient in ultrasound-guided biopsies in a single training session.

SPECIFICATIONS

Test Lesions
Water-filled Cysts
High Contrast Gel
Low Contrast Gel
Storage Temp. . . . 2 to 38° C (40 to 100° F)
Diameter . . . . . 12.7 cm (approx. 5 in)
Height . . . . . 7.62 cm (approx. 3 in)
Weight. . . . . 623.7 g (1 lb 6 oz)

GAMMEX 429

MAMMOGRAPHY

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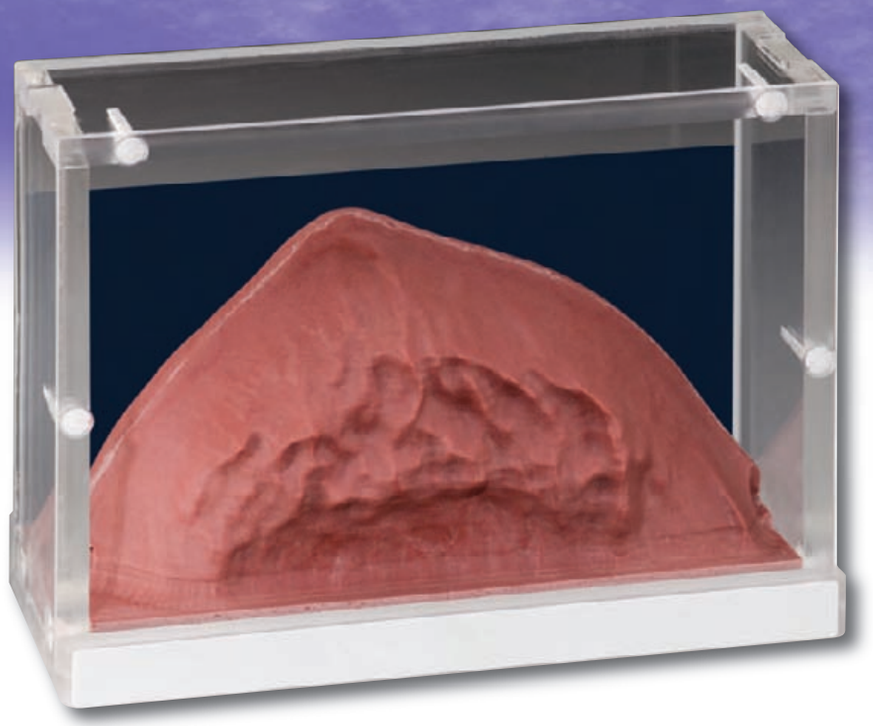

"Rachel" Anthropomorphic Breast Phantom

GAMMEX 169

The Gammex 169 "Rachel" Anthropomorphic Breast Phantom is a unique test instrument that produces an image with the contrast range and details found on a clinical mammogram. This phantom may be used for evaluation of effects of changing mammographic imaging parameters such as machines, machine settings, film/screen combinations, and digital image processing. The use of a simulated mammogram complements the usual test objects by providing an overall visual comparison.

The active portions of the phantom consist of a base and an imaging target. The base is constructed using BR-12 (breast equivalent material) formed to simulate typical breast thickness variations. Tissue detail is provided using a test target derived from a clinical mammogram. The target itself is a digitally processed film image of the mammogram that was then enhanced with mercury. These elements are contained within a protective case. This case is designed to facilitate reproducible positioning of the phantom in the mammographic machine.

SPECIFICATIONS

Construction
Acrylic Case
Molded Tissue Equivalent Breast Material (BR-12)
Mercury Enhanced Film
Size. . . . . 16.5x22.2x9.5 cm (6.5x8.75x3.75 in)
Weight. . . . . 1.56 kg (3.48 lbs)

GAMMEX 169

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Breast Compression Test Device

GAMMEX 163

Appropriate compression of the breast may be the single most important parameter of dedicated screen film mammography. Firm compression of the breast in screen film mammography lowers the radiation dose to patients, enhances image contrast and definition, and improves visibility of pathologies.

The Gammex 163 Breast Compression device measures the compression force in automatic and manual modes to assure accuracy and reproducibility. The gauge features a maximum force reading memory which indicates the peak force applied.

SPECIFICATIONS

Force Range . . . . 3-30 kg (6-66 lbs)
Accuracy . . . . . ±0.27 kg
Contact Area. . . . 8.5 cm diameter
Size. . . . . 11.5x9x5 cm (4.5x3.5x2 in)
Weight. . . . . 0.91 kg (2 lbs)

GAMMEX 163

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Eleven step film exposure of the Gammex 150K Mammographic DCF Test Tool.

Mammographic DCF Test Tool

GAMMEX 150K

The Gammex 150K Mammographic Density Control Function (DCF) test tool enables a quick and accurate assessment of a film-screen mammography unit's Automatic Exposure Control (AEC) accuracy.

The Mammographic DCF Test tool can record up to eleven exposures on a single piece of film. This saves film cost, set-up time, and processing time. Combining all eleven exposures on a single piece of film eliminates processing variability. The resulting density read-out can be used to perform ACR Density Control Function Tests.

The Gammex 150K consists of a base plate with an engraved density scale and a sliding exposure plate with a small window. By sliding the exposure plate without moving the cassette, the same film can be exposed at each of up to eleven AEC density steps (-5 to +5). Lightweight, convenient, and economical, the Gammex 150K Mammographic DCF Test Tool is an excellent addition to your mammographic QA program.

continued .....

GAMMEX 150K

MAMMOGRAPHY

continued from front...

Optional Carrying Case model 150K-CASE is available.

SPECIFICATIONS

Construction
Base Plate . . . . . Aluminum
Exposure Plate . . Stainless Steel
Dimensions
Overall . . . . . 15.2x30.5x.95 cm (HWD)
(6x12x.375 in)
Exposure
Window . . . . . 12x18.6 mm (.47x1.12 in)
Weight. . . . . 0.8 kg (1.75 lbs)
Film size . . . . . 7x9.5 in
Features
Exposure Steps . . 11 (-1 to -5, zero, +1 to +5)
Compatibility . . . Tissue Equivalent Breast material and acrylic (Gammex 159, 159A, 159BR and 159A-BR Phantoms)
NOTE: Tissue Equivalent Material sold separately

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Mammographic Phototimer Consistency Tool

GAMMEX 159A AND GAMMEX 159A-BR

The Gammex 159A and 159A-BR Mammographic Phototimer Consistency Test Tools are designed to test Automatic Exposure Control (AEC) performance.

Phototimer consistency test tools come in either:

- 7 pieces of acrylic (159A), or
- 7 pieces of breast tissue equivalent material (159A-BR)

With this test tool, different thicknesses can be imaged and densities measured to confirm that the automatic exposure control/phototimer is operating at an optimum level.

SPECIFICATIONS

Gammex 159A

Construction . . . . 7 pieces of Acrylic
3 ea. . . . . 14x14x1.90 cm ±2.0 mm
(5.5x5.5x0.750 in ±0.1 in)
2 ea. . . . . 14x14x0.95 cm ±1.5 mm
(5.5x5.5x0.375 in ±0.06 in)
2 ea. . . . . 14x14x0.48 cm ±1.0 mm
(5.5x5.5x0.188 in ±0.04 in)
Weight. . . . . 0.7 kg (1.7 lbs)

Gammex 159A-BR

Construction . . . . 7 pieces of Tissue Equivalent Breast Material
3 ea. . . . . 14x14x2.0 cm ±0.2 mm
2 ea. . . . . 14x14x1.0 cm ±0.2 mm
2 ea. . . . . 14x14x0.5 cm ±0.2 mm
Weight. . . . . 0.65 kg (1.5 lbs)

GAMMEX 159A AND GAMMEX 159A-BR

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Mammographic Aluminum Stepwedge

GAMMEX 118

The Gammex 118 Aluminum Stepwedge allows users to examine the effects of changing digital image receptor settings, film-screen combinations, x-ray generator settings, mAs reciprocity and other factors.

This product is constructed from a single piece of high purity aluminum. The nine steps have thickness ranging from 0.3 mm to 2.27 mm. This design provides graduated exposure steps to the image receptor.

Note: This device may be used for sensiometric evaluation of film by an expert. However, one of our dedicated sensitometers is recommended for results independent of x-ray generator variability.

SPECIFICATIONS

Construction	High Purity Aluminum Alloy and Copper 9 steps 0.3 mm high, and 1.4 cm deep
Size	14.2x4 cm (5.6x1.9 in)
Weight	10 g (0.4 oz)

GAMMEX 118

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Artifact Identification Phantom

GAMMEX 179

The Gammex 179 Artifact Identification Phantom is a full field device that allows for a grey film to be produced when the phantom is imaged. This will indicate any artifacts that may be caused by a mammographic system's grid or filters. It is also a great tool to verify that the film processor is working correctly. The Gammex 179 is a great QA check tool to verify that your mammographic system is working smoothly on all levels.

SPECIFICATIONS

Size. . . . . 3.8x30x24 cm (1.5x11.8x9.6 in)
Weight. . . . . 3.2 kg (7 lbs)

GAMMEX 179

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Mammographic Film/Screen Contact Test Tool

GAMMEX 157A

Film/Screen contact can have a significant influence on image quality.

Today's mammography film/screen systems have higher resolution than diagnostic radiography x-ray systems and require test tools with finer detail. Regular testing with the Gammex 157A detects problems and artifacts early. Use of the tool and the evaluation of the resulting images is simple. Areas of poor screen contact appear darker than areas of good contact. Any dark areas greater than 1 cm should be investigated and corrective action taken. Gammex recommends testing cassettes every six months or when new or repaired cassettes are put into service.

SPECIFICATIONS

Screen Size. . . . . 24x30 cm (9.4x11.8 in)
Mesh . . . . . #40 Mesh - Copper
Size. . . . . 25.8x31.5 cm (10.2x12.4 in)
Weight. . . . . 0.4 kg (0.9 lbs)

GAMMEX 157A

MAMMOGRAPHY

RADIATION ONCOLOGY

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Camel Hair Brush

GAMMEX 168

The brush provides an easy way to clean a cassette quickly and efficiently. For more frequent screen cleanings and when time is not available for complete drying of cassettes cleaned with antistatic solution, Gammex provides a two inch camel's hair brush which is soft and static resistant.

SPECIFICATIONS

Brush Size . . . . . 5.1 cm (2 in)
Overall Size . . . . 1x5x19 cm (.39x2x7.5 in)
Weight. . . . . 25 g (1 oz)

GAMMEX 168

MAMMOGRAPHY

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Routine Mammographic QC Kit

GAMMEX 183

The Gammex 183 Routine Mammographic QC Kit contains the all the tools, instructions, and data recording forms needed for a film-screen mammography program that meets MQSA requirements. The instruments evaluate image quality, compression force, film-screen contact, processor performance, and film hypo retention. In addition, the kit includes a camel hair brush and lint free cloths for maintaining mammographic screens.

SPECIFICATIONS

Gammex 183 kit contains:
Densitometer MA0025
Sensitometer MA5034
Digital Thermometer TM-99A
Mammographic Accreditation Phantom 156
4mm Acrylic Disk 158
Mammographic Film/Screen Test Tool 157A
Breast Compression Device 163
Fixer Retention kit 166B
Lint Free Cloths 167
Camel Hair Brush 168
ACR Mammographic Quality
Control Manual
Foam Lined Case 081A

Size. . . . . 24x42x63.5 cm (9.5x16.5x25 in)
Weight. . . . . 9kg (20 lbs)

GAMMEX 183

MAMMOGRAPHY

RADIATION ONCOLOGY

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Mammographic QC Kit

GAMMEX 182M

Quality control provides the necessary assurance that your images contain all the information possible for the delivered dose. Every mammographic system deteriorates with time, gradually producing less accurate images. Without the use of specific quality control techniques, even the experienced professional may not detect the slow and subtle degradation of the image quality.

The Gammex 182M Mammographic Quality Control Kit is used at every type of mammography facility, from small clinics to large medical centers. Each kit is complete and will provide you with the tools used to perform the following tests:

- Image quality
- Film/screen contact
- kVp accuracy
- Automatic exposure control reproducibility
- Timer accuracy
- Half value layer
- Focal spot size
- Output reproducibility and linearity

continued .....

GAMMEX 182M

MAMMOGRAPHY

continued from front...

SPECIFICATIONS

The Gammex 182M
Digital kVp Meter Gammex 330
Mammographic Accreditation Phantom Gammex 156
Half Value Layer Attenuator Set Gammex 115H
Phototimer Consistency Test Tool (Acrylic) Gammex 159A
Aluminum Stepwedge Gammex 118
Breast Compression Device Gammex 163
Film/Screen Contact Test Tool Gammex 157A
0.5° Star Test Pattern Gammex MA0021
Quality Assurance Handbook Gammex 781A
Screen Film Mammography Handbook Gammex 582
Tape Measure Gammex 090
Foam Lined Case Gammex 081A

Size. . . . . 24x42x63.5 cm (9.5x16.5x25 in)
Weight. . . . . 13.4 kg (29.5 lbs)

Optional Kit:
Gammex 182M-BR: The Acrylic Mammographic Phototimer Consistency Test Tool is replaced with Tissue Mimicking Breast Material.

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RADIATION ONCOLOGY

X-ray Exposure Meter

GAMMEX MA0393

The Gammex MA0393 X-ray Exposure Meter is a rugged meter for making routine tests of x-ray exposure and rate. This compact instrument consists of an electrometer with display electronics and a built-in ion chamber. Just place the meter on the optional remote detector on the x-ray table, collimate the beam to the detector and make an exposure. The 3 1/2 digit, 1/2 inch liquid display is easy to read and presents up to 2 R and 20 R/min.

SPECIFICATIONS

Range	0.001 to 2 R, 0.01 to 20 R/min
Measurement Area	20.5 cm^2 (5.1 cm diameter) effective
Center of Ion Chamber	1.03 cm below top of chamber
Standard Calibration	At 75 kVp w/4 mm Al filtration at 22° C and one atmosphere
Reproducibility	Within 2% short term over 100 mR to 2 R
Energy Response	±5% from 15 to 65 keV (30 to 150 kVp filtered)
Electrometer Drift	0.5 to 1 mR/min typical; 6 mR/min max
Maximum Exposure Rate	Minimum 90% collection at 20 R/sec
Reset	Automatic or Manual
Operating Environment	10 to 40° C, max 90% relative humidity
Display	3 1/2 digit LCD
Controls	Auto/Manual Reset, Zero Reset, Dose/Dose Rate, Integral/Remote Ion Chamber ON/OFF Switch
Power	9V Alkaline Battery (included)
Size	7x15x16 cm (2x6x6.3 in)
Weight	0.7 kg (1.5 lbs)

GAMMEX MA0393

MAMMOGRAPHY

RADIATION ONCOLOGY

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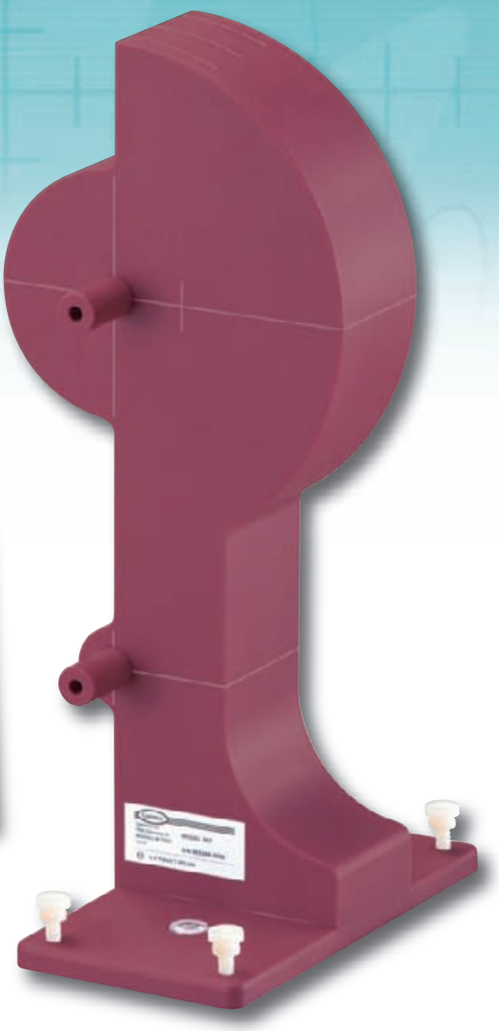
LASER ALIGNMENT
DIAGNOSTIC RADIOLOGY
ULTRASOUND
MAMMOGRAPHY

RADIATION ONCOLOGY



Rotational Therapy Phantom

GAMMEX 507

The NEW Gammex 507 Rotational Therapy Phantom is designed to meet the unique daily Quality Assurance requirements of the Hi-Art linear accelerator, and any other system that performs rotational radiation treatment. The Gammex 507 innovative system for quality control of rotational therapy includes a phantom and software which provides a method of performing seven crucial quality control checks of the rotational system in less than 6 minutes:

- Rotational output rate constancy
- Rotational energy constancy
- Gantry speed constancy
- Gantry position constancy
- MLC synchrony with gantry position
- Stationary and movable lasers position
- Beam lateral profile

The phantom's unique design consists of a block of Gammex's proprietary Solid Water® with two co-centric hemi-cylinders with two ion chamber holes, one at the center of the phantom, and one 15 cm away from center. The analytical software allows inspection of the MLC and gantry position synchrony, beam profile comparisons, constancy checks, and dose rate checks.

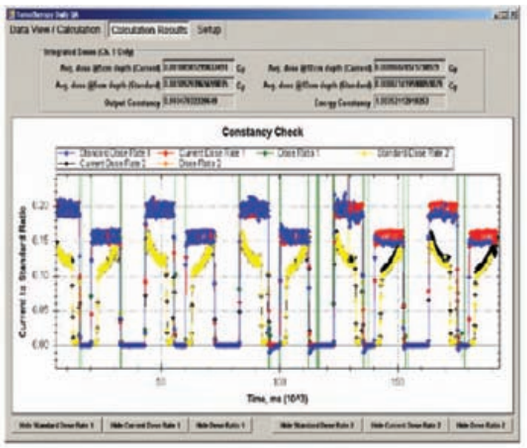
continued .....

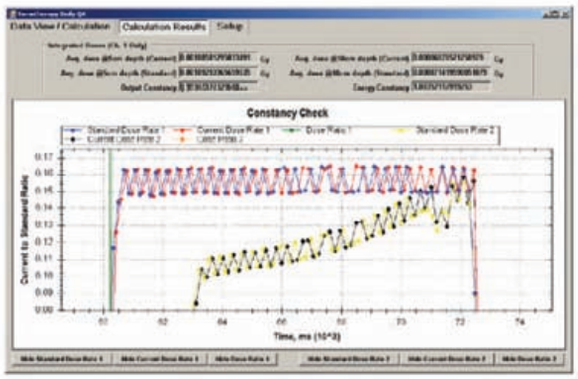
GAMMEX 507

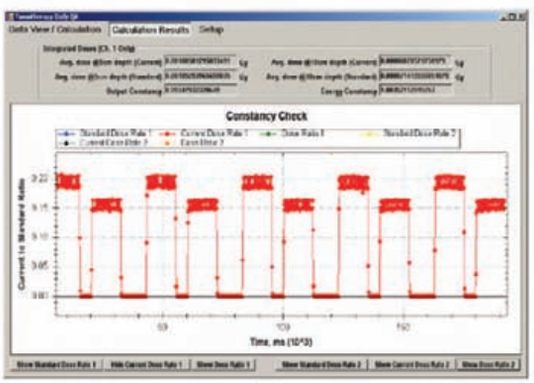
RADIATION ONCOLOGY

continued from front...

The analytical software allows inspection of the MLC and Gantry position synchrony, beam profile comparisons, constancy checks, and dose rate checks.







SPECIFICATIONS

Size. . . . . 35.3x15x20 cm
Weight. . . . . 2 kg

Gammex 507 includes:
Phantom with 2 ion chamber adaptors, 1 blank plug, Analytical Software package, and rugged carrying case.

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Tissue Characterization Phantom

GAMMEX 467

Accurate corrections for tissue inhomogeneities are a critical part of isodose treatment planning. Although most computerized treatment planning systems currently use CT image data, these systems frequently use empirical formulae in computing correction factors for tissue inhomogeneities.

The Gammex 467 Tissue Characterization Phantom can be used to establish the relationship between the electron density of various tissues and their corresponding CT number in Hounsfield Units. This data can then be transferred to the computerized treatment planning system for more accurate corrections for tissue inhomogeneities.

Scanning the phantom on a periodic basis provides data useful for the Quality Assurance Program of both the CT scanner and treatment planning system.

The Tissue Characterization Phantom consists of a Solid Water® disk approximately the size of an average pelvis. A matrix of sixteen holes in the disk hold interchangeable rods made of various tissue and water simulating materials. The physical density (g/cm^3) and electron density relative to water of the rod materials are on a specification sheet that is provided with each phantom. The phantom also has a pattern of small air holes with known spacings for checking the CT scanners's distance measurement accuracy. A handy carrying case is also included.

continued .....

GAMMEX 467

RADIATION ONCOLOGY

continued from front...

Rod Material	Electron Density Relative to Water	Physical Density g/cm^3
Lung (LN-300)	0.28	0.30
Lung (LN-450	0.40	0.45
Adipose (AP6)	0.90	0.92
Breast	0.96	0.99
CT Solid Water	0.99	1.02
Brain	1.05	1.05
Liver (LV1)	1.07	1.08
Inner Bone	1.09	1.12
Bone (B200)	1.11	1.15
Bone (CB2-30% Mineral)	1.28	1.34
Bone (CB2-50% Mineral)	1.47	1.56
Cortical Bone (SB3)	1.69	1.82
True Water	1.00	1.00
Optional Titanium Insert	3.79	4.59

SPECIFICATIONS

Disk Material. . . . Solid Water® (Gammex 451)
Diameter . . . . . 33 cm (12.9 in)
Height . . . . . 5 cm (2 in)
Weight
  Disk and Rods . . 4.6 kg (10 lbs)
  Phantom
  with case. . . . . 6.6 kg (14.5 lbs)

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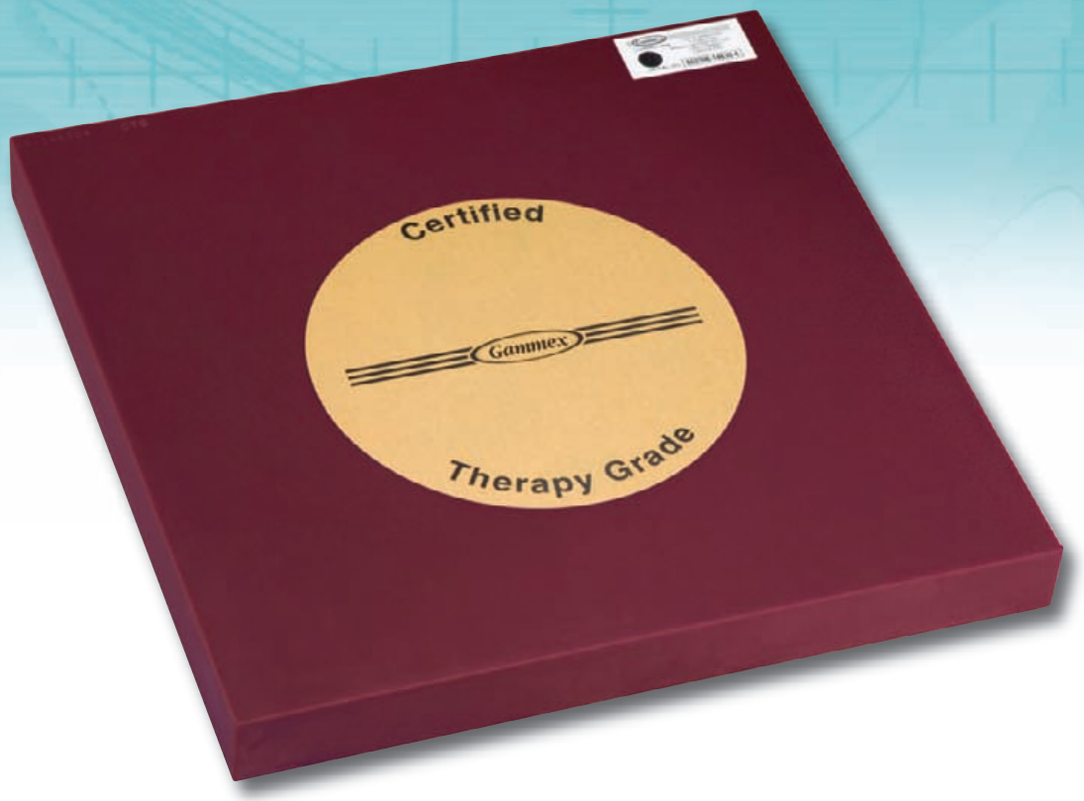

Certified Therapy Grade Solid Water®

GAMMEX 457-CTG

Gammex 457-CTG is a Certified Therapy Grade (CTG) of Solid Water® that is manufactured to the most exact quality assurance standards in the industry and is ideally suited to AAPM's Task Group 51 protocol recommendations. CTG Solid Water® is designed for electron and photon beam measurements including relative ionization, depth dose and uniformity.

Gammex performs meticulous analysis of each slab to ensure the highest possible quality. We provide a Certificate of Conformance with each slab that includes:

- Calculated elemental composition
- Calculated mass
- Volume electron densities
- Electron and photon transmission characteristics
- Measured physical dimensions

A radiograph is also provided demonstrating that the product is free from voids, contamination or other artifacts. Our precision manufacturing techniques provide ion chamber cavities free from air pockets or voids and assure measurement accuracy and reproducibility of chamber placement within the radiation beam.

Gammex 457-CTG is available in 20x20 cm, 30x30 cm, and 40x40 cm slabs with thicknesses from 0.2 cm to 6.0 cm.

continued .....

GAMMEX 457-CTG

RADIATION ONCOLOGY

continued from front...

Convenient packages of CTG Solid Water® kits are also available in the following sizes:

Gammex 457- CTG Kit 4.5

2 ea	0.2x30x30 cm slab
2 ea	0.3x30x30 cm slab
1 ea	0.5x30x30 cm slab
1 ea	1.0x30x30 cm slab
1 ea	2.0x30x30 cm slab with chamber cavity

Gammex 457-CTG Kit 18.5

2 ea	0.2x30x30 cm slab
2 ea	0.3x30x30 cm slab
1 ea	0.5x30x30 cm slab
1 ea	1.0x30x30 cm slab
2 ea	2.0x30x30 cm slab
1 ea	4.0x30x30 cm slab
1 ea	6.0x30x30 cm slab
1 ea	2.0x30x30 cm slab with chamber cavity

Gammex 457-CTG Kit 21.5

2 ea	0.2x30x30 cm slab
2 ea	0.3x30x30 cm slab
1 ea	0.5x30x30 cm slab
1 ea	1.0x30x30 cm slab
1 ea	2.0x30x30 cm slab
3 ea	5.0x30x30 cm slab
1 ea	2.0x30x30 cm slab with chamber cavity

SPECIFICATIONS

Electron and Photon Stopping Power
Linear attenuation coefficient relative to water shall be 1.030 ±0.01 for photon energies from 100 kV to 24 MV.

Homogeneity
Material shall be free from air bubbles or other artifacts greater than 1 mm in diameter within 5 cm of the center of the slab. No more than two (2) air bubbles or other artifacts greater than 2 mm in diameter outside the 5 cm radius, but within 10 cm of center. Scanning for homogeneity shall be done by x-ray at 50 kVp, no filtration, with a dose sufficient to produce an x-ray image of 0.8 to 1.2 o.d.

Dimensions
Tolerance for the length and width, or diameter of the Gammex 457-CTG material shall be the nominal ±0.5 mm
Thickness
Tolerance . . . . . ±0.15 mm (0.006 in)
Flatness . . . . . ±0.15 mm (0.006 in)
Where applicable, squareness shall be within 90° ±0.3°
Sizes . . . . . 20x20 cm, 30x30 cm, and 40x40 cm (other sizes upon special request)
Thicknesses . . . . 0.2 cm to 6.0 cm

Certification
Each batch of Gammex 457-CTG material shall be irradiated on a linear accelerator, using 18 MeV electrons and 6 MV photons. A certified copy of the scan results accompanies each slab and includes the following data:

- Measured depth ionization for electrons and photons relative to water.
- Calculated mass restricted electron stopping power relative to water.
- Calculated linear attenuation coefficient relative to water.
- Measured physical density 1.043 ±.005 g/cm^3
- Calculated elemental composition (typical, H-8.1, C-67.2, N-2.4, O-19.9, Cl-0.1, Ca-2.3)
- Calculated mass electron density (0.539 ±0.001 e-/cm^3)
- Calculated electron density (0.562 ±0.003 e-/cm^3)

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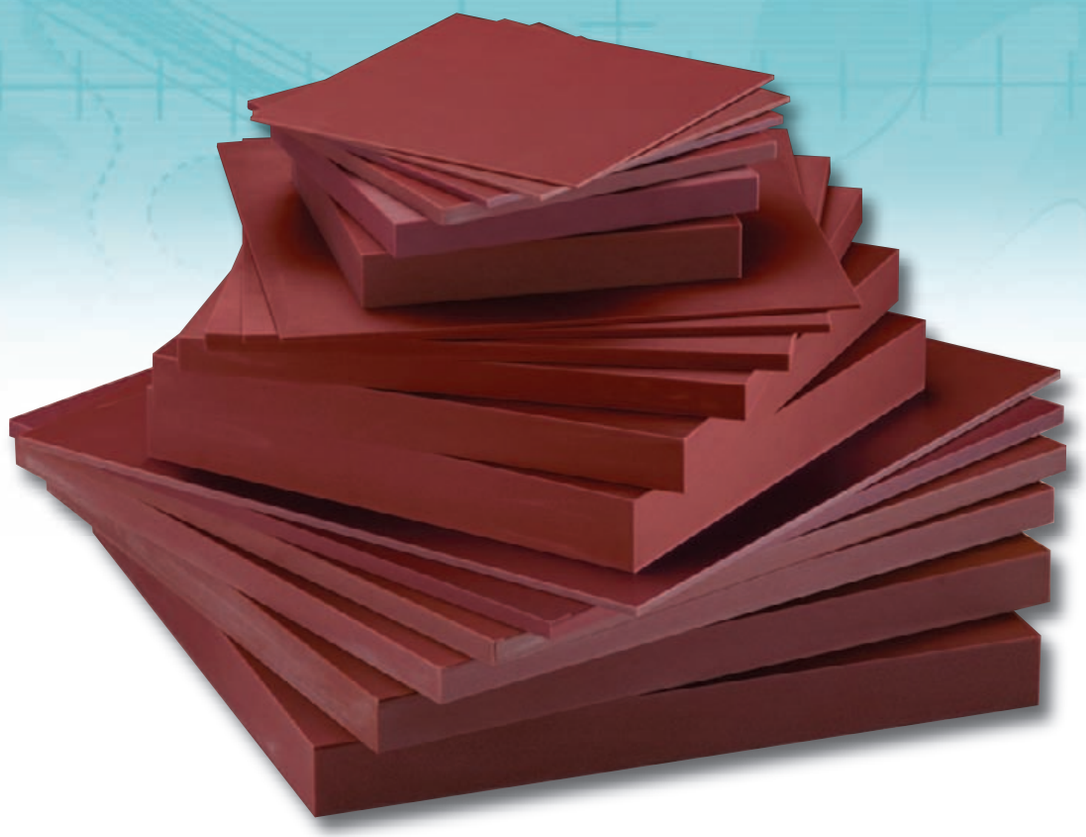

Standard Grade Solid Water®

GAMMEX 457

Gammex 457 Solid Water® mimics the absorption characteristics of water more closely and over a wider range of energies than any other product. Solid Water® makes radiation beam calibration easier than ever and is specifically designed for photon and electron beam measurements.

Solid Water® is perfect for achieving calibrations within 1% of the true water dose and additional uses include relative ionization calibration, depth dose measurements and absolute calibrations.

Gammex Solid Water® scatters and attenuates radiation in the same way as water, and can be easily machined to accommodate custom applications. Solid Water® does not adhere to surfaces or other slabs, and the rigid construction eliminates broken ion chambers. Slabs are carefully molded and accurately machined into standard dimensions and customized phantoms per customer request. Gammex also has the ability to provide ion cavities in slabs of 2.0 cm thickness or greater to accommodate most commercially available ion chambers found in the field.

Solid Water® is available in 20x20 cm, 30x30 cm, and 40x40 cm slabs. Thicknesses range from 0.2 to 6.0 cm.

continued .....

GAMMEX 457

RADIATION ONCOLOGY

continued from front...

Convenient packages of Solid Water® kits are also available in the following sizes:

Gammex 457-Kit 4.5

2 ea 0.2x30x30 cm slab
2 ea 0.3x30x30 cm slab
1 ea 0.5x30x30 cm slab
1 ea 1.0x30x30 cm slab
1 ea 2.0x30x30 cm slab with chamber cavity

Gammex 457-Kit 18.5

2 ea 0.2x30x30 cm slab
2 ea 0.3x30x30 cm slab
1 ea 0.5x30x30 cm slab
1 ea 1.0x30x30 cm slab
2 ea 2.0x30x30 cm slab
1 ea 4.0x30x30 cm slab
1 ea 6.0x30x30 cm slab
1 ea 2.0x30x30 cm slab with chamber cavity

Gammex 457-Kit 21.5

2 ea 0.2x30x30 cm slab
2 ea 0.3x30x30 cm slab
1 ea 0.5x30x30 cm slab
1 ea 1.0x30x30 cm slab
1 ea 2.0x30x30 cm slab
3 ea 5.0x30x30 cm slab
1 ea 2.0x30x30 cm slab with chamber cavity

SPECIFICATIONS

Density . . . . . 1.04 g/cm^3
Thickness
Tolerance . . . . . nominal, ±0.20 mm (0.008 in)
Length and Width
Tolerance . . . . . ±1.0 mm (0.020 in)
Physical Form . . . Square slabs (disks and other shapes upon special request)
Flatness . . . . . 0.2 mm (0.008 in)
Sizes . . . . . 20x20 cm, 30x30 cm and 40x40 cm (other sizes upon special request)
Thicknesses . . . . 0.2 cm to 6.0 cm

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Tissue Equivalent Materials

GAMMEX 450, 452, 453, 454, 455, 456, 481, 482

Gammex Tissue Equivalent Materials allow simple, convenient, and accurate simulations for therapy dose determinations. These materials have the absorption and scattering properties within 1% of living tissue. Tissue Equivalent Materials have a variety of uses for routine quality assurance and quality control in both diagnostic and therapeutic physics.

Tissue Equivalent Materials are user friendly, and provide adequate simulations for electron and photon applications between 0.01 and 100 MeV.

Gammex manufactures tissue equivalent materials for:

- Cortical Bone (Gammex 450)
- Muscle (Gammex 452)
- Adipose (Gammex 453)
- Breast (Gammex 454)
- Lung (Gammex 455)
- Inner Bone (Gammex 456)
- Brain (Gammex 481)
- Liver (Gammex 482)

SPECIFICATIONS

Sizes . . . . . 20x20 cm, 30x30 cm and 40x40 cm
Thicknesses . . . . 0.2 to 6.0 cm (Gammex 455 Lung material 1.0 cm minimal)

GAMMEX 450, 452, 453, 454, 455, 456, 481, 482

RADIATION ONCOLOGY

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Isocentric Rotation Plate

GAMMEX 442-R

The Gammex 442-R Isocentric Rotation Plate is a quality assurance test instrument

designed to make necessary tests on radiotherapy machines quickly and easily. The Isocentric Rotation Plate takes only minutes to set up and performs routine QA tests such as:

- Light/Radiation Field Coincidence
- Symmetry and Flatness
- Accuracy of Optical Distance Indicators and Laser Alignment
- Gantry and Collimator Isocentricity

An optional ion chamber holder can be provided to be used with the base and side support for "in air" measurements.

SPECIFICATIONS

Overall Size	45.7x31.8x34.9 cm (18x12.5x13.75 in)
Weight	4.4 kg (10 lbs)
Ion Chamber Holder	Optional RO5138 Inner diameter 1.27 cm (0.5 in)
Film Used	10x12 in ready-pack

GAMMEX 442-R

RADIATION ONCOLOGY

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Daily Laser and Light Field Plate

GAMMEX 443

The Gammex 443 Daily Laser and Light Field Plate is an effective tool for verifying the accuracy of the laser adjustments.

The Daily Laser and Light Field Plate determines that the lasers indicate the isocenter and the lines are straight, level, sharp, and in focus. The Gammex 443 provides a daily accuracy check of the following:

- Field size indicators
- Crosshair wander with collimator rotation
- Ceiling and wall laser alignment

SPECIFICATIONS

Size. . . . . 20.3x20.3x3.6 cm (8x8x1.42 in)
Thickness
Tool . . . . . 3.18 cm (1.25 in)
Main Plate . . . . . 0.64 cm (0.25 in) Side blocks extend 1.3 cm (0.5 in) above plate
Weight. . . . . 0.31 kg (0.7 lbs)

GAMMEX 443

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Daily Constancy Tool

GAMMEX 444D

The Gammex 444D Daily Constancy Tool (DCT) is the perfect single channel device to measure photon and electron beam constancy every day of the year. Measuring relative beam output is quick, easy, and reliable with the 444D. The DCT has a single diode detector embedded in a uniform density plastic phantom for measuring radiation output. The device is battery operated and completely portable. It only requires an initial set up and then there is no need for preparation when doing routine radiation output tests on linear accelerators.

This DCT can store up to 10 exposures that show relative dose, relative dose rate, and irradiation time. Multiple exposures can be taken without having to reset the device. An indicator light will blink to let you know that the 444D is ready for the next exposure. By having this auto reset function, you only have to enter the treatment room a second time to retrieve the DCT and acquire the necessary data. With features like these, and automatic pressure correction, you can see why this Gammex product is one of the most time saving devices you'll ever use in the treatment room.

continued .....

GAMMEX 444D

RADIATION ONCOLOGY

continued from front...

SPECIFICATIONS

Dose Rate Range . 1 to 2000 cGy/min

Beam Energy

Photons . . . . . 1.25 to 25 MV

Electrons . . . . . 3 to 25 MeV

Field Size . . . . . 10x10 cm

Temperature Dependence . . . . 1% of reading per °C

Long Term Stability. . . . . ±1.5% of reading over 60,000 Rads (approximately 6 months of use)

Readings . . . . . Relative Dose (machine output), Relative Dose Rate, Time

Detector . . . . . Diode

Power Supply . . . 4 AA alkaline batteries (20 hours approx. lifetime)

Physical Dimensions

Weight. . . . . 1.05 kg (2 lbs 5 oz)

Dimensions (H/W/D) . . . . . 12x32x3 cm (4.7x12.6x1.1 in)

Miscellaneous

- RS-232 port
- Stores 10 complete readings
- No pressure corrections needed

Options

- Auxiliary tray holder for Varian (444-TRAY-V) or Siemens (444-TRAY-S) machines
- Solid Water 12x12 cm build-up plates (444-SLABS) with thickness of 0.2, 0.5, 1.0, 2.0, and 3.0 cm
- Laser alignment cap (444-CAP) to align DCT with sidewall lasers

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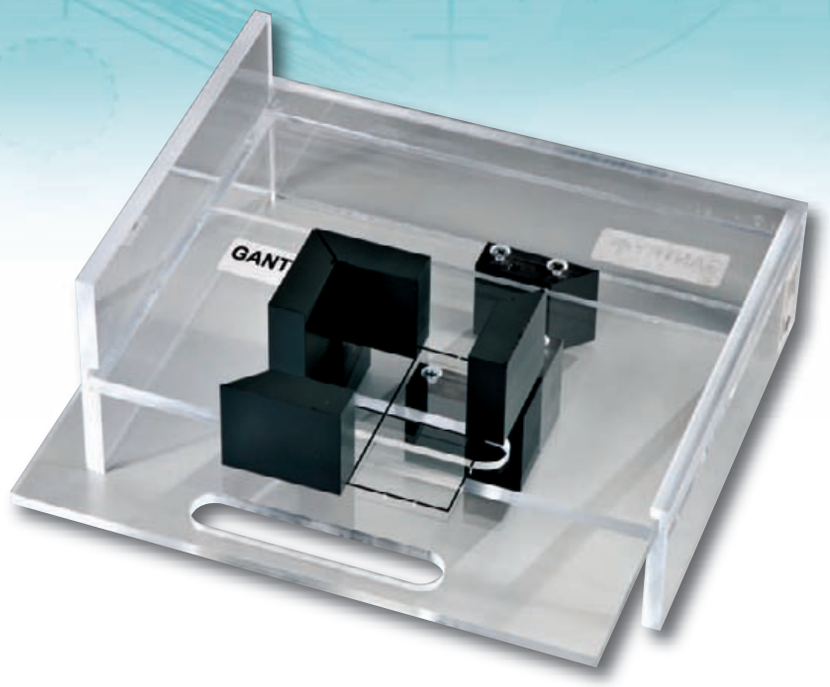

Beam Alignment Test Instrument

GAMMEX 430

The Gammex 430 is an instrument used to analyze the alignment of a linear accelerator. It is recommended that beam alignment tests be completed at least once a year to determine the following problem situations:

- Displaced focal spot
- Asymmetric collimators
- Non-intersection of the collimator and gantry axes
- Lack of gantry arm support

The Gammex 430 complies with the alignment requirements of AAPM Task Group 40.

SPECIFICATIONS

Construction	Acrylic with lead blocks in a 10x10 cm field
Size	13x23.5x30 cm (5x9.3x11.5 in)
Fits	8x10 in standard film pack
Weight	6 kg (13.5 lbs)

GAMMEX 430

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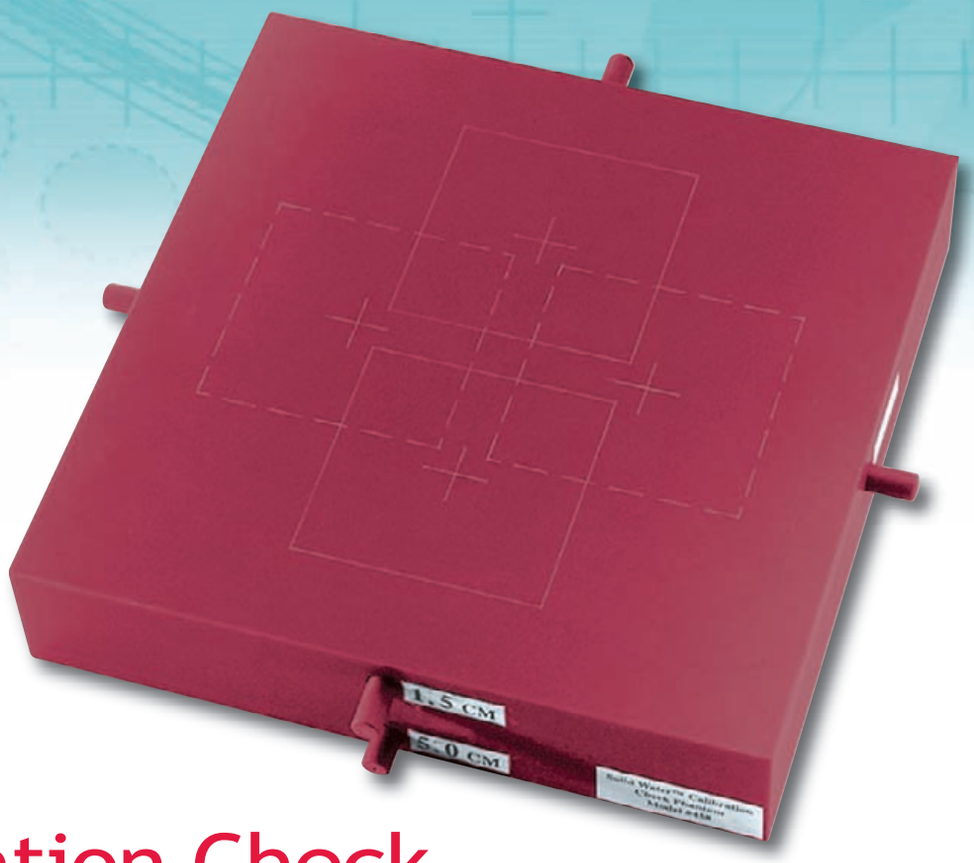

Calibration Check Phantom

GAMMEX 458 SOLID WATER®

The Gammex 458 Calibration Check Phantom is an excellent test tool for checking energy output from radiotherapy machines. The phantom contains six cavities with corresponding plugs. The cavities are placed at 1.2, 1.5, 2.0, 2.5, 3.2, and 5.0 cm. This allows for measurements at depth of maximum dose deposition. Gammex also provides a custom adaptor to exactly match the ion chamber you use. Please specify the ion chamber at time of order.

The Gammex 458 also comes with four 10x10 cm squares inscribed on the top surface of the phantom. Each square contains a set of crosshairs located directly over the center location where the ion chamber will be placed. This feature makes the Gammex 458 the perfect tool to set your light field and quickly take energy readings.

SPECIFICATIONS

Slab size . . . . . 30x30x6 cm (11.8x11.8x2.4 in)
Plugs and ion chamber adaptor size
Diameter . . . . . 16.5 cm (0.650 in)
Length. . . . . 117 mm (4.6 in)
Weight. . . . . 5.65 kg (12.4 lbs)

GAMMEX 458 SOLID WATER®

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Couch/Laser Alignment Tool

GAMMEX 440

Our Laser Alignment Tool can be used with all stationary laser systems to assure proper beam alignment. Daily checks can be performed quickly and easily by a single person. The phantom has alignment holes for use with CT or MRI systems and white recessed lines that are easily visible from across the room when hit by a laser.

SPECIFICATIONS

Size. . . . . 30.5x20.3x3.8 cm
(12.11x8.11x1.5 in)

GAMMEX 440

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