

ISIS QA-1 GEOMETRIC QA PHANTOM



Geometric Accuracy for all QA Steps

- Room Lasers
- Patient Marking Laser
- CT Simulator Conventional
- Simulator
- Treatment Delivery System

Ensure Data Transfer

- From Scanned Images
- Density Checks
- Anatomical Structures
- Isocenter + Central Axis
- Planned Beams for Patient Marking

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 lasermarking 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 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)

Item #	Description
681-110	ISIS QA-1 Geometric Phantom Package
Specify Ion Chamber: Manufacturer, Model Number and Description	

QUALITY ASSURANCE DEVICES

INSERTS 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



Item #	Description
681-104	Insert, Farmer Style Chamber

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



Item #	Description
681-101	Insert with 2.54 cm Diameter Teflon Ball

INSERT, PTW 31006 CHAMBER

Item #	Description
681-104-31006	Insert, PTW 31006 Chamber



INSERT, PTW 31016 CHAMBER

Item #	Description
681-104-31016	Insert, PTW 31016 Chamber



INSERT, EXRADIN A12 CHAMBER

Item #	Description
681-104-A12	Insert, Exradin A12 Chamber



INSERT, EXRADIN A12S CHAMBER

Item #	Description
681-104-A12S	Insert, Exradin A12S Chamber

Photo
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INSERT, EXRADIN A14SL CHAMBER

Item #	Description
681-104-A14SL	Insert, Exradin A14SL Chamber



INSERT, EXRADIN A1SL CHAMBER

Item #	Description
681-104-A1SL	Insert, Exradin A1SL Chamber



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.



Item #	Description
681-106	Insert, Stereotactic Tungsten Ball

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.**



Item #	Density Plug	Physical Density gm/cm ³	Electron Density cc x 10 ²³	Electron Density Relativeto H ₂ O
681-107	Insert, Multi-Density Holder ONLY			
681-107-6	Lung Inhale	0.195 ± 0.20	0.634	0.190
681-107-7	Lung Exhale	0.495 ± 0.20	1.632	0.489
681-107-8	Bone 800 mg/cc	1.609 ± 0.01	4.862	1.456
681-107-9	Water	1.008 ± 0.01	3.346	1.002
681-107-10	Adipose (Fat)	0.967 ± 0.01	3.170	0.949
681-107-11	Breast (50% Gland / 50% Adipose)	0.991 ± 0.01	3.261	0.976
681-107-12	Muscle	1.062 ± 0.01	3.483	1.043
681-107-13	Liver	1.071 ± 0.01	3.516	1.052
681-107-14	*Trabecular Bone - 200 mg/cc	1.161 ± 0.01	3.730	1.117
681-107-15	*Dense Bone - 1000 mg/cc	1.660 ± 0.01	5.243	1.570
681-107-16	*Dense Bone - 1250 mg/cc	1.830 ± 0.01	5.718	1.712
681-107-17	*Dense Bone - 1500 mg/cc	2.000 ± 0.01	6.209	1.859
681-107-18	*Dense Bone - 1750 mg/cc	2.170 ± 0.01	6.698	2.005
681-107-19	*Coritcal Bone	1.930 ± 0.01	5.956	1.780
681-107-20	**Titanium	4.507 ± 0.01	12.475	3.735
681-107-21	***Aluminum	2.718 ± 0.01	-	-

* 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.



Item #	Description
681-108	Insert, Liquid Fillable

INSERT, HOLDS ISOTOPE 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.



Item #	Description
681-109	Insert, Holds Isotope Pin In Center
681-114	Holder for NA-22 Isotope
710-045-3	NA-22 Isotope

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

Item #	Description
681-119	Insert, Seed Calibration

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

QUALITY ASSURANCE DEVICES

ISIS QA-1 GEOMETRIC PHANTOM ACCESSORIES

ISIS PHANTOM CUBE

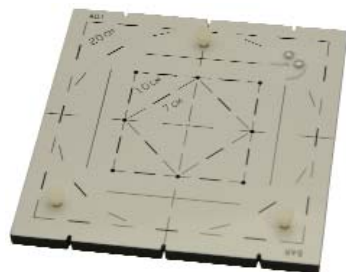


This is a 14 cm cube made of clear acrylic with a 10 cm square scribed on three sides of the cube. The scribes are 2 mm wide and painted in white. Four of the six sides of the cube have nine holes per side for use of tungsten pins. One side has a slot to hold the 50 cm ruler. Crosshair markings are on 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.

Density Plug	Physical Density	Electron Density Per cc x 10 ²³	Electron Density Relative to H ₂ O
Lung Inhale	0.20	0.634	0.190
Lung Exhale	0.50	1.632	0.489
Dense Bone 800 mg/cc	1.53	4.862	1.456
Water	1.01	3.346	1.002

Item #	Description
681-100	ISIS Phantom Cube

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.

Item #	Description
681-159	Leveling Platform with 20 cm Field

ALIGNMENT BAR



681-150

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.

Item #	Alignment Bar
681-150	Varian ETR Couch
681-151	Varian ETR and G.E. Discovery Couch
681-152	With Snap-On Ends

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.



Item #	Tungsten Pins	Quantity
681-112	1/16" Dia. x 1/2" L (0.16 x 1.27 cm)	20
681-113	3/32" Dia. x 1/2" L (0.24 x 1.27 cm)	20

50 CM ALUMINUM RULER

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



Item #	Description
681-120	50 cm Ruler

QUALITY ASSURANCE DEVICES

ISIS QA-1 GEOMETRIC PHANTOM ACCESSORIES



MAGNETIC GANTRY LEVEL WITH LIGHT

Torpedo level with three lighted vials and a magnetic strip. **Batteries not included.**

Item #	Description
352-234	Magnetic Gantry Level with Light



ROUND BUBBLE LEVEL

Item #	Description
681-121	Round Bubble Level



PROTECTIVE ROLLING CASE

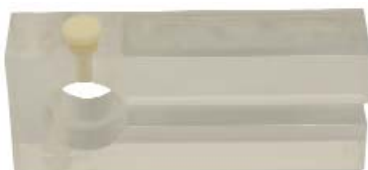
This black case has rigid wall construction and reinforced rounded bumper corners. For ease in transport there are two heavy duty urethane wheels and a 7" (17.8 cm) extension handle. The case has seven latches, an o-ring seal and an atmospheric purge valve. The case is airtight, watertight and corrosion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

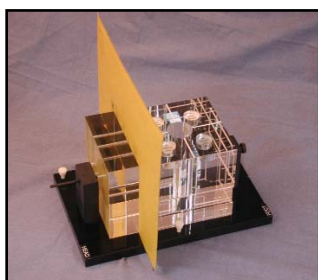
Item #	Description
681-193	Protective Rolling Case with Cut-Outs



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.

Item #	Description
681-170	Holder, Farmer Chamber / Density
681-171	Holder, Markus Chamber
681-172	Holder, Roos Chamber



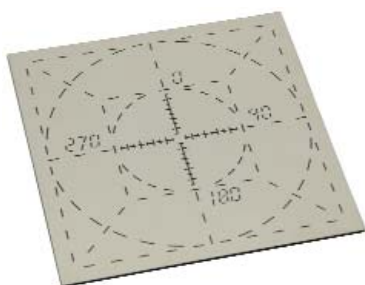
FILM PHANTOM ASSEMBLY

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.

Item #	Description
681-130	Film Phantom Assembly

ALIGNMENT PATTERN IN TUNGSTEN

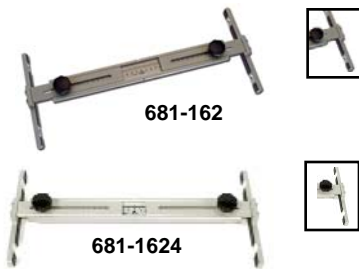
Place the alignment pattern over film to check multileaf and field sizes. Circles can be used on simulator tv monitor to set horizontal or vertical adjustments.



Item #	Description
681-158	Alignment Pattern in Tungsten

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.

Item #	Description
681-162	Adjustable Centering Bar for Tables w/Alignment Bumps
681-1624	Centering Bar, Slotted Ends f/ Civco Couch Align Bumps

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)

Item #	Description
681-169	Adapter for the CIVCO Lok-Bar

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 $\pm 90^\circ$. 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.

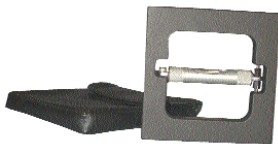
Specifications:

Material: Clear Acrylic

Dimensions: 15cm x 15cm x 5cm thick

Item #	Description
681-180	Mini Phantom

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.

Item #	Description
352-200	High Precision Four-Sided Gantry Level
352-201	Vinyl Case for High Precision Gantry Level

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

Item #	Description
681-2002	Phantom, Constancy, PTW N23333 w/Build-up Cap

SELF LEVELING 5 BEAM DOT LASER LEVEL



- Lock that turns laser off and secures mirrors for handling
- Self-leveling laser
- Laser projects five self-leveling beams simultaneously
- Audible alarms when beyond leveling range
- Laser can be rotated 360°

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.

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

Item	Description
710-851	Self-Leveling Laser Level with 5 Beam Dot Laser

QUALITY ASSURANCE DEVICES

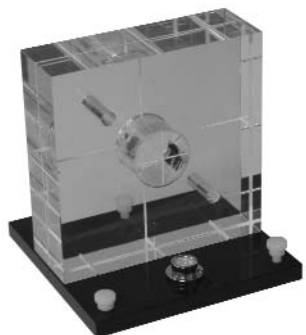
MINI PHANTOM WITH LEVELING PLATFORM



Mini Phantom
Item 710-186



Tungsten Ball Mini Phantom
Item 710-188



5 Seed Calibration Mini Phantom
Item 710-190

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 top of the mini-phantom. Raising and lowering the couch to the scribes at 5 cm from center and checking the couch vertical movement indicator can check the couch vertical movement. To check lateral couch movements rotate the mini-phantom so a side with the scribes 5 cm off-center is facing up towards the gantry. Then move the couch left and right to align with the scribes that are 5 cm off-center and check the lateral couch movement indicator.

The Mini-Phantom can be used to check the alignment of the internal and external lasers to the radiographic center of CT and PET/CT units and to verify lateral gantry angle. It can also be used with accelerator units to check vertical and lateral gantry angles, laser alignment and vertical table movement.

The Mini-Phantom is made of clear acrylic measuring 15 cm x 15 cm x 5 cm thick. One 15 cm x 15 cm side has centering scribe lines that go all the way across the phantom. All four of the 5 cm x 15cm sides are scribed through the center and two opposite sides are also scribed at 5 cm from center. The scribe lines are 1.3mm wide and white for ease of viewing the lasers. All four 5 cm x 15 cm sides have three pinholes, one at center and two at 5 cm from center. The center pinholes are 1.5 mm dia to hold a tungsten pin and the other pinholes are 1.0 mm. Four 1.5 mm dia tungsten pins are included with the mini-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 sterotactic 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)

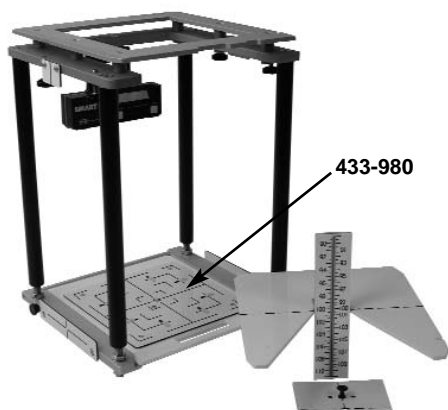
The Mini Phantom CT 5 Seed Calibration has 5 aluminum seeds 1mm diameter x 5mm with a chart indicating center to center spacing between all seeds.

Item #	Description
710-186	Mini Phantom with Leveling Platform
710-188	Tungsten Ball Mini Phantom with Leveling Platform
710-190	5 Seed Calibration Mini Phantom with Leveling Platform

QUALITY ASSURANCE DEVICES

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.

Item	GARD™
433-411	All Siemens with Digital Coding
433-518	Varian II - 65.4cm, with Standard 11 3/4" Tray
433-522	Varian II - 61.6cm, with Standard 11 3/4" Tray
433-535	Varian III-61.6cm, w/Opt. Coded Tray
433-536	Varian III-65.4cm, w/Optical Coded Tray
433-537	Varian III-65.4cm, MLC w/Optical Tray

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

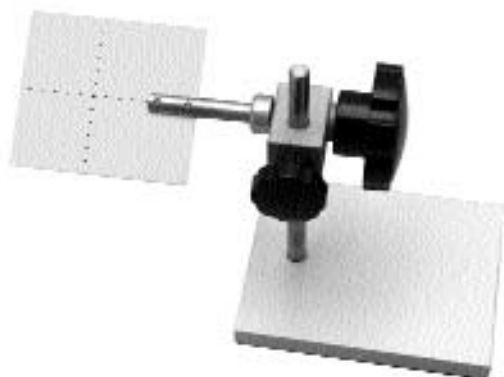
Size: 13.5" x 13.5" x 14.5" H (34.3 x 34.3 x 36.8 cm)

Weight: 9.5 lb (4.4 kg)

Item	GARD™
433-700	Elekta Precise 31.9cm
433-753	Elekta Synergy/Infinty 66.59 cm
433-754	Elekta Synergy/Infinty 65.31 cm
433-755	Elekta Precise 56.23 cm
433-756	Elekta Synergy 52.9 cm
433-980	Optional Film Cassette

Please call regarding other manufacturers

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)

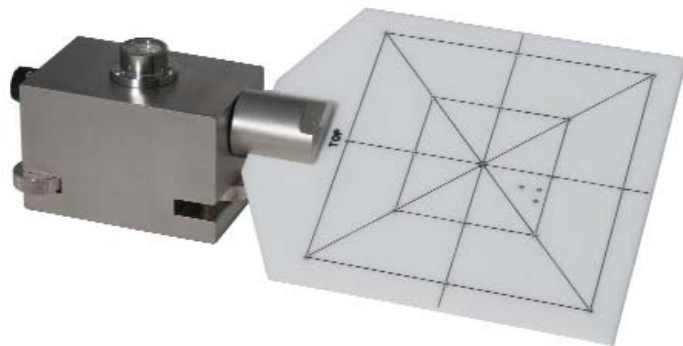
Color: Beige base

Weight: 3.6 lb (1.64 kg)

Item	Description
710-005	Rotating Alignment Plate and Stand

QUALITY ASSURANCE DEVICES

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)

Item	Description
710-020	Isocentric Beam Checker I

- 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

ISOCENTER/LASER ALIGNMENT DEVICE



710-030



352-104



352-108

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

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)

Item	Description
710-030	Isocenter/Laser Alignment Device
352-104	Bulls Eye Circular Level
352-108	6 cm Level

ISOCENTER/LASER ALIGNMENT DEVICE WITH TUNGSTEN BALL



2 mm
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

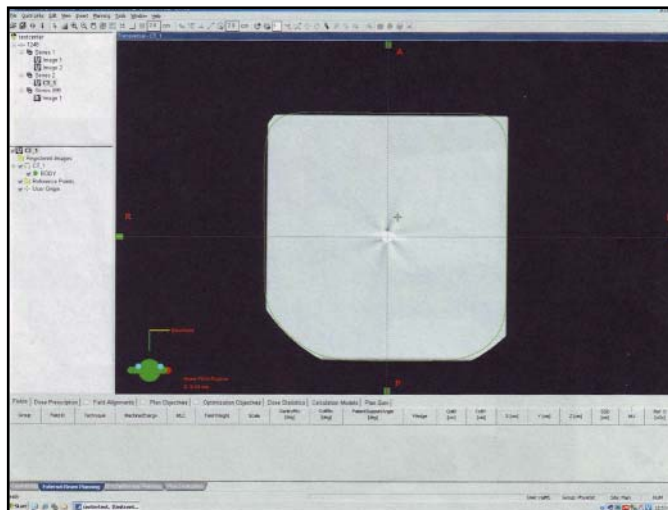
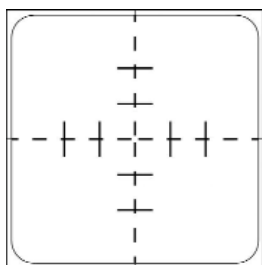
Size: 2" L x 2.25" W x 2" H (5.08 x 5.72 x 5.08 cm)

Weight: 0.2 lb (.01 kg)

Item	Description
710-031	Isocenter/Laser Alignment Device with Tungsten Ball

73 mm CUBE

Acrylic Cube with One 2mm Stainless Steel Marker



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

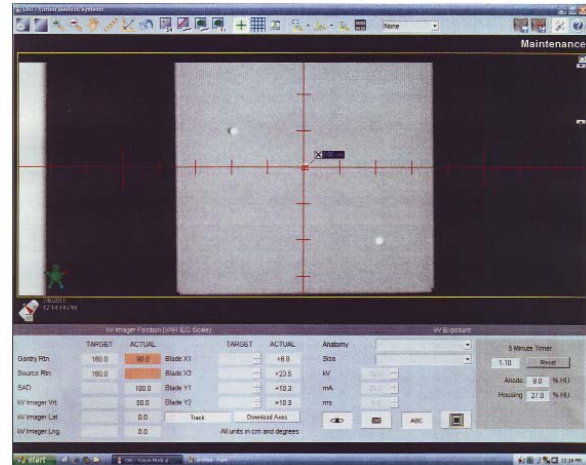
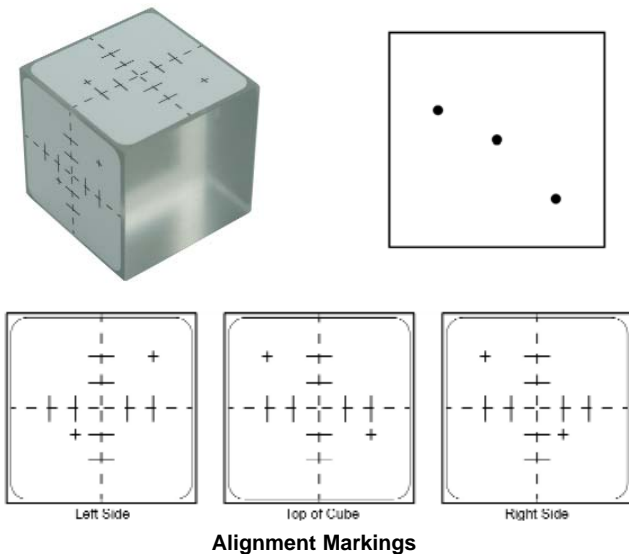
Material: Acrylic, White Vinyl and Stainless Steel

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

Item	Description
710-038	73 mm Cube, Acrylic w/One 2 mm Stainless Steel Marker

QUALITY ASSURANCE DEVICES

73 mm CUBE Acrylic Cube with Three 2 mm Tungsten Markers



Sample Left Lateral kv Image: Displacement of 1 mm is noted from the crosshair to center of phantom

Monthly OBI Gantry Rotation and Isocenter Accuracy Test

Place the phantom in the isocenter position (on the center tungsten marker) with the aid of the Linac crosshairs. Then acquire a kv image at the four cardinal angles. Using the OBI graticule tool, the displacement of the tungsten marker from the graticule crosshair can be tabulated as shown in the worksheet below (this process can also be applied to the MV imaging):

Date	KV Image	Measured displacement (mm)			Limit (cm)	Results
		Sup Inf	Ant Post	L/R		
OBI Gantry Rotation and Isocenter Accuracy	RL Lat			N/A	1.5	
	AP		N/A	N/A	1.5	
	HL		N/A	N/A	1.5	
	NA				1.5	

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 tungsten markers can be seen on the other three (3) sides.

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)

Item	Description
710-039	73 mm Cube, Acrylic w/Three 2 mm Tungsten Markers

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.

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
- One bubble level attached to top with screws
- 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

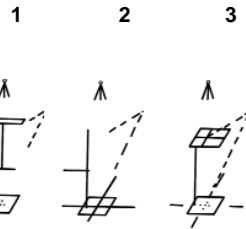
- Vertical dashed line
- Horizontal lines at 5.0 cm, 10.0 cm, 15.0 cm and 20.0 cm from bottom of scale

Item #	Description
710-040	T.A.D. Therapy Alignment Device

QUALITY ASSURANCE DEVICES

OPTICAL DISTANCE VERIFICATION AND ALIGNMENT TOOL

With Isocentric Ball Pointer



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.

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.

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

Item #	Description
710-000	Optical Distance Verification and Alignment Tool

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.

Item	Magnetic Front Pointer
701-401	for Varian Clinac 4/80
701-402	for Varian Type II Accessory Mount
701-403	for Varian Type III Accessory Mount
701-407	for Siemens with Coding By-Pass
701-408	for Siemens with Screw Coding
701-409	for Siemens with Digital Coding Plug
701-410	for Siemens with MLC - Digital Coding
701-411	for Siemens Primus with MLC, 56.6 cm
701-420	for Philips SL25
701-426	for GE Saturne 40, 41, 42 or 43
701-428	for ACEL Theratron 780C
701-429	for AECL Theratron Elite 80
701-430	for MDS Nordion / BEST
701-431	for Mitsubishi ML-6M, ML 20M
701-432	for Mitsubishi
701-433	for Siddharth 6MeV Linear Accelerator

Item	Rods
701-400-30	70 to 80 cm
701-400-31	80 to 90 cm
701-400-32	90 to 100 cm
701-400-33	100 to 110 cm
701-400-34	110 to 120 cm

X-LITE

QA Tool for Light Field Alignment Checks



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)

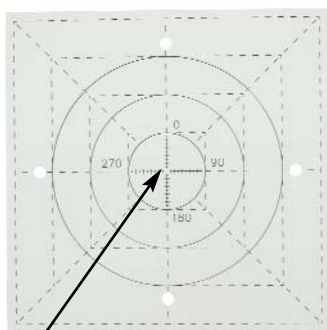
Item	Description
710-705	X-Lite

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 ± 2 mm 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.

TUNGSTEN ALIGNMENT PATTERN PLATE

For Accelerators and Simulators



4 Posterior Crosshair Line Viewers

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)

Item	Description
710-713	Tungsten Alignment Pattern Plate

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.

Item	Description
352-120	Plumb Bob, Nickel-Plated

QUALITY ASSURANCE DEVICES

TUNGSTEN ROTATING ALIGNMENT PATTERN DEVICE

For Ready Pack Film For Accelerators and Simulators



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 10"x12" Ready-Pack Film

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).

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

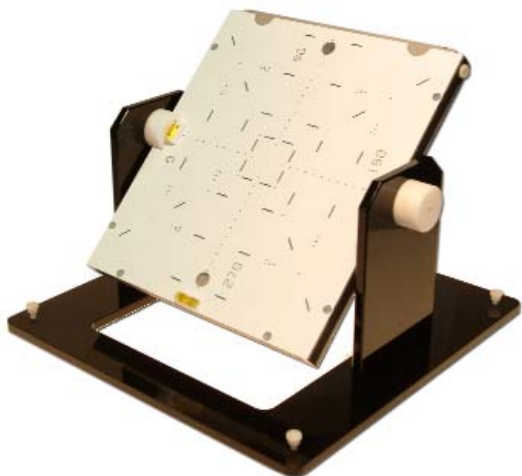
Material: Black acrylic; White and clear engraving material

Weight: 9 lb (4.09 kg)

Item	Description
710-720	Tungsten Rotating Alignment Pattern Device for Ready Pack Film

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 used to form arrows so film orientation is easily seen. 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
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: 14 lb (6.36 kg)

Item	Description
710-721	Tungsten Rotating Alignment Pattern Device for CR Cassette

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).

ISOCENTRIC BEAM CHECKER II



- Radiation / light-field congruence
- Collimator isocentricity
- Collimator field size accuracy
- Isocenter rotational stability
- Accepts 10" x 12" Ready Pack Films
- Laser alignments
- ODI accuracy
- Gantry isocentricity
- Table isocentricity

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°.

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)

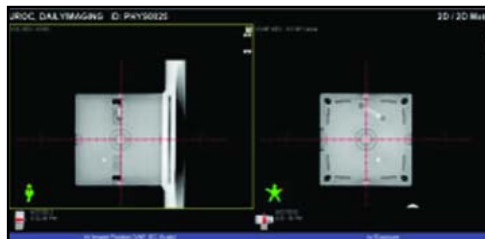
Shipping: Fully assembled

Item #	Description
710-730	Iso-centric Beam Checker II

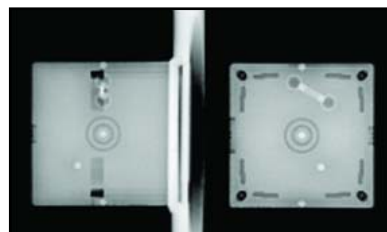
ISO CUBE™ DAILY QA PHANTOM



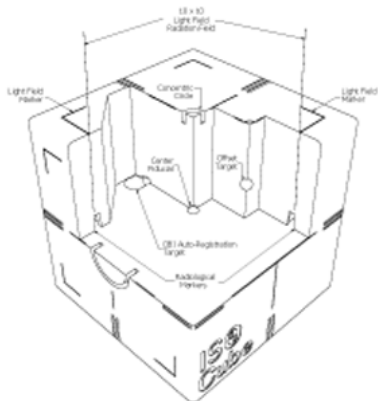
ISO Cube™ with ISO Base



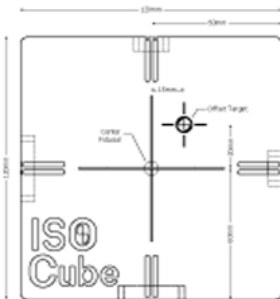
2D/2D match of kV and DRR



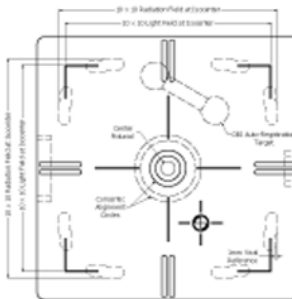
Concentric circles verify accurate alignment of ISO Cube and establish true position of the kV radiation isocenter



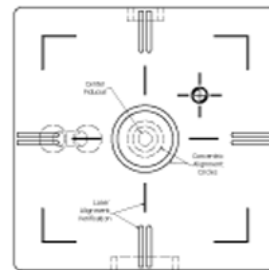
Internal View



Inferior / Superior View



Anterior / Posterior View



Lateral View

- **Fast and easy to use**
- **Unique shell fiducials produce sharp clear images in EPID, kV and CBCT imaging**
- **Offset fiducial to check accuracy of couch corrections**
- **Check**
 - Laser alignment
 - Light field size verification
 - kV and MV imager coincidence
 - CBCT process accuracy
 - ODI accuracy
 - Table height accuracy
 - Radiation field/light field alignment

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 spatial alignment and coincidence with that of the treatment beam.

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)

Item	Description
710-323	ISO Cube™ Daily QA Phantom

Item	Accessories
710-325	ISO Cube™ Stereotactic Target Frame Adapter
710-327	ISO Align Altazimuth Alignment Platform
710-328	ISO Analyze Image Analysis Software Pkg
710-329	ISO Base Alignment Platform

QUALITY ASSURANCE DEVICES

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 Base™ 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)

Item	Description
710-330	ISO Cube™ Daily QA Package
710-325	ISO Cube™ Stereotactic Target Frame Adapter

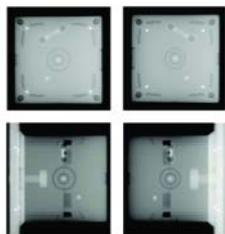
QUALITY ASSURANCE DEVICES

Integrated Data Analysis in 5 Easy Steps

Acquire

Use pre-established ISO Cube's treatment plan to acquire all necessary images for analysis of parameters

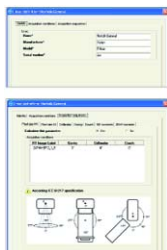
ISO Analyze™ Software provides suggested image sequences for each parameter



Define

One time setup for each LINAC requires:

- LINAC Identity
- Acquisition Conditions
- Acquisition Sequences



Select

Select pre-acquired DICOM images to use in each parameter calculation

Select images are highlighted for each parameter.



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.

Calculate

ISOAnalyze™ quickly calculates parameters and displays detailed results



Report

Detailed results can be manipulated for in-depth analysis

Summary report is displayed and PDF document may be printed and saved



QUALITY ASSURANCE DEVICES

BEAM SENTRY 2 DAILY OUTPUT CONSTANCY MONITOR

Model 105 A



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: $\pm 0.1\%$ of reading + 1 digit

Linearity: $\pm 0.1\%$, +1 digit or precision of reading, whichever is greater

Leakage: <60 fA

Temperature Stability: 20ppm/ $^{\circ}$ 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")

- Sealed ion chamber - no air density correction necessary
- Reversible detector - dual entrance windows, 6 & 18 MV
- Electrometer protected from radiation
- Remote operation using a standard triax extension cable
- Powered by a single 9V battery - no bias batteries to replace
- Electronic bias - full and half voltage

Beam Sentry 2 provides a convenient and economical means of performing daily radiation output constancy checks. It is a light-weight, portable unit with remote readout featuring the accuracy of a digital display. The unique design, featuring a separate ion chamber, eliminates radiation damage to the electronics while allowing both the dosimeter and the ion chamber to be used independently for other purposes.

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.

Item #	Description
321-031	Beam Sentry 2 Daily Output Constancy Monitor
321-041	Acrylic Build-Up Plate Set
323-1303	10 Meter Triax Cable BNC-F to BNC-M

THERAPRO DAILY OUTPUT AND SYMMETRY MONITOR



- 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

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.

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® II Diode Detector

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

Item 347-950 TheraPro Daily Output and Symmetry Monitor

Includes:

Chamber Array
Data Acquisition Module
Controller
64 MB CompactFlash™ Card
USB CompactFlash™ Card Reader
Mouse
Keyboard
Acrylic Buildup Plates
Gantry Mounting Bracket
Interconnecting Cables

Specifications

Repeatability: Within 0.5% of reading

Detectors: Six ion chambers, one on central axis, four chambers spaced at ±8cm off central axis on X-Y axes, one energy check chamber

Chamber size: ~ 0.6 cc, 1.2 cm diameter

Buildup: 0.60 g/cm² (0.481 acrylic + 0.084 polystyrene + 0.035 Mylar®)

Range: ~ 500 cGy (6 MV photons)

Rate Limitation: 1000 cGy/min

Deviation Limit: User selected low and high alarm

Data Link: 15 m cable transmits data from the Data Acquisition Module to the controller

Data Storage: 32 MB internal flash memory. 64 MB CompactFlash™ and USB CompactFlash™ card reader for exporting data included.

Temp. Accuracy: ±1°C

Pressure Accuracy: ±1.5 mmHg

Power: 100-240 AC, 50-60 Hz, 2 A fuse

Dim./weight:

Chamber Array Size: 9.1" x 11.2" x 1.2" (23.1 x 28.5 x 3.0 cm)

Chamber Array Weight: 3.75 lb (1.7 kg)

Data Acquisition Module Size: 10" x 5.3" x 3.7" (25.4 x 13.5 x 9.5 cm)

Data Acquisition Module Weight: 3.1 lb (1.4 kg)

Controller Size: 8.2" x 8.2" x 5.8" (20.8 x 20.7 x 14.8 cm)

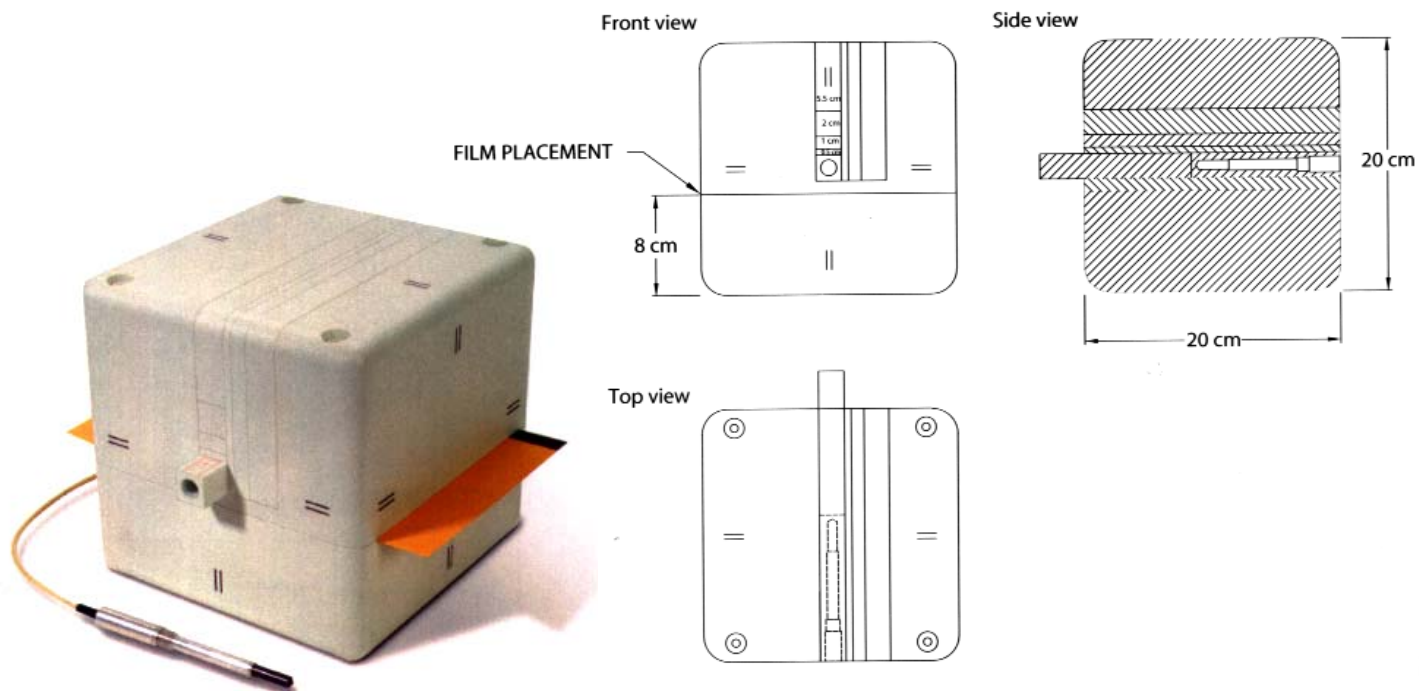
Controller Weight: 4 lb (1.8 kg)

Item #	Description
347-950	TheraPro Daily Output and Symmetry Monitor
347-952	TheraPro Dose Verification Software and Diode Input Module

QUALITY ASSURANCE DEVICES

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

Item #	Description
682-400	Cube 20 Phantom