The ISIS QA-1 Phantom provides “Machine to Machine” geometric QA for Treatment Machines, CT Simulator, and Conventional Simulators.

The ISIS QA-1 Phantom was designed to provide an easy low cost approach to the daily, monthly, and annual QA tasks for the Physicist and Therapists. The ISIS QA-1 phantom will aid in verifying the geometric laser position accuracies with multiple laser systems within your department. Further, the ISIS QA-1 provides the Physicist and Dosimetrist the ability to verify electron beam density values produced by your CT / CT-Simulator. Your staff scans the four unique density value inserts then transfer this image to the RTP system for verification of the electron density values of the Bone, Water, Inhale and Exhale Lung density inserts. Comparing the individual value for each known density value the user can quickly verify CT image electron density values for treatment planning image QA.

Additionally, the ISIS QA-1 provides an internal known object insert that is scanned with the CT / CT-Simulator. With this multiple image slice set you can create a Treatment Plan / Virtual Simulation plan of the known object for size and location verification though your RTP and Virtual Simulation system. Then the ISIS QA-1 goes one step further to use these known geometric phantom positions for verification of the laser positions as verified with the scanned ISIS QA-1 phantom. This QA process provides a geometric QA of the processed RT Plan for use with IMRT treatment machine lasers and mechanical treatment field setup verifications.

The dose chamber insert provided will provide the physicists the ability to quickly measure single point expected dose values without using additional phantom devices.

CT Simulation RT Field Marking Verification QA
The ISIS QA-1 provides the user the ability to scan, plan, and verify the exported RTP beam designs of the intended treatment field to the laser marking system for laser point position verification. Additionally this process can be accomplished on the intended treatment machine.

A sample generic QA process is described as follows
Scan the phantom after you have verified the position of the ISIS QA-1 phantom is centered in the X and Y position of the scan plane. This is accomplished by physically moving the ISIS QA-1 phantom and verifying the placement position with the tool set supplied with the scanner.

Additionally, verify the tilt of gantry is at a 0 degree tilt in respect to center of the ISIS QA-1 phantom. Once alignment is verified correctly you can scan the ISIS QA-1 phantom at 1 mm increments throughout the entire phantom body. Then create three 10 cm x 10 cm RTP / Virtual Simulation plans for export to the laser marking system for laser position verification. You then compare the expected field positions with the actual laser field illuminated positions. These positions are viewed on three of the external sides of the ISIS QA-1 phantom.

Additionally the internal object insert positioned in the exact center axis of the ISIS QA-1 phantom provides laser position RTP field verification. When the ISIS QA-1 is setup on your treatment machine table you can verify lasers / field lights and the expected treatment dose by using an electrometer chamber with the ISIS QA-1 dose chamber insert.

General Benefits of the ISIS QA-1
• Two millimeter wide alignment verification grooves on the surfaces of the ISIS QA-1 provides for easy viewing and quick alignment checks of laser beam positions.
• Multiuse QA machine programs within the therapy department can use the ISIS QA-1 phantom.
• Provides the ability to verify scanned image set position alignment from the radiology department to the radiation therapy department for geometric verifications prior to the laser marking process.
• Precision 10 cm x 10 cm and 5 cm x 5 cm fixed fields on three surfaces of the ISIS QA-1 phantom provide for exact image and beam geometric design QA verification.
• Easy leveling base for setting up an exact level plane for the QA process from machine to machine.
• Single slice check for laser –offset verification with standard CT Scanner and / or CT Simulator. Treatment machine QA for lasers, mechanicals, and beam geometry.

Electron Density Verification Inserts
The four ISIS QA-1 electron density inserts provide the user with the ability to easily verify the electron density values produced on the CT / CT Simulator. This is of particular benefit when determining the consistency of electron density values from week to week. The four inserts are: Bone (+800), H2O (0.0), Inhale Lung (-800), Exhale Lung (-500), and Water (0). This verification is useful in providing a repeatable and dependable QA program for inhouse machine to machine transfer of images. This QA task can be accomplished on a daily, weekly, monthly, and annual by normal radiotherapy staff members.

Item 681-110 ISIS QA-1 Geometric Phantom Package Includes
• Item 681-100 Phantom Cube with Bone, Water, Lung Inhale and Lung Exhale density plugs
• Item 681-159 Leveling Platform with 20 cm Field
• Item 681-150 Alignment Bar
• Item 681-101 2.54 cm Object Insert
• Item 681-112 Tungsten Pins, 20/Pkg
• Item 681-120 50 cm Ruler
• Item 352-234 Magnetic Gantry Level with Light, batteries not included
• Item 681-121 Round Bubble Level
• Item 681-193 Protective Rolling Case

Specifications
Phantom Size: 5.5" L x 5.5" W x 5.5" H (14 x 14 x 14 cm)
Electron Density of Acrylic: 3.847 x 10²³
Phantom Surface Tolerance: .005
Phantom Weight: 8 Lb (3.6 kg)
Rolling Case Size: 32.5" L x 21.5" W x 11.5" D (82.6 x 54.6 x 29.2 cm)
Total Shipping Weight: 45 lb (20.5 kg)
## INSETS FOR ISIS PHANTOM CUBE

- All inserts are 4 cm in diameter and 14 cm long.
- They are made of clear acrylic with a rubber o-ring at one end to keep the insert snug in the phantom cube.
- Each insert is labeled with the item number, description and density.

### INSERT, FARMER STYLE CHAMBER

This insert holds a farmer style chamber (without build-up cap) with the center of the collection volume at the center of the phantom cube.

**The Farmer Chamber Insert accommodates the following chambers:**
- PTW: 23333, 30001, 30002, 30004, 30006, 30010, 30011, 30012, 30013
- Bicron/NE 2571, 2581, 2505/3 (A or B)
- Nuclear Associates 30-351
- Capintec PR-06G, PR-06C
- Victoreen 580-006
- Exradin A19, RMI 448

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104</td>
<td>Insert, Farmer Style Chamber</td>
</tr>
</tbody>
</table>

### INSERT WITH 2.54 CM DIAMETER TEFLON BALL

This insert has a 2.54 cm Teflon ball centered in the insert. The teflon ball is used as tumor value to verify measurement accuracy on the CT/CT Simulator and treatment planning system.

**Specifications**

- **Density:** 2.13 - 2.2 g/cm³

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-101</td>
<td>Insert with 2.54 cm Diameter Teflon Ball</td>
</tr>
</tbody>
</table>

### INSERT, PTW 31006 CHAMBER

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104-31006</td>
<td>Insert, PTW 31006 Chamber</td>
</tr>
</tbody>
</table>

### INSERT, PTW 31016 CHAMBER

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104-31016</td>
<td>Insert, PTW 31016 Chamber</td>
</tr>
</tbody>
</table>

### INSERT, EXRADIN A12 CHAMBER

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104-A12</td>
<td>Insert, Exradin A12 Chamber</td>
</tr>
</tbody>
</table>

### INSERT, EXRADIN A12S CHAMBER

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104-A12S</td>
<td>Insert, Exradin A12S Chamber</td>
</tr>
</tbody>
</table>

### INSERT, EXRADIN A14SL CHAMBER

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104-A14SL</td>
<td>Insert, Exradin A14SL Chamber</td>
</tr>
</tbody>
</table>

### INSERT, EXRADIN A1SL CHAMBER

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-104-A1SL</td>
<td>Insert, Exradin A1SL Chamber</td>
</tr>
</tbody>
</table>
QUALITY ASSURANCE DEVICES

INSERT, STEREOTACTIC TUNGSTEN BALL
This insert has a tungsten ball with a diameter of 5.5 mm (7/32") in the center of the insert.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-106</td>
<td>Insert, Stereotactic Tungsten Ball</td>
</tr>
</tbody>
</table>

INSERT, MULTI-DENSITY HOLDER
The Multi-Density holder insert accommodates 8 density plugs (2.5 cm diameter x 1.5 cm thick). An acrylic end plug and o-ring on each end of the insert holds the density plugs in place. This insert is custom made. The customer must specify Density Plug material needed and the order of placement in the insert when ordering. Density plugs are sold separately.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Density Plug</th>
<th>Physical Density gm/cm³</th>
<th>Electron Density cc x 10²³</th>
<th>Electron Density Relative to H₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-107</td>
<td>Insert, Multi-Density Holder ONLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>681-107-6</td>
<td>Lung Inhale</td>
<td>0.195 ± 0.20</td>
<td>0.634</td>
<td>0.190</td>
</tr>
<tr>
<td>681-107-7</td>
<td>Lung Exhale</td>
<td>0.495 ± 0.20</td>
<td>1.632</td>
<td>0.489</td>
</tr>
<tr>
<td>681-107-8</td>
<td>Bone 800 mg/cc</td>
<td>1.609 ± 0.01</td>
<td>4.862</td>
<td>1.456</td>
</tr>
<tr>
<td>681-107-9</td>
<td>Water</td>
<td>1.008 ± 0.01</td>
<td>3.346</td>
<td>1.002</td>
</tr>
<tr>
<td>681-107-10</td>
<td>Adipose (Fat)</td>
<td>0.967 ± 0.01</td>
<td>3.170</td>
<td>0.949</td>
</tr>
<tr>
<td>681-107-11</td>
<td>Breast (50% Gland / 50% Adipose)</td>
<td>0.991 ± 0.01</td>
<td>3.261</td>
<td>0.976</td>
</tr>
<tr>
<td>681-107-12</td>
<td>Muscle</td>
<td>1.062 ± 0.01</td>
<td>3.483</td>
<td>1.043</td>
</tr>
<tr>
<td>681-107-13</td>
<td>Liver</td>
<td>1.071 ± 0.01</td>
<td>3.516</td>
<td>1.052</td>
</tr>
<tr>
<td>681-107-14</td>
<td>*Trabecular Bone - 200 mg/cc</td>
<td>1.161 ± 0.01</td>
<td>3.730</td>
<td>1.117</td>
</tr>
<tr>
<td>681-107-15</td>
<td>*Dense Bone - 1000 mg/cc</td>
<td>1.660 ± 0.01</td>
<td>5.243</td>
<td>1.570</td>
</tr>
<tr>
<td>681-107-16</td>
<td>*Dense Bone - 1250 mg/cc</td>
<td>1.830 ± 0.01</td>
<td>5.718</td>
<td>1.712</td>
</tr>
<tr>
<td>681-107-17</td>
<td>*Dense Bone - 1500 mg/cc</td>
<td>2.000 ± 0.01</td>
<td>6.209</td>
<td>1.859</td>
</tr>
<tr>
<td>681-107-18</td>
<td>*Dense Bone - 1750 mg/cc</td>
<td>2.170 ± 0.01</td>
<td>6.698</td>
<td>2.005</td>
</tr>
<tr>
<td>681-107-19</td>
<td>*Coritcal Bone</td>
<td>1.930 ± 0.01</td>
<td>5.956</td>
<td>1.780</td>
</tr>
<tr>
<td>681-107-20</td>
<td>**Titanium</td>
<td>4.507 ± 0.01</td>
<td>12.475</td>
<td>3.735</td>
</tr>
<tr>
<td>681-107-21</td>
<td>***Aluminum</td>
<td>2.718 ± 0.01</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* All Bone references 10 mm diameter in H₂O density plug.
** Titanium references 6 mm diameter in H₂O density plug.
*** Aluminum references 9.5 mm diameter in H₂O density plug.

INSERT, LIQUID FILLABLE
This insert has a 2.5 cm diameter hollow space in the center of the insert. There are two fill holes drilled at an angle into the hollow space. Each fill hole has an o-ring and screw to hold the liquid in the space. The Customer fills the space with a liquid of their choice.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-108</td>
<td>Insert, Liquid Fillable</td>
</tr>
</tbody>
</table>

INSERT, HOLDS ISOPLATE PIN IN CENTER
This insert accommodates a holder the NA-22 Isotope is placed into. The holder of the insert keeps the NA-22 in the center of the insert.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-109</td>
<td>Insert, Holds Isotope Pin In Center</td>
</tr>
<tr>
<td>681-114</td>
<td>Holder for NA-22 Isotope</td>
</tr>
<tr>
<td>710-045-3</td>
<td>NA-22 Isotope</td>
</tr>
</tbody>
</table>

INSERT, SEED CALIBRATION
This insert has five (5) aluminum pins which are spaced at different levels laterally and longitudinally at specified angles within the insert.

Specifications
Aluminum Pin Size: 1 mm Diameter x 5 mm Long

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-119</td>
<td>Insert, Seed Calibration</td>
</tr>
</tbody>
</table>

Custom chamber inserts available. Specify the ion chamber manufacturer, model number and description that the insert is to be drilled for.

Radiation Products Design, Inc.  | Albertville, MN 55301  | (800) 497-2071  | Fax: (763) 497-2295  | www.rpdinc.com
ISIS QA-1 GEOMETRIC PHANTOM ACCESSORIES

ISIS PHANTOM CUBE

This is a 14 cm cube made of clear acrylic with a 10 cm square scribed on three sides of the cube. The scribes are 2 mm wide and painted in white. Four of the six sides of the cube have nine holes per side for use of tungsten pins. One side has a slot to hold the 50 cm ruler. Crosshair markings are on five sides of the cube. A 4 cm wide hole is drilled through the middle of the cube to accommodate the inserts. The cube also has four fixed density inserts. The density inserts are 2.5 cm in diameter x 1.5 cm thick and correspond in density to water, bone, lung inhale and lung exhale. The inserts are labeled with the material and density.

<table>
<thead>
<tr>
<th>Density Plug</th>
<th>Physical Density</th>
<th>Electron Density Per cc x 10²⁰</th>
<th>Electron Density Relative to H₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung Inhale</td>
<td>0.20</td>
<td>0.634</td>
<td>0.190</td>
</tr>
<tr>
<td>Lung Exhale</td>
<td>0.50</td>
<td>1.632</td>
<td>0.489</td>
</tr>
<tr>
<td>Dense Bone 800 mg/cc</td>
<td>1.53</td>
<td>4.862</td>
<td>1.456</td>
</tr>
<tr>
<td>Water</td>
<td>1.01</td>
<td>3.346</td>
<td>1.002</td>
</tr>
</tbody>
</table>

LEVELING PLATFORM WITH 20CM FIELD

The leveling platform is 1 cm thick black acrylic plate topped with white engraving material and is 22.9 cm wide and 23.2 cm long. The leveling platform has three leveling screws and is engraved with crosshair dashes, a dashed 7 cm square rotated 45° to intersect with a non-rotated dashed 10 cm square, a dashed 20 cm square and a dashed 20 cm diameter circle. The dashes are etched deep and long enough to lay the tungsten pins in the dashes. There is also a 14 cm square for placement of the phantom cube and an adjustable corner guide with two screws at one corner to prevent rotation of the phantom cube. To set corner guide loosen the screws, adjust the corner guide to be snug to the phantom cube when in the correct position then tighten the screws. To connect the leveling platform to the alignment bar or adjustable table centering bar, fit the pin in either bar into a groove on the leveling platform. Two sides of the leveling platform have three alignment grooves, one at center and one on either side at 7 cm from center.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-159</td>
<td>Leveling Platform with 20 cm Field</td>
</tr>
</tbody>
</table>

ALIGNMENT BAR

The Alignment Bar fits on the couchtop for proper alignment of the ISIS Phantom Cube (Item 681-100). The Alignment Bar is white with engraved black dash lines on the top and all four sides for central axis/laser location. Each end has a 1.5 mm diameter x 12.7 mm tungsten pin in the center. There are seven aluminum balls across the top of the bar, one in the center and three on either side at 13, 14 and 15 cm from center. The three balls on each side are 1/32", 1/16", and 3/32" (0.08, 0.16, and 0.24 cm) in diameter with the smallest ball closest to the center. The overall size of the bar is 56.52 cm wide, 4.47 cm long and 2 cm thick. A pin centered on one side of the alignment bar is used to connect the Alignment Bar to the leveling platform (Item 681-159) for center alignment on the couchtop.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Alignment Bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-150</td>
<td>Varian ETR Couch</td>
</tr>
<tr>
<td>681-151</td>
<td>Varian ETR and G.E. Discovery Couch</td>
</tr>
<tr>
<td>681-152</td>
<td>With Snap-On Ends</td>
</tr>
</tbody>
</table>

TUNGSTEN PINS

The tungsten pins fit into the 9 holes on 4 sides of the phantom cube or they can be placed in the dashes on the leveling platform.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Tungsten Pins</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-112</td>
<td>1/16&quot; Dia. x 1/2&quot; L (0.16 x 1.27 cm)</td>
<td>20</td>
</tr>
<tr>
<td>681-113</td>
<td>3/32&quot; Dia. x 1/2&quot; L (0.24 x 1.27 cm)</td>
<td>20</td>
</tr>
</tbody>
</table>

50 CM ALUMINUM RULER

This 50 cm aluminum ruler with mm and cm markings is 3.5 cm wide and 2 mm thick.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-120</td>
<td>50 cm Ruler</td>
</tr>
</tbody>
</table>
ISIS QA-1 GEOMETRIC PHANTOM ACCESSORIES

MAGNETIC GANTRY LEVEL WITH LIGHT
Torpedo level with three lighted vials and a magnetic strip. Batteries not included.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>352-234</td>
<td>Magnetic Gantry Level with Light</td>
</tr>
</tbody>
</table>

ROUND BUBBLE LEVEL

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-121</td>
<td>Round Bubble Level</td>
</tr>
</tbody>
</table>

PROTECTIVE ROLLING CASE
This black case has rigid wall construction and reinforced rounded bumper corners. For ease in transport there are two heavy duty urethane wheels and a 7" (17.8 cm) extension handle. The case has seven latches, an o-ring seal and an atmospheric purge valve. The case is airtight, watertight and corrosion proof. The inside has foam padding with cutouts for the components.

Specifications
Outside Dimensions: 32.5" L x 21.5" W x 11.5" D (82.6 x 54.6 x 29.2 cm)
Weight: 30 lb (13.6 kg)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-193</td>
<td>Protective Rolling Case with Cut-Outs</td>
</tr>
</tbody>
</table>

HOLDERS FOR MARKUS OR ROOS CHAMBER
This holder allows a Farmer Style, Markus or Roos chamber to be held in place with the nylon thumb screw. Different density plugs are placed on top of the chamber and exposed to radiation. This holder works in conjunction with Item 681-107 Multi-Density Insert.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-170</td>
<td>Holder, Farmer Chamber / Density</td>
</tr>
<tr>
<td>681-171</td>
<td>Holder, Markus Chamber</td>
</tr>
<tr>
<td>681-172</td>
<td>Holder, Roos Chamber</td>
</tr>
</tbody>
</table>

FILM PHANTOM ASSEMBLY
The film phantom unit includes a film phantom base, 1.5 cm and 5.0 cm acrylic phantom blocks and a steel marker pin. The phantom cube and the 1.5 cm and 5.0 cm phantom blocks are placed on the film phantom base. A ready pack film is placed between the 1.5 cm and 5.0 cm phantom blocks and the steel marker pin is used to mark film for orientation. Once in the correct position, the film is exposed several times at different gantry angles which produces a star pattern on the film for verification of the machine isocenter.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-130</td>
<td>Film Phantom Assembly</td>
</tr>
</tbody>
</table>

ALIGNMENT PATTERN IN TUNGSTEN
Place the alignment pattern over film to check multileaf and field sizes. Circles can be used on simulator tv monitor to set horizontal or vertical adjustments.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-158</td>
<td>Alignment Pattern in Tungsten</td>
</tr>
</tbody>
</table>
ISIS QA-1 GEOMETRIC PHANTOM ACCESSORIES

ADJUSTABLE TABLE CENTERING BAR
This bar is used to properly align the ISIS Phantom Cube (681-100) on a table. The bar is adjustable from 37 cm to 68 cm wide. There is a scale on the bar with zero at center. The scale has mm and cm markings on both sides of zero. T-squares at each end of the bar are placed on the side of the couch and adjusted so each side is equal distance from zero on the scale. Knobs at both ends of the bar are loosened and tightened to make adjustments. There is an alignment pin on one side of the bar to connect it to the leveling plate (681-159). An alignment groove on the other side bar is to connect the Alignment Bar (681-150) to the Adjustable Centering Bar.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-162</td>
<td>Adjustable Centering Bar for Tables w/Alignment Bumps</td>
</tr>
<tr>
<td>681-1624</td>
<td>Centering Bar, Slotted Ends f/ Civco Couch Align Bumps</td>
</tr>
</tbody>
</table>

ADAPTER FOR THE CIVCO LOK-BAR
The Adapter for the CIVCO Lok-Bar is designed to be used on the CIVCO Lok-Bar to allow using the ISIS QA-1 Alignment Bar (681-150) and/or the Leveling Platform (681-159) with the CIVCO Lok-Bar. The Adapter has a circular hole on one side and an oval hole on the other which fit on the Lok-Bar pins. The underside of the Adapter has a cutout groove so it hugs the Lok-Bar which allows the Adapter to sit on the couch top, so it is not just sitting on top of the Lok-Bar. The Adapter has an alignment pin and a pin cutout to allow the Alignment Bar and/or Leveling Platform to fit to the Adapter. The centers of the Adapter's Lok-Bar pin holes are 1" (2.54 cm) from the ends of the Adapter.

Specifications
Adapter Size: 1 5/8" W x 11" L x 3/4" Thick (4.13 x 27.94 x 2 cm)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-169</td>
<td>Adapter for the CIVCO Lok-Bar</td>
</tr>
</tbody>
</table>

MINI PHANTOM
This Optional Mini Phantom can be used with the Alignment Bar or the Adjustable Table-Centering Bar to verify the coincidence of the lasers and the crosshairs and to check for gantry sag and optical back pointer position when the gantry is rotated ± 90°. The phantom can be used in the flat or vertical position. It has a “L-shaped” pin groove that sits on the alignment pin on either bar. It is scribed on four sides with 2 mm white painted lines. There are holes for tungsten pins on four sides of the phantom. Four 1.5 mm dia tungsten pins are included.

Specifications:
Material: Clear Acrylic
Dimensions: 15cm x 15cm x 5cm thick

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>681-180</td>
<td>Mini Phantom</td>
</tr>
</tbody>
</table>

HIGH PRECISION GANTRY LEVEL
The four-sided Gantry Level is used to check the gantry angle indicators at four locations: 0, 90, 180, and 270 degrees, with accuracy to 1/40 of a degree. Vinyl Case is not included.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>352-200</td>
<td>High Precision Four-Sided Gantry Level</td>
</tr>
<tr>
<td>352-201</td>
<td>Vinyl Case for High Precision Gantry Level</td>
</tr>
</tbody>
</table>

MINI PHANTOM
This is an acrylic phantom with a cavity for a PTW 23333 Ion chamber with a build-up cap.

Specifications:
Material: Acrylic
Dimensions: 5.5" L x 5.5" W x 1" T (14 x 14 x 2.54 cm)
Cavity Depth: 1.5 cm from top surface to center of cavity

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>681-2002</td>
<td>Phantom, Constancy, PTW N23333 w/Build-up Cap</td>
</tr>
</tbody>
</table>
SELF LEVELING 5 BEAM DOT LASER LEVEL

710-851 Includes
- Multi-functional magnetic base
- 3 "AA" alkaline batteries
- Mounting strap
- Magnetic target
- Tinted glasses
- Instruction manual with warranty card
- Soft-sided carrying case

Specifications
Number of Beams: 5
Leveling Method: Self-Leveling (Pendulum)
Laser Wavelength: 650nm ± 10nm (Red)
Laser Classification: Class IIIa
Maximum Power Output: <=5mW
Accuracy: ± 1/8"/50ft. (±2mm/10m)
Interior Range: Up to 200ft. (60m) depending on light conditions
Self-Leveling Range: ± 4.5°
Power Supply: 3 "AA" alkaline batteries (included)
Battery Life: Approximately 20 hours with alkaline batteries
Dimensions: 3.15" x 3.858" x 4.0" (80 x 98 x 101.6mm)
Weight: 1.1 lb (0.5 kg)
Working Temperature: 14°F to 113°F (-10°C to +45°C)
Center Screw Thread: 5/8"-11, 1/4"-20
IP Protection Class: 55

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>710-851</td>
<td>Self-Leveling Laser Level with 5 Beam Dot Laser</td>
</tr>
</tbody>
</table>

This 5 Beam Laser Level projects a vertical beam straight up and straight down to easily transfer a point from the floor to the ceiling plus will project 3 horizontal beams, one from left, one from right and one straight on to give you a perfect 90° angle in a room. This level is self-leveling with accuracy of 1/8" at 50 feet, plus has locking compensators so the laser level won't shake or be damaged while not in use.
**MINI PHANTOM WITH LEVELING PLATFORM**

**Leveling Platform for Mini-Phantom**
The Leveling Platform for the Mini-Phantom is made of black acrylic that is 15 cm square x 1.0 cm thick. A hole in the center of the Mini-Phantom is for a tungsten pin that goes into the Mini-Phantom. A bubble level and three leveling screws with rubber tips are used to level the platform. The rubber tips help prevent the platform from moving.

**Directions for use in CT or PET/CT**
Place the Mini-Phantom on the leveling platform with the pinholes towards the lateral lasers and the 15 cm side with scribe lines towards the foot of the couch. Align the Mini-Phantom to the center of the couch using the sagittal or overhead lasers. Level the platform using the bubble level and three leveling screws. Align the phantom to the CA of the beam by raising or lowering the couch to align the Mini-Phantom with the lateral lasers. A scan through the center of the Mini-Phantom should show the eight 1mm dia pinholes and four 1.5mm dia pinholes. Verify that the CT lasers are on the center scribe line around the phantom. Move the couch out so the lateral and ceiling lasers project onto the phantom. Check the couch movement distance. Verify that the lateral and ceiling lasers are on the center scribe line on the phantom. The movement of the lateral or ceiling lasers can also be checked by raising and lowering the lasers to the scribe lines 5 cm from the center. If present, the sagittal laser should align with the scribe lines on the 15 cm side of the phantom. The couch vertical movement can also be verified by raising and lowering the couch to the 5cm off-center scribe lines on the phantom.

**Directions for use in Accelerators or Conventional Simulators**
Insert the four tungsten pins into the four 1.5 mm dia holes in the Mini-Phantom. Place the Mini-Phantom on the leveling platform with the pinholes towards the lateral lasers and the 15 cm side with scribe lines towards the foot of the couch. Align the Mini-Phantom to the center of the couch using the sagittal or overhead lasers. Level the platform using the bubble level and three leveling screws. Align the phantom to the CA of the beam by raising or lowering the couch to align the Mini-Phantom with the lateral lasers and by moving the couch in to align with CA crosshairs. To verify vertical and lateral gantry angles take a radiograph with the gantry in the vertical position and in the lateral position. The tungsten pins should be on top of each other on the radiographs. The lateral lasers should align with the center scribe lines and the sagittal laser should align with the scribed line on the 15 cm side of the mini-phantom. To check the overhead laser rotate the gantry so the overhead laser shows upon the mini-phantom. The overhead laser should align with the center scribed line on the phantom. Raising and lowering the couch to the 5cm off-center scribe lines on the phantom.

The two large holes are 9.5 mm in diameter and are 10.6 cm apart from center to center. Each hole is in the exact center of a quadrant of the phantom.

**Tungsten Ball Mini Phantom**
(Item 710-188)
The Mini Phantom, for stereotactic collimator verification, has a 5.5mm diameter tungsten ball in the center. The ball is removable for CT applications.

**5 Seed Calibration Mini Phantom with Leveling Platform**
(Item 710-190)
The Mini Phantom CT 5 Seed Calibration has 5 aluminum seeds 1mm diameter x 5mm with a chart indicating center to center spacing between all seeds.

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**Radiation Products Design, Inc. | Albertville, MN 55301 | (800) 497-2071 | Fax: (763) 497-2295 | www.rpdinc.com**
GARD™
Designed to Verify Geometric Accuracy of Linear Accelerators and Simulators

- Easy to use
- Provides quick visual verifications
- Helps eliminate errors

The GARD™ is designed to fit into the shadow tray of the therapy machine, providing a fixed reference point for all measurements. This helps to eliminate errors associated with using independent devices for each geometric parameter.

Gantry and Collimator Angle Indicators
By using a smart tool level, indicators of gantry and collimator angle can be visually verified to 1/16” (0.16 cm) of a degree. The level is mounted so that it can check any gantry or collimator angle.

Optical Distance Indicator and Laser Alignment
An acrylic tray with a distance scale is supplied with the GARD™. Simply slide the tray into the accessory mount of the GARD™ and turn on the machine distance indicator. The distance markers from the machine will be visible on the GARD’s™ distance indicator and should coincide. The sides of the GARD™ have white acrylic plates on which black vertical and horizontal lines have been engraved. When aligned, the field lasers should coincide with the etched black lines.

Light and Radiation Field Coincidence
An optional film cassette (8” x 10” or 20.32 x 25.4 cm) is available which fits into the accessory mount of the GARD™. The top is etched with markings of four field sizes. Field size and crosshair position accuracy, as well as light and radiation field coincidence, can be verified.

Specifications
Goniometer Accuracy/Resolution: 0.2°
Optical Distance Indicator Resolution: 1.0 mm
Field Size Indicators: 5 x 5 cm, 10 x 10 cm, 15 x 15 cm, 20 x 20 cm
Size: 13.5” x 13.5” x 14.5” H (34.3 x 34.3 x 36.8 cm)
Weight: 9.5 lb (4.4 kg)

ROTATING ALIGNMENT PLATE AND STAND
The Rotating Alignment Plate and Stand will allow an easy check of isocenter using the collimator light and lasers. A 1.3 mm diameter tungsten ball located in the center will show up on x-ray or under fluoroscopy.

Specifications
Size
White Acrylic Plate: 2.5” x 3” (6.35 x 7.62 cm)
Steel Base: 4” x 5” x 0.5” (10.16 x 12.7 x 1.27 cm)
Stainless Steel Post: 5.5” (14 cm)
Color: Beige base
Weight: 3.6 lb (1.64 kg)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>710-005</td>
<td>Rotating Alignment Plate and Stand</td>
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QUALITY ASSURANCE DEVICES

ISOCENTER/LASER ALIGNMENT DEVICE

The Isocenter Alignment Device is a simple quality assurance device for testing alignment of isocentric beams. It allows for adjustments to be made by one person. One set-up will permit alignment of the side, overhead and sagittal lasers. It is usable with dot or line lasers.

Specifications
- Material: Stainless Steel and Lucite
- Size: 2" L x 2.25" W x 2" H (5.08 x 5.72 x 5.08 cm)
- Weight: 0.2 lb (.01 kg)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>710-030</td>
<td>Isocenter/Laser Alignment Device</td>
</tr>
<tr>
<td>352-104</td>
<td>Bulls Eye Circular Level</td>
</tr>
<tr>
<td>352-108</td>
<td>6 cm Level</td>
</tr>
</tbody>
</table>

ISOCENTER/LASER ALIGNMENT DEVICE WITH TUNGSTEN BALL

The Isocenter / Laser Alignment Device with Tungsten Ball is a simple quality assurance device for testing alignment of isocentric beams and room lasers. The addition of the 2 mm Tungsten Ball at central axis is to allow film verification of isocenter with a set orthogonal film exposures. This device allows for laser adjustments to be made by one person. One set-up will permit alignment of the side, overhead and sagittal lasers and isocenter verification on film. It is usable with dot or line lasers.

Specifications
- Marker: 2 mm Tungsten Ball
- Size: 2" L x 2.25" W x 2" H (5.08 x 5.72 x 5.08 cm)
- Weight: 0.2 lb (.01 kg)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>710-031</td>
<td>Isocenter/Laser Alignment Device with Tungsten Ball</td>
</tr>
</tbody>
</table>

ISOCENTRIC BEAM CHECKER I

The Isocentric Beam Checker I (IBC I) is used to precisely find the isocenter of any radiation therapy machine. It checks the alignment of side lights or laser beams used for patient set-ups in radiation therapy, conventional tomography and CT scanning.

The Isocentric Beam Checker consists of stainless steel base containing three adjustable rubber-tipped legs and built-in bubble level. Attached to the base is a translucent screen plate which can be rotated 360° in 15° steps. Inscribed on the plate are 3 field sizes; 2 mm x 2 mm, 5 cm x 5 cm and 10 cm x 10 cm. The field sizes are outlined with parallel and diagonal lines. The center of the field and all corners are provided with tungsten markers to project a sharp image of the field on verification films.

Specifications
- Material: Stainless Steel and Lucite
- Size: 9.5" L x 4.7" W x 2.5" H (24.13 x 11.94 x 6.35 cm)
- Weight: 3 lb (1.4 kg)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>710-020</td>
<td>Isocentric Beam Checker I</td>
</tr>
</tbody>
</table>

• Radiation and light-field congruence
• Collimator isocentricity
• Collimator field size accuracy
• Compact and easy to carry
• Laser alignments
• No assembly required
• Gantry isocentricity
• Rugged construction
This Cube can be used to do a modified Winston-Lutz test for IGRT accuracy. The phantom will provide a means to test the isocenter coincidence from CT scan to treatment planning system to treatment delivery.

The accuracy of radiation isocenter relative alignment and couch shift process is of fundamental importance in the accuracy of delivered dose in Image Guided Radiation Therapy (IGRT). Item 710-038, the 73mm Cube, has one (1) Central axis stainless steel marker for the testing and verification of predetermined measurable couch shifts. This phantom can be used to test the accuracy of CBCT alignment and couch shift in a simple and efficient manner. Images can be transferred to the treatment planning system to check coincidence of treatment planning system to couch shifts.

It is, therefore, critical to ensure the coincidence of these two coordinate systems for different clinical needs of image-guided radiation therapy procedures. The QA item "imaging and treatment coordinate coincidence" is aimed to test this coincidence and is applicable for each of the imaging systems considered. In addition, each system performing patient positioning and/or repositioning based on in-room imaging systems, either 2D or 3D, relies upon vendor software that compares and registers on-board images and reference images. Quality assurance of this process could be easily done by a phantom study with known shifts and is recommended for each system used clinically. The accuracy of this process should be tested on the daily basis, especially for SRS/SBRT.

Like the original Winston-Lutz test, the isocenter coincidence test is an end-to-end QA procedure in that it must start with the planning imaging process and end with the treatment step. In this case the last step is the use of the treatment beam to both irradiate and image markers using the treatment beam.

The 73mm Cube is made of Acrylic with three (3) sides each having a white vinyl label with the alignment markings as seen above. The stainless steel marker can be seen on the other three (3) sides.

Specifications
Stainless Steel Marker Location in Cube: at isocenter: X;Y;Z=0
Stainless Steel Marker Diameter: 2mm
Alignment Markings
Central axis: 4mm long dashes
X, Y, and Z: at 1cm and 2cm from central axis, 1cm long dashes
Material: Acrylic, White Vinyl and Stainless Steel
Size: 2.875 x 2.875 x 2.875 cm (73 x 73 x 73 mm)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>710-038</td>
<td>73 mm Cube, Acrylic w/One 2 mm Stainless Steel Marker</td>
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</table>
The accuracy of CBCT alignment and couch shift process is of fundamental importance in the accuracy of delivered dose in Image Guided Radiation Therapy (IGRT). Item 710-039, the 73mm Cube, has one (1) Central axis tungsten marker and two (2) offset tungsten markers for the testing and verification of predetermined measurable couch shifts. This phantom can be used to test the accuracy of CBCT alignment and couch shift in a simple and efficient manner. Images can be transferred to the treatment planning system to check coincidence of treatment planning system to couch shifts.

**General Operation for Daily CBCT Shift Verification**

Place the phantom cube on the CT couch. Align the phantom utilizing the positioning lasers on the CT machine and the laser alignment markings on the phantom. An axial CT scan of the phantom is acquired. The reference images are imported into the TPS and a simple plan is generated where the tungsten marker is aligned to the isocenter described by the TPS.

Normally one would place the phantom on the Linac couch in a known offset position from isocenter with the use of inscribed markings on the phantom. Then a CBCT scan is acquired in the offset position and the therapist aligns the phantom as one would align the patient using tools on the OBI workstation. The necessary couch shift is applied to move the phantom to the isocenter. After the couch shift is performed, the user can verify the location of the isocenter after the shift and document the deviation from the true isocenter. This test will ensure the CBCT alignment process is performing as intended within the tolerance levels established by the physicist.

**Specifications**

- **Tungsten Marker Locations in Cube**
  - One (1) at isocenter: X;Y;Z=0
  - One (1) located from isocenter: X: -2 cm; Y: -2 cm; Z: +2 cm
  - One (1) located from isocenter: X: +2 cm; Y: +1 cm; Z: -1 cm

- **Tungsten Marker Diameter:** 2 mm

- **Alignment Markings**
  - Central Axis: 4 mm long marks
  - X, Y, and Z: 1 cm and 2 cm from central axis, 1 cm long marks

- **Offset Marker Locations:** Marked with +

- **Material:** Acrylic, White Vinyl and Tungsten

- **Size:** 2.875 x 2.875 x 2.875 cm (73 x 73 x 73 mm)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>710-039</td>
<td>73 mm Cube, Acrylic w/Three 2 mm Tungsten Markers</td>
</tr>
</tbody>
</table>
T.A.D. THERAPY ALIGNMENT DEVICE

One simple device can align your Linac, ODI, CT, Lasers and Couch.

Perform the following tests with just one tool:

- Optical Distance Check Over 20 cm Range
- Collimator 90° Rotation Test
- Lasers Test: Side, Overhead and Sagittal
- Couch Height Test Over 20 cm Range
- Couch Vertical Travel Wander
- Couch 90° Left or Right Rotation
- CT Test Cut for Couch Center Alignment and Height
- CT Side Laser Height Check Over 20 cm
- CT Laser Height Test Over 20 cm
- CT Couch Height Vertical Travel
- CT Couch Height, Vertical Travel, CT Cut Stays on Same Spot to Indicate Gantry Vertical
- Gantry 90° Right and Left Test with Radiation and Gantry Vertical Test Using Film or Image Receptor
- Light Field vs. Radiation Field 10 cm x 10 cm and 20 cm x 20 cm with divergent tungsten pins
- CT Distance Alignment Check Over 0 cm, 8 cm, 13 cm and 21 cm Viewing 0.75 mm Aluminum Balls (Inside Balls 5 cm apart and Outside Balls 21 cm apart)

Therapy Alignment Device Specifications

Leveling Plate Base
- 8.5” x 8.5” x 3/4” thick (21.6 x 21.6 x 1.9 cm) black acrylic with a 1/16” (0.16 cm) white engraving material top
- Three leveling screws with rubber tips to prevent movement
- Two half-moon side plates, scribed with black dashes that align to top of leveling plate and center markings on leveling plate

Scribing on Leveling Plate
- Central axis to 20 cm
- 10 cm x 10 cm field
- 20 cm x 20 cm field

Accelerator Markers in Leveling Plate
- Eight 1.6 mm diameter x 12.5 mm tungsten pins mounted divergently at the four corners of the 10 cm and 20 cm fields
- One removable tungsten pin in the center
- Two 1.6 mm diameter tungsten pins are horizontally half-way embedded in the scribe lines 3 mm from the side plates

CT Markers in Leveling Plate
- Four 1/32” (0.08 cm) diameter aluminum balls imbedded flush with surface at 2.5 cm and 10.5 cm from central axis in one plane

Note: Tungsten pin must not be in the center hole for CT

ODI Scale Specifications

Base
- 2” x 2” x 0.875” thick (5.08 x 5.08 x 2.22 cm) black acrylic base
- 2” W x 8.125” H x 1/8” thick (5.08 x 20.64 x 0.32 cm) white/black/white engraving material attached to base

Scribing on ODI Scale
- Vertical dashed line
- Horizontal lines at 5.0 cm, 10.0 cm, 15.0 cm and 20.0 cm from bottom of scale

<table>
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<tr>
<th>Item #</th>
<th>Description</th>
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<tbody>
<tr>
<td>710-040</td>
<td>T.A.D. Therapy Alignment Device</td>
</tr>
</tbody>
</table>
OPTICAL DISTANCE VERIFICATION AND ALIGNMENT TOOL
With Isocentric Ball Pointer

This system will calibrate optical distance indicators on accelerators, cobalt units and simulators. The ball pointer is used to determine the rotational isocenter of the treatment machine collimator head and gantry. The ball pointer is also visible in fluoroscopy on simulators.

Instructions
Step 1
Determine the most useful range (40 cm or less) of the Optical Distance Indicator (ie. 80 cm to 120 cm range with a 100 cm isocenter). Figure 1 - set the white plastic tray five steps (20 cm) down from the top. Use an Accurate Mechanical Distance Rod adjusted for 100 cm isocenter and adjust the couch height until the distance rod just touches the white plastic tray.

Step 2
Figure 2 - rotate the white plastic tray around 180° out of the field and adjust the alignment tool so crosshairs align with the black dots on the base plate.

Step 3
Figure 3 - raise the white plastic tray up 20 cm. This tray would show field light crosshairs intersecting with 80 cm. The black dots on the base represents the crosshairs and will intersect with 120 cm.

Step 4
Adjust the Optical Distance Indicator so that 80 cm and 120 cm are obtained at the same time. When both points are precisely on, linearity can be checked in 5 cm steps by moving the plastic tray down the rod.

Specifications
Optical Distances: 5 cm steps to 40 cm
Material: White plastic w/mat finish and black dots
Ball Pointer: 1/16” dia. ball on 12” long rod
Rod Clamp
Base: 10 cm W x 13 cm L x 1/2” T zinc plated steel w/rubber feet
Height: 43 cm
Weight: 4 lbs

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
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<tbody>
<tr>
<td>710-000</td>
<td>Optical Distance Verification and Alignment Tool</td>
</tr>
</tbody>
</table>

MAGNETIC FRONT POINTER

The Magnetic Front Pointer provides a mechanical SSD Check, and verification of the Optical Distance Indicator (ODI).

The tray for the magnetic front pointer slides into the block tray slot. The rod is held to the tray by a magnet. Each rod has a 10 cm range with an engraved scale in 2 mm increments. The scale on the Magnetic Front Pointer has an adjustment range of 3.8 mm.

One rod of the customers choice is included with the magnetic front pointer.

When ordering please specify manufacturer and model of machine, tray size, and rod to be included.

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<tr>
<th>Item</th>
<th>Magnetic Front Pointer</th>
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<td>701-401</td>
<td>for Varian Clinac 4/80</td>
</tr>
<tr>
<td>701-402</td>
<td>for Varian Type II Accessory Mount</td>
</tr>
<tr>
<td>701-403</td>
<td>for Varian Type III Accessory Mount</td>
</tr>
<tr>
<td>701-407</td>
<td>for Siemens with Coding By-Pass</td>
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<tr>
<td>701-408</td>
<td>for Siemens with Screw Coding</td>
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<tr>
<td>701-409</td>
<td>for Siemens with Digital Coding Plug</td>
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<tr>
<td>701-410</td>
<td>for Siemens with MLC - Digital Coding</td>
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<tr>
<td>701-411</td>
<td>for Siemens Primus with MLC, 56.6 cm</td>
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<tr>
<td>701-420</td>
<td>for Philips SL25</td>
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<td>701-426</td>
<td>for GE Saturne 40, 41, 42 or 43</td>
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<td>701-428</td>
<td>for ACEL Theratron 780C</td>
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<td>701-429</td>
<td>for AECL Theratron Elite 80</td>
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<td>701-430</td>
<td>for MDS Nordion / BEST</td>
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<td>701-431</td>
<td>for Mitsubishi ML-6M, ML 20M</td>
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<td>701-432</td>
<td>for Mitsubishi</td>
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<tr>
<td>701-433</td>
<td>for Siddharth 6MeV Linear Accelerator</td>
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<td>701-400-31</td>
<td>80 to 90 cm</td>
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<td>701-400-32</td>
<td>90 to 100 cm</td>
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<td>100 to 110 cm</td>
</tr>
<tr>
<td>701-400-34</td>
<td>110 to 120 cm</td>
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</table>
Correct alignment of the light field with the radiation field is essential for reliable treatment set-up. According to national and international recommendations this alignment should be checked at least once a week and should correspond to within ±2mm at SSD 100cm.

The X-Lite with a fluorescent plate helps you align the accelerator radiation fields on the treatment table quickly and directly. The plate is activated by ionizing radiation, producing a green fluorescence which is clearly visible for a few minutes after the radiation is switched off. The 5x5, 10x10, 15x15 and 20x20 cm² active areas are permanently marked with field scales in centimeters.

A protective red filter prevents activation of the phosphor by the light field from the gantry head or by ambient light. Irradiation photons and electrons penetrate the filter to activate the plate.

Using X-Lite is easy and alignment checks can be part of the daily routine. With the filter in place, align the light field according to the scale on X-Lite. Put any required build-up material on the plate and irradiate. Remove the filter from X-Lite and check the radiation field alignment.

It is not necessary to wait for the afterglow to fade between irradiations, since the contrast is high as long as the following irradiation uses the same dose or higher.

**Specifications**

- **Active Area:** 23 x 23 cm
- **Field Scale:** 5 x 5 cm, 10 x 10 cm, 15 x 15 cm, 20 x 20 cm
- **Deviation Scale:** ±5 mm in steps of 1 mm from each field scale.
- **Scale Accuracy:** ±1 mm
- **Maximum Dose:** 6 Gy/exposure
- **Radiation Type:** Photons, electrons
- **Daylight Filter:** Red, removable
- **Material:** Plexiglass / polycarbonate
- **Operating Temperature:** 59° - 113°F (15° - 45°C)
- **Dimensions:** 10.87" W x 12.6" L x 0.55" H (32 x 27.6 x 1.4 cm)
- **Weight:** 3.1 lb (1.4 kg)

**TUNGSTEN ALIGNMENT PATTERN PLATE**

For Accelerators and Simulators

Film Verification of light field to radiation field is accomplished by placing a Ready Pack film under the tungsten pattern plate. Tests include the following: collimator zero and rotation verification, field size, gantry sag, collimator filament sag, light field to radiation field with film or image tube, fluoroscopy horizontal and vertical linearity check.

**Specifications**

- **Sizes:** 10, 20, 30, and 40 cm squares and circles
- **Overall Size:** 16 5/8" sq. x 1/8" T (42.38 x 0.32 cm)

**PLUMB BOB**

Nickel-Plated

The Plumb Bob can be used to align gantries, couches, laser lights and more. Gantry vertical alignment can be accomplished by marking the cross hair projection spot on the ceiling and floor, then dropping the Plumb Bob line from the ceiling spot to the floor spot. The machine alignment is vertical when the Plumb Bob line intersects with the ceiling and floor spots.
QUALITY ASSURANCE DEVICES

TUNGSTEN ROTATING ALIGNMENT PATTERN DEVICE
For Ready Pack Film For Accelerators and Simulators

The vertical supports are black acrylic with 1 3/4" (4.46 cm) diameter knobs for rotating the plate. The knobs have indents every 45° for accurate positioning when rotating the plate. The rotating plate consists of two white plates that allow a 10" x 12" ready pack film to be inserted between and secured by a clamp. Two half-moon cutouts on the plates make it easy to grasp the film and pull it out.

On one plate there are 1.6 mm diameter tungsten balls and 1.6 mm diameter x 12.7 mm long tungsten rods embedded with gray epoxy which give a sharper film image. The dark markings allow for easy viewing of the field-light and central axis on the plate surface. The 5 cm², 10 cm² and 20 cm² fields are defined by tungsten balls and rods. The tungsten balls are used to form arrows so film orientation is easily seen and no film pricking is necessary. Tungsten balls are also placed at central axis and every cm from 2 cm to 13 cm and again at 15 cm. Device orientation is accomplished with 0, 90, 180 and 270 markings on the plate. Two bubble levels on this plate ensure level accuracy of the rotating plate.

On the other plate dashed lines are used to correspond to central axis. This allows for verification of lasers to central axis.

Specifications
Field Sizes: 5 x 5 cm, 10 x 10 cm and 20 x 20 cm
Rotation: 360° in 45° increments
Positioning: Self-seating indents
Markers: 1.6 mm Dia. tungsten balls
          1.6 mm Dia. x 12.7 mm L tungsten rods
Leveling: 3-point with 2 bubble levels
Maximum Size: 40.5 W x 40.5 L x 36.7 H cm
Screen Size: 33.7 W x 30.5 L cm
Material: Black acrylic; White and clear engraving material
Weight: 9 lb (4.09 kg)

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<th>Item</th>
<th>Description</th>
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<tr>
<td>710-720</td>
<td>Tungsten Rotating Alignment Pattern Device for Ready Pack Film</td>
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</table>
TUNGSTEN ROTATING ALIGNMENT PATTERN DEVICE
For CR Cassette For Accelerators and Simulators

The vertical supports are black acrylic with 1 3/4" (4.46 cm) diameter knobs for rotating the plate. The knobs have indents every 45° for accurate positioning when rotating the plate. The rotating plate consists of two white plates that allow a standard CR Cassette to be inserted between and secured by thumb screws. Two half-moon cutouts on the plates make it easy to grasp the cassette and pull it out.

On one plate there are 1.6 mm diameter tungsten balls and 1.6 mm diameter x 12.7 mm long tungsten rods embedded with gray epoxy which give a sharper film image. The dark markings allow for easy viewing of the field-light and central axis on the plate surface. The 5 cm², 10 cm² and 20 cm² fields are defined by tungsten balls and rods. The tungsten balls are also placed at central axis and every cm from 2 cm to 13 cm and at 15 cm. Device orientation is accomplished with 0, 90, 180 and 270 markings on the plate. Two bubble levels on this plate ensure level accuracy of the rotating plate.

On the other plate dashed lines are used to correspond to central axis. This allows for verification of lasers to central axis.

Specifications

- **Field Sizes:** 5 x 5 cm, 10 x 10 cm and 20 x 20 cm
- **Rotation:** 360° in 45° increments
- **Positioning:** Self-seating indents
- **Markers:** 1.6 mm Dia. tungsten balls
- **Leveling:** 3-point with 2 bubble levels
- **Material:** Black acrylic; White and clear engraving material
- **Maximum Size:** 40.5 W x 40.5 L x 36.7 H cm
- **Weight:** 14 lb (6.36 kg)

Checks the following mechanical and geometrical parameters of accelerators and simulators easily and accurately:
- Radiation / field-light congruence
- Collimator field size accuracy
- Isocenter rotation accuracy
- Collimator, gantry, and table isocentricity
- ODI accuracy
- Laser alignment
- Uses a Standard CR Cassette

The Tungsten Rotating Alignment Pattern (TRAP) is an easy to use multi-purpose QA test tool for daily, weekly, monthly, or annual checks of the mechanical and geometric parameters of linear accelerators and simulators.

The TRAP has a 40.5 cm wide x 40.5 cm long black acrylic base with a 25 cm wide x 30 cm long cutout. The base cutout allows for viewing of the central axis on the plate with the gantry at 0°. The base has 5 rubber-tipped leveling screws (3 leveling screws and 2 stabilization screws).

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<tr>
<td>710-721</td>
<td>Tungsten Rotating Alignment Pattern Device for CR Cassette</td>
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</table>
QUALITY ASSURANCE DEVICES

ISOCENTRIC BEAM CHECKER II

Tungsten markers of 2 mm diameter are embedded in the center and corners of the fields. A 10" x 12" ready-pack film can be sandwiched between the two plates. When exposed, the tungsten markers project a sharp image on the film. The necessity of pricking holes into the film is therefore eliminated.

Caution: Although provided with non-slip rubber-tipped adjustment thumb screws, care must be taken not to displace the IBC during rotation of the screen plate. The screen plate can be rotated in 45° increments. To rotate the screen plate it is best to grab both left and right knobs together while turning them simultaneously. When turned 45°, the screen seats itself accurately and automatically thus repositioning is accomplished easily and quickly.

Specifications

Field Sizes: 2 mm, 5 cm, 10 cm, 15 cm and 20 cm
Rotation: 360° in 45° increments
Positioning: Self-Seating
Markers: All intersecting corners: 2 mm O.D. dia. tungsten balls
Leveling: 3-point w/bubble level
Size: 20.3 W x 45.7 L x 33 H cm
Screen Size: 30.5 x 30.5 cm
Materials: White and clear plexi and tungsten
Weight: 6.1 lb (2.8 kg)
Shipping: Fully assembled

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<tr>
<td>710-730</td>
<td>Isocentric Beam Checker II</td>
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The IBC II, a "multi-purpose" precision quality assurance tool, is an easy to use test device for daily, weekly or monthly quality assessments of all mechanical and geometrical treatment parameters of linear accelerators or teletherapy units.

The Multifunctional Isocentric Beam Checker, IBC II, consists of a large opaque acrylic screen backed by a secondary plate, both supported by two lateral uprights. The screen is inscribed with lines precisely defining corners, edges and center of the screen’s 2 mm square, 5 cm square, 10 cm square, 15 cm square and 20 cm square fields. Intersecting center lines are inscribed with short lines spaced 1 cm apart. The screen can rotate about its axis in increments of 45°.
ISO CUBE™ DAILY QA PHANTOM

ISO Analyze™ Image Analysis Software integrates with the ISO Cube™ Daily QA Phantom and ISO Base™ Alignment Platform, enabling user-friendly quality control of the isocenter of a LINAC by analyzing DICOM images acquired with the EPID detector. Controls are run automatically, analyzing the image of the ISO Cube™ and quantifying a large number of evaluation parameters. It allows users to easily generate a report for each preceding control.

Item 710-323 ISO Cube Daily QA Phantom Includes
- ISO Cube™ Daily QA Phantom
- User Guide
- 48 month Warranty

Specifications
Material: Plastic Water®
Size: 4.75" x 4.75" x 4.75" (12 x 12 x 12 cm)
Weight: 3.9 lb (1.7 kg)

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<th>Item</th>
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<td>710-325</td>
<td>ISO Cube™ Stereotactic Target Frame Adapter</td>
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<tr>
<td>710-327</td>
<td>ISO Align Altazimuth Alignment Platform</td>
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<tr>
<td>710-328</td>
<td>ISO Analyze Image Analysis Software Pkg</td>
</tr>
<tr>
<td>710-329</td>
<td>ISO Base Alignment Platform</td>
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Target positioning through imaging localization is critical for the accurate delivery of radiation treatment. Verifying that all of the imaging, localization and targeting systems are aligned with the true radiation isocenter is crucial. The ISO Cube™ provides a cost-effective, quick and accurate means of testing radiation isocenter coincidence with the isocenters of the image guidance systems.

The ISO Cube™ was designed specifically for daily system checks. The lasers and light field can be tuned to the true radiation isocenter using the engraved markings on the exterior of the ISO Cube™. The light field and radiation field alignment can be checked using integral radiographic markers. More importantly the isocenters of both the ODI and the EPID can be checked for true spacial alignment and coincidence with that of the treatment beam.
ISO CUBE™ DAILY QA PACKAGE

Affordable "TurnKey" Solution for daily machine QA

Target positioning through imaging guidance is critical for the accurate delivery of radiation treatment. Verifying that all of the imaging, localization and targeting systems are aligned with the true radiation isocenter is crucial. The ISO Cube™ Daily QA Package provides a cost-effective, fast and accurate means of testing radiation isocenter coincidence with the isocenters of the image guidance systems.

The package includes ISO Cube™ Daily QA Phantom, ISO Base™ Platform and ISO Analyze™ Image Analysis Software.

ISO Analyze™ integrates with the ISO Cube™ and ISO Base™, enabling user-friendly quality control of the isocenter of a LINAC by analyzing DICOM images acquired with the EPID detector. Controls are run automatically, analyzing images of the phantom and quantifying a large number of evaluation parameters. The software allows users to easily generate, save and print a report for each preceding control.

The ISO Cube™ is used to position and level the ISO Cube™ on the treatment couch. It contains integrated pixel calibration targets for use with ISO Analyze™.

The phantom, base and software were designed specifically for daily system checks. LINAC laser and light fields can be "tuned" to true radiation isocenter using the engraved markings on the exterior of the phantom. The light field and radiation field alignment can be checked using the phantom’s integral radiographic markers. More importantly the isocenters of both the OBI and the EPID can be checked for true special alignment and coincidence with that of the treatment beam.

The ISO Cube contains a center point target and an offset target. The center point target imaged in concert with the external concentric engraved circles provides greater accuracy localizing the center of the phantom with respect to the center of the radiation field. The off-set target is used to insure the table offset coordinates generated by kV/MV imaging are accurate.

Item 710-330 ISO Cube™ Daily QA Package Includes
- ISO Cube™ Daily QA Phantom
- ISO Base™ Alignment Platform
- ISO Analyze™ Image Analysis Software Package
- User Guide
- 48 month Warranty

Optional Items
Item 710-325 ISO Cube™ Stereotactic Target Frame Adapter

Specifications - ISO Cube™

Material: Plastic Water®
Size: 4.75" x 4.75" x 4.75" (12 x 12 x 12 cm)
Weight: 3.9 lb (1.7 kg)

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<tr>
<th>Item</th>
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<td>710-325</td>
<td>ISO Cube™ Stereotactic Target Frame Adapter</td>
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### Integrated Data Analysis in 5 Easy Steps

<table>
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<tr>
<th>Acquire</th>
<th>Define</th>
<th>Select</th>
<th>Calculate</th>
<th>Report</th>
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</table>
| Use pre-established ISO Cube's treatment plan to acquire all necessary images for analysis of parameters. | One time setup for each LINAC requires:  
- LINAC Identity  
- Acquisition Conditions  
- Acquisition Sequences | Select pre-acquired DICOM images to use in each parameter calculation. Select images are highlighted for each parameter. | ISOAnalyze™ quickly calculates parameters and displays detailed results. | Detailed results can be manipulated for in-depth analysis. Summary report is displayed and PDF document may be printed and saved. |

#### Why use ISO Cube™?

1. The stereo-triangulation approach employed with ISO Cube is similar to that of highly accurate GPS Systems. The calculation accuracy of the isocenters is based on projections of targets distributed in a 3D space contained within the 3D space found at the convergence of the treatment beams.
2. ISO Cube allows for comprehensive and thorough testing of LINAC specific centers of rotation.
3. ISO Cube allows for quick, daily QA of OBI and CBCT isocenters.
4. ISO Cube shows the impact of positioning a 3D object on the couch using LINAC specific positioning lights and lasers.
5. ISO Cube offers an opportunity to assess the orthogonality of LINAC specific positioning lights and lasers.
6. ISO Cube allows calculation of the planar deviation between the center of the radiation field and the projection of the LINAC mechanical ISO center on the image plane for each gantry and collimator position. This eases troubleshooting of clear outliers.
7. ISO Cube’s internal features permit assessment of misalignment between light field and radiation field.
Beam Sentry 2 is easy to use. Simply connect the electrometer to the ion chamber assembly, place the electrometer at the foot of the treatment table, collimate the beam to the 10 cm field markings on the ion chamber, make the exposure and collect the reading.

The electrometer offers high accuracy, precision and repeatability, and is suitable as a stand-by or a back-up dosimeter. The connectors are triaxial BNC, permitting use with a standard triaxial extension cable for reading successive doses from outside of the treatment room and providing interchangeability with other dosimetry ion chambers and electrometers.

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<td>321-031</td>
<td>Beam Sentry 2 Daily Output Constancy Monitor</td>
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<tr>
<td>321-041</td>
<td>Acrylic Build-Up Plate Set</td>
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<tr>
<td>323-1303</td>
<td>10 Meter Triax Cable BNC-F to BNC-M</td>
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</tbody>
</table>

The detector assembly contains a sealed plane-parallel plate ion chamber, requiring no corrections for barometric pressure and temperature changes. The detector assembly is reversible, having two entrance windows, each with a 10 cm field markings. One entrance window has a buildup optimized for 6MV and electron beams, and the opposite entrance window has a buildup optimized for 18MV.

**Specifications**

**Electrometer**
- Display: 3 1/2 digit LCD
- Range: 19.99 and 199.9
- Units: Factory set: R, cGy, or nC
- Accuracy: ±0.1% of reading + 1 digit
- Linearity: ±0.1%, +1 digit or precision of reading, whichever is greater
- Leakage: <60 fA
- Temperature Stability: 20ppm/°C
- Input Connector: BNC-F triax w/cap and chain
- Bias Supply: Static, 300V, 100%, 50% off
- Power: 9V battery, NEDA 1604A
- Size: 6" x 6" x 3.5" (15.24 x 15.24 x 8.89 cm)
- Weight: 2 lb (1 kg)

**505A Ion Chamber Assembly**
- Chamber Type: Plane-parallel
- Sensitive Volume: 2cc, nominal
- Collector: 31 mm diameter
- Electrode Spacing: 2.6 mm
- Sensitivity: 0.7 nC/cGy, nominal
- Top Buildup: 1.4 g/cm² (4-10 MV, 5-12 MeV)
- Bottom Buildup: 2.6 g/cm² (10-25 MV, 12-25 MeV)
- Cable: 6.5' (2 m) integral
- Connector: Triaxial BNC (TNC optional)
- Size: 6" x 6" x 1.5" (15 x 15 x 3.8 cm)
- Weight: 2.4 lb (1.1 kg)

**Optional Acrylic Build-Up Plate Set Includes**
- (1) 15 cm² x 0.63 cm (1/4")
- (1) 15 cm² x 1.27 cm (1/2")
- (1) 15 cm² x 1.90 cm (3/4")
**THERAPRO DAILY OUTPUT AND SYMMETRY MONITOR**

The TheraPro is designed for daily output/symmetry/flatness/energy checks of radiation therapy treatment machines. High quality, ease-of-use and versatility are the prime objectives in the TheraPro design. A Windows®-based control panel digitally controls the instrument. The TheraPro guides the user through setup, measurement and data management. The user proceeds through measurement sequences easily by using either the touchscreen interface or by clicking the mouse. The TheraPro stores a virtually-unlimited number of calibrations and measurements. Years of measurements can be stored on multiple machines using the internal 32 MB flash memory. Stored beam information includes date, time, machine name, energy, chamber readings, flatness and symmetry. Data files can be transferred via the supplied 64 MB CompactFlash™ card and USB card reader to standard spreadsheet or word processor applications.

When compared to similar devices, the TheraPro is unique because it is expandable. With the optional Diode Dosimetry Software, diode input module and diode detectors, the TheraPro can be economically upgraded to perform as a five-channel diode dosimeter, with the same data collection and storage power as mentioned above. As such, the TheraPro does not sit idle after the daily beam output checks are done.

### Components

#### Chamber Array

The chamber array contains six ion chambers that are automatically corrected for temperature and pressure. One chamber is located in the center of the 20 cm x 20 cm field and four chambers are each located 8 cm off the central axis on the X and Y axes. The signals are sent through a custom made, molded-jacket, shielded multi-coax cable to the Data Acquisition Module located inside the treatment room. The sixth ion chamber, in a separate location, provides energy constancy information.

- Consistency, flatness, symmetry and energy monitoring
- Five ion chamber array with sixth chamber for energy constancy
- Automatically corrects for temperature and pressure
- No electronics near beam
- Controller runs on Windows®
- Touchscreen display (with optional mouse and keyboard included)
- 32 MB internal flash memory
- Includes 64 MB CompactFlash™ card and USB CompactFlash card reader for exporting data
- Flexible data transfer to any Windows application for charting, reporting, etc.
- Expandable to a five-channel diode dose monitor

### Data Acquisition Module

The data acquisition module contains a six-channel electrometer that sends data to the controller located outside the treatment room via inexpensive, readily available 49’ (15 m) cable. Longer cable lengths are available on request.

### Controller

The controller provides control and data storage for the TheraPro. This controller runs the TheraPro software under Windows® using either touchscreen or keyboard & mouse for operation. Data can be exported to standard spreadsheet and word processing programs for more extensive plotting, charting, and reporting of data.

### Diode Dosimetry Software (optional)

The TheraPro can be used as a one-to-five channel dose verification monitor by using optional software and simply replacing the ion chamber array with a diode input module that accepts up to five diode detectors of either polarity.

### Equidose® Il Diode Detector

Items 322-862 to 322-879. Sold Separately.

### Item 347-950 TheraPro Daily Output and Symmetry Monitor

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<td>347-950</td>
<td>TheraPro Daily Output and Symmetry Monitor</td>
</tr>
<tr>
<td>347-952</td>
<td>TheraPro Dose Verification Software and Diode Input Module</td>
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</tbody>
</table>
CUBE 20 PHANTOM
The most convenient device for routine QA and IMRT applications

Features
- Routine patient QA
- Beam constancy checks
- MLC QA
- User friendly set-up and positioning
- Suitable for head/neck and torso treatments
- Mimics water within 1%

The Cube 20 Phantom was designed for routine QA in RT and IMRT applications where ease of use and quick set-up are important. The Cube 20 phantom is manufactured from Plastic Water® DT which faithfully mimics water within 1% from 50 keV to 25 MeV. This enables complete QA from CT image acquisitions to therapy dose verifications. The 20 cm cubic dimension was chosen as a suitable approximation for both head/neck and torso treatments. All the edges are rounded to avoid CT artifacts.

Chamber, diode or MOSFET detectors are easily positioned at isocenter of the cube and laser alignment marks on all sides facilitate precise positioning of the phantom. Detector position can be adjusted in 1mm increments longitudinally and 5mm increments for lateral and elevational adjustments.

Ready-Pac film can be inserted in the cube. By rotating the cube, the film is easily set in sagittal, coronal or transverse orientations. Stainless steel fiducial points are clearly resolvable on CT images and leave small indentations on the film for precise film to plan registration.

Specifications
Size: 20 cm x 20 cm x 20 cm
Lateral Spacers: 0.5 cm, 1 cm, 2 cm
Elevational Spacers: 0.5 cm, 1 cm, 2 cm
Please specify chamber to be used

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<td>682-400</td>
<td>Cube 20 Phantom</td>
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