

THEBES® II

Victoreen® Model 7020/7040



Radiation Oncology

Introduction

The THEBES® II (THErapy Beam Evaluation System) consists of a linear ion chamber array, electrometer, communicator, THEBES II Contour Manager software, wall mount power supply, interconnecting cable, and carrying case. An acrylic base plate that holds the ion chamber array and build up plates are also provided. The linear ion chamber array is permanently connected to the electrometer by a 1.5 m shielded multiconductor cable to eliminate radiation damage to the electrometer.

The THEBES II linear ion chamber array is a waterproof, linear array of 47 ion chambers on 0.5 cm centers. The total active length of the array is 23.42 cm.

The THEBES II communicator provides power and the communication interface for the THEBES II electrometer.

THEBES II Contour Manager Software is a Windows based application that acquires beam contour data from the detector array and displays it graphically.

Applications

The THEBES II is used to perform linear accelerator quality assurance using physicist-preferred air ion chamber technology for dose measurement, avoiding the ion transport issue of the competing liquid chamber technology and radiation damage issues of diode detectors. The detector array consists of 47 waterproof air ion chambers in a linear array. Two detector arrays are being offered: Model 7020 with 47 ion chambers on a 0.5 cm pitch (23.42 cm total active length) and Model 7040 with 47 ion chambers on a 1 cm pitch (46.88 cm total active length).

The software performs beam contour analysis such as flatness and symmetry. Beam contour data is saved in an Access compatible database, facilitating daily, weekly, and yearly checks, aiding in following the guidelines in TG-40 and TG-51.

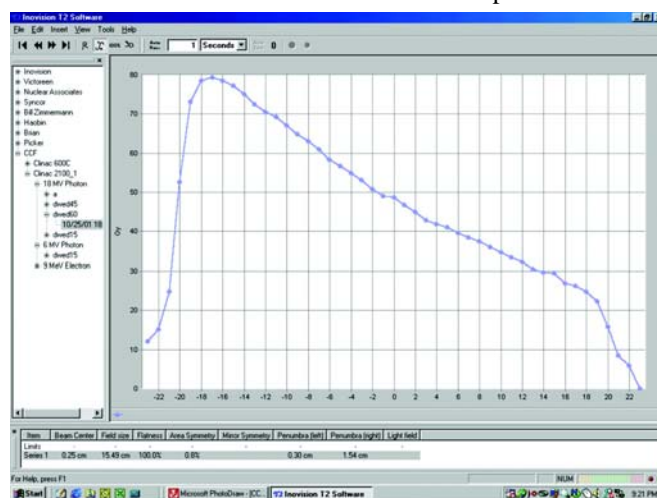
* Patent pending.



- Linear array of 47 air ion chambers
- 0.5 cm spacing for Model 7020
- 1.0 cm spacing for Model 7040
- Central axis chamber
- Waterproof and vented
- Simultaneously checks symmetry, flatness, light field vs. radiation field coincidence, field size, beam center, penumbra, constancy, and integrated total dose
- Real-time dose maps for service and setup
- No electronics in or near the beam
- Windows® applications software
- Calibrated by Global Calibration Laboratory

Features

- Flexible and easy-to-use
- Range: 50 to 500 cGy/min
- No external power is needed at detector location
- Dynamic wedge contour mapping
- Daily, weekly, and yearly checks as per TG-40
- Use with watertank for depth dose calculations
- Microsoft® Access database compatible
- Microsoft Excel data export



60 degree dynamic wedge

Specifications

Linear ion chamber array

Detector type Ionization chambers, waterproof and vented

Number of detectors 47

Dimensions

7020 6.2 (w) x 30.2 (d) x 3.7 cm (h)

7040 6.2 (w) x 53.5 (d) x 3.7 cm (h)

Active area

7020 1.0 x 23.42 cm (23 cm center to center)

7040 0.88 x 46.88 cm (46 cm center to center)

Detector spacing

7020 0.5 cm

7040 1.0 cm

Inherent buildup 0.5 cm polystyrene, .02 cm polycarbonate

Inherent backscatter

Without mounting plate 0.3 cm acrylic

With mounting plate 0.3 cm acrylic, 1.0 cm acrylic

Radiation detected

Photons ⁶⁰Co to 25 MV

Electrons 6 to 25 MeV

Beam limits

Maximum dose/pulse 12.5 mGy per pulse

Maximum pulse rate 1000 pulses per second

Maximum continuous dose rate 500 cGy/min

Ion chamber dimensions

7020 0.42 (w) x 0.95 (d) x 0.50 cm (h)

7040 0.88 (w) x 0.88 (d) x 0.50 cm (h)

Ion chamber nominal volume

7020 0.17 cm³

7040 0.36 cm³

Ion chamber alignment ± 0.3 mm chamber outline on top of array in all axes

Nominal bias voltage - 300 V

Weight 0.75 lb (0.34 kg)

Electrometer

Number of channels 48

Amplifiers Non-multiplexed, low leakage, mosfet operational amplifier

Array scan time 1.1 ms

Frame rate 5 frames/sec

Status indicators 4

Dimensions 10.9 (w) x 21.6 (d) x 3.2 cm (h)

Communicator

Computer interface RS-232, DB-9 connector

Power requirements 12 VDC, 1 A

Communication interface

Connector RJ-45

Baud rate 57.6 K

Dimensions 4.2 (w) x 8.8 (d) x 2.0 cm (h)

System

Power requirements

Input 120 VAC, 60 Hz, 22 W

Output 12 VDC, 1 A

Computer requirements

Computer IBM® compatible PC, Intel® Pentium® 90 or higher with at least one unused COM port

Operating system Microsoft Windows 98, ME®, XP®, 2000

Hard disk space 64 MB of available space

Mounting plate dimensions

7020 22.8 (w) x 30.5 (d) x 2.5 cm (t)

7040 22.8 (w) x 53.8 (d) x 2.5 cm (t)

Calibration

Accuracy 2%

Reproducibility 1%

Long term stability 1%

Linearity 1%

System (continued)

Environmental

Operating temperature 50° to 104°F (10° to 40° C)

Storage temperature - 13° to + 149°F (- 25° to + 65° C)

Relative humidity 20% to 75%, non-condensing

Weight 21 lb (10 kg)

Accessories supplied

Available AC adapters (specify with order)

Model Number	Description	Typical Geo. Region
14-328	110 VAC 12 VDC 1000 mA	USA, Japan
14-401	230 VAC 12 VDC 1000 mA	Europe
14-414	230 VAC 12 VDC 1000 mA	UK
14-414 and 14-416 adapter	230 VAC 12 VDC 1000 mA	Australia

Communication Cable, 75 ft (23 m) (Model 1090026000)

Terminator, 120 ohm (Model 1080024000)

Communicator (Model 1090005000)

7020

Holding Assembly (Model 1070006000)

1 cm Buildup Plate (Model 1070008000)

2.5 cm Buildup Plate (Model 1070007000)

7040

Holding Assembly (Model 1070106000)

1 cm Buildup Plate (Model 1070108000)

2.5 cm Buildup Plate (Model 1070107000)

Optional accessories

Lead Foil for TG-51, 1 mm x 20 cm² (Model 57-051)

7020

9.5 cm Buildup Plates (Model 1070049000)

ARM 3-D Watertank Adapter (Model 1070071000)

Multidata Watertank Adapter (Model 1070069000)

Wellhöfer (Dovetail) Watertank Adapter (Model 1070060001)

Wellhöfer Blue (Pin) Watertank Adapter (Model 1070065000)

Tray Adapter Kit, Varian Type 3 (Model 1070052000)

Tray Adapter Kit, Elekta (Model 1070055000)

Tray Adapter Kit, Siemens (Model 1070061000)

7040

9.5 cm Buildup Plates (Model 1070149000)

Tray Adapter Kit, Varian Type 3 (Model 1070153000)

Available model(s)

7020 THEBES II 20 cm Field Size Array, consists of electrometer, communicator, THEBES II Contour Manager software, and carrying case

7040 THEBES II 40 cm Field Size Array, consists of electrometer, communicator, THEBES II Contour Manager software, and carrying case



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

CE Tested. Meets applicable standards.

Specifications are subject to change without notice.

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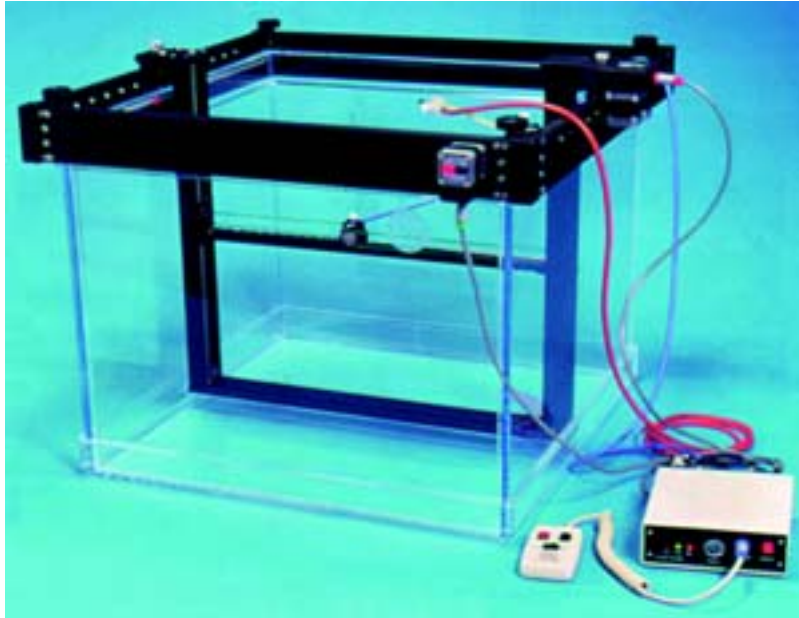
7020-ds rev 1 25 mar 03

3-D Radiation Scanning System

Model 7303



Radiation Oncology



- Fast and accurate
- Simple and easy to setup
- A serial cable is the only link with outside laptop or PC
- Interfaces with Victoreen® THEBES® II 47 channel ion chamber array
- New intuitive Windows® application

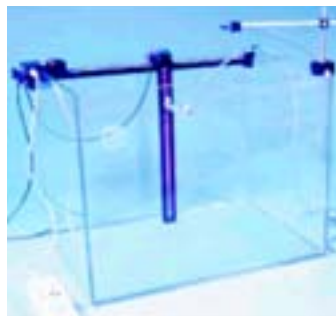
Introduction

The 3-D Radiation Scanning System is fast, accurate, simple, and easy to setup. It consists of two waterproof ion chambers and one lift table. The electronics and firmware are all encapsulated in a compact iBox (intelligent Box) that controls scanner motions and data acquisition using embedded firmware featuring an Intel® microprocessor. The 3-D system is portable and comes in a specially designed case.

Applications

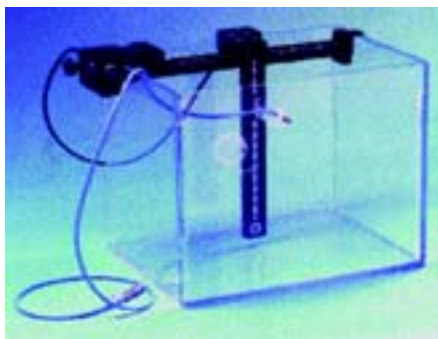
In addition to the 3-D system, we offer two 2-D and a 1-D system with the same accuracy, simplicity, and rugged, trouble free use.

The Model 7302 2-D system can be assembled or disassembled in 15 seconds and it's horizontal arm is driven by lead screw for complete accuracy of positioning. Like the 3-D system, data acquisition and scanner motion are controlled by the iBox.



2-D Radiation Scanning System

Using the 1-D system, a pendant and small power supply can control pre-programmed motions inside or outside of the treatment room with no electronic boxes or cables. Only a serial cable links the actuator either to the pendant or laptop or PC. In addition, the 1-D system complies with all the requirements of TG-51.



2-D Mini Radiation Scanning System

Features

- Made of aircraft anodized aluminum
- Scanning area: 50 x 50 x 40 cm (deep)
- Accuracy of positioning: 0.1 mm
- Accuracy of measurement: 0.5%, except for radial motions
- All axes driven by lead screw for accuracy
- All scanner motions controlled by iBox (intelligent Box)
- Use with Microsoft® Windows 95, 98, ME®, NT®



1-D Radiation Scanning System

New intuitive Windows application

Using Windows on a laptop or personal computer, it is easy to access the customized toolbar to allow changes to protocols, normalization, and profiles. One of the program features is the use of the scripts. Scripts allow you to preset all the field sizes, depths, and cross beams you want to scan.

Photons - percentage depth dose (PDD) curves

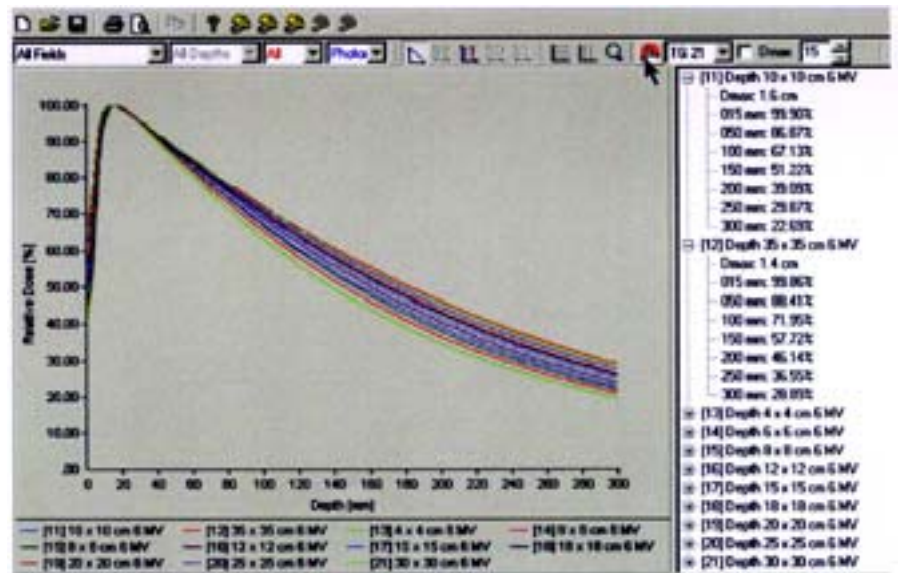
A simple click of the mouse on the customized toolbar and alternatively it will change:

Protocols TG-21/TG-51 or any other protocol

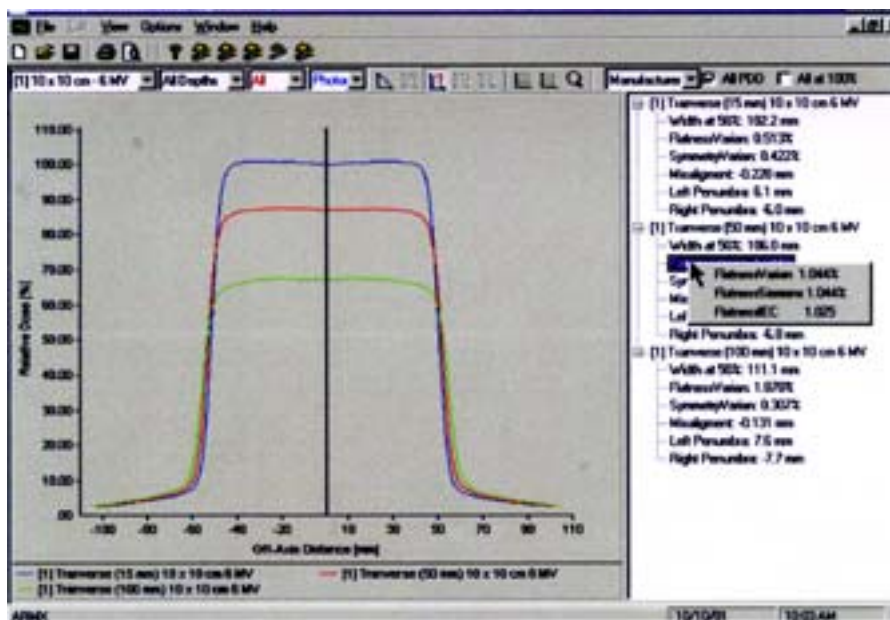
Normalization Dmax/any desired depth

Profiles PDD/photons - cross profiles

Tables PDD/tissue max ratio (TMR)



PDD analysis; PDD normalization



Flatness photons and electrons with three definitions

Photons - cross beam profiles

The analysis provides with the field size width at 50%, flatness, symmetry, and left and right penumbra. Click on Symmetry (or Flatness) and the program will show the values for different protocols. Single click on the mouse button and change protocols, normalization, and profiles.

Scripts

Scripts allow you to preset all the field sizes, depths, and cross beams you want to scan. This screen shows the script for cross beams. You may select the number of axes you want to scan and the program successively performs the scan of the selected axes.



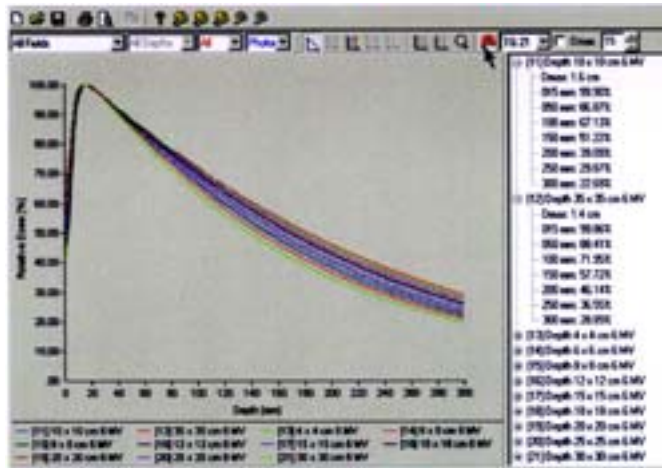
New intuitive Windows application (continued)

Electrons

A simple click of the mouse on the customized toolbar and alternatively it will change:

Depth curves Ionization/PDD

Protocols TG-21/TG-51 or any other protocol

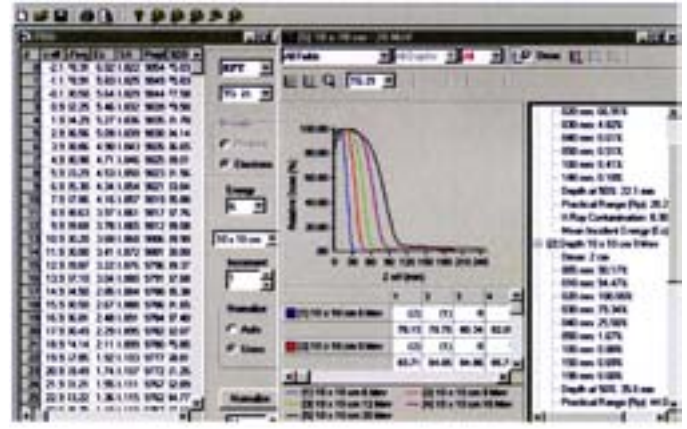


The 3-D system programs include all major protocols: TG-21 and TG-51

Normalization Dmax/any desired depth

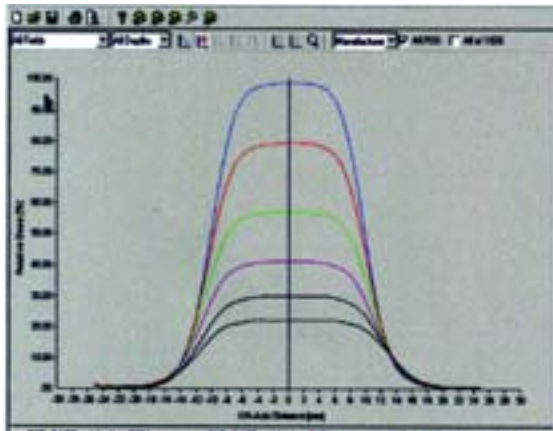
Profiles PDD/photons - cross profiles

Tables EFT (electron full table/PDD). The EFT shows physical depth, effective depth, ionization values, mean energy, P-replacement, and PDD values

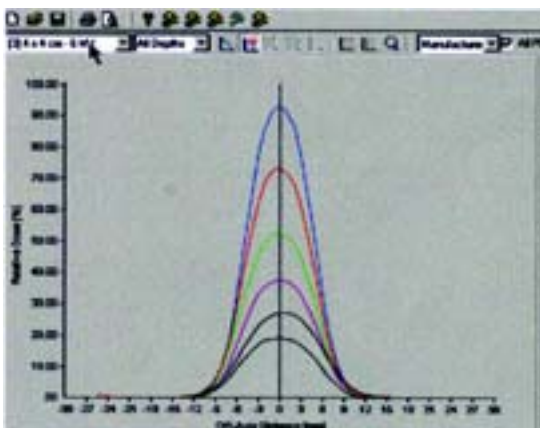


Electrons: this caption shows the ionization curves of the electrons

2-D Mini for radio-surgery and tomo-therapy

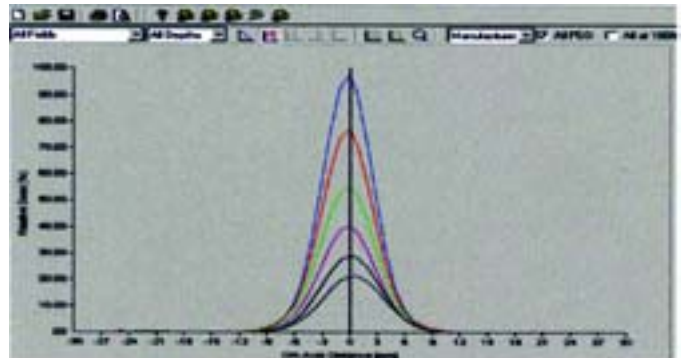


Cross Profiles: field size (cm) 2x1



Cross Profiles: field size (cm) 1x2

Depths (cm): 1.5, 5, 10, 15, 20, 25



Cross Profiles: field size (cm) 0.5 x 1

In the normal scanning process, the number of samples collected per each step is approximately 9,000. Thanks to the speed of the firmware and microprocessor, this sample size can be multiplied by a factor three or larger. This can be applied to scan a very small field size as shown in the example above. Accurate, clean profiles are obtained without any smoothing or other manipulations.

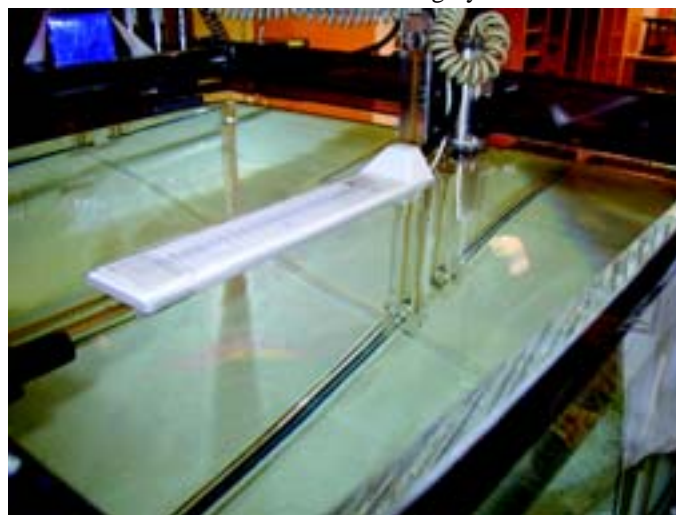
Case with the 3-D system

In supplying scanners, our priorities are accuracy, simplicity, and also portability. Including our 3-D system, shown here inside of a specially designed case.



Interfaces

Interfaces with Victoreen THEBES II 47 channel ion chamber array via pull-down menu in scanner software for 3-D Model 7303 and 2-D Model 7302 Radiation Scanning Systems.



THEBES II waterproof ion chamber array in water tank

Specifications

3-D Model 7303

Housing material Machined aircraft aluminum

Color Black

Watertank material Acrylic

Watertank dimensions 62 x 62 x 54 cm

Watertank scanning area 50 x 50 x 40 cm deep

Watertank maximum water volume and weight 175 L

Axes All driven by lead screw for accuracy

Accuracy of positioning 0.1 mm

Accuracy of measurement 0.5%, except for radial motion

Leveling Levels the scanner, not the water tank

Portability The scanner assembles/disassembles in approx. 5 minutes

Perpendicularity $\pm 0.15^\circ$

Interface All major Treatment Planning Systems

Software All conventional protocols, TG-21 and TG-51 with complete analysis of parameters for photons and electrons. Tables of Percentage Depth Dose (PDD), Tissue Max Ratio (TMR), and Tissue Phantom Ratio (TPR). Written in Windows 95, 98, and NT. Files are stored in ASCII format. Interface with all major TP

System includes Two 0.125 waterproof ion chambers and 1 lift table

2-D Model 7302

Housing material Machined aircraft aluminum

Watertank material Acrylic

Watertank dimensions 67 x 47 x 50 cm

Watertank scanning area 50 x 40 cm

Watertank maximum water volume and weight 150 L

Horizontal arm Driven by lead screw for accuracy

Accuracy of positioning 0.1 mm

Accuracy of measurement 0.5%

Leveling Levels the scanner arms, not the water tank

Portability The scanner assembles/disassembles in 15 seconds

Perpendicularity Special coupling mechanism between the horizontal and vertical arms, keeps perfect perpendicularity

Interface All major Treatment Planning Systems

System includes 2 waterproof ion chambers

2-D Mini Model 7302M (radio-surgery and tomo-therapy)

Housing material Machined aircraft aluminum

Watertank material Acrylic

Watertank dimensions 37 x 37 x 30 cm deep

Watertank scanning area 25 x 25 cm

Horizontal arm Driven by lead screw for accuracy

Accuracy of positioning 0.1 mm

Accuracy of measurement 0.5%

Leveling Levels the scanner arms, not the water tank

Portability The scanner assembles/disassembles in 15 seconds

Perpendicularity Special coupling mechanism between the horizontal and vertical arms, keeps perfect perpendicularity

Interface All major Treatment Planning Systems

System includes 2 waterproof ion chambers

1-D Model 7301

Standard acrylic tank 30 x 30 x 30 cm

Accuracy of positioning 1/20 mm

Pendant With digital display

Firmware Embedded in the actuator, controls the ion chamber position from steps of 0.1 mm to any desired step length

Maximum measuring depth 20.4 cm

Weight (including the acrylic tank) 15 lb

Options Operated from the PC with full TG-51 protocol. Interface with electrometer

Optional accessories

Lead Foil for TG -51, 1 mm x 20 cm² (Model 57-051)

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

Manufactured for Cardinal Health, Radiation Management Services by ARM.

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Advanced Therapy Dosimeter Model 35040



Radiation Oncology



- Now with Timer Function and wider dynamic range
- Ultra long-term stability error of approximately 0.1% per five years
- Virtually removes effects of system leakage during measurement. Uncorrected leakage < 10 fA over temperature range
- Eleven user-defined bias settings from - 500 to + 500 V
- Read out in C, A, R, Gy, Sv, Bq, and more

Introduction

The Model 35040 Advanced Therapy Dosimeter (ATD) is a reference grade instrument used to measure the charge and current from ion chambers in Radiation Therapy, and provides bias voltage for all commonly used chambers. The ATD large clear display offers direct readings of charge, current, time, and radiation units over a wide range. The user can customize the display for basic use or for specialized applications such as brachytherapy. The Advanced Therapy Dosimeter exceeds the recommendations of calibration laboratories for leakage, linearity, and stability by a wide margin. This instrument raises the standard of Radiation Therapy measurements.

Applications

Radiation Therapy requires great accuracy in the measurement of dose and dose rate values associated with linear accelerators and radioactive sources. The Model 35040 Advanced Therapy Dosimeter provides the long-term stability and accuracy demanded for calibrations, quality assurance programs, and protocols in Radiation Therapy. A unique electrometer design provides more accuracy than high meg resistor or capacitor feedback electrometers.

The Advanced Therapy Dosimeter is fully stable within five minutes, a fraction of the time of conventional dosimeters. The flexibility of the instrument optimizes user efficiency and saves time. In battery operation or using AC Line, the ATD measures dose and effective exposure time in a single exposure, thus eliminating the need for multiple exposures for ^{60}Co and brachytherapy measurements. Front panel controls select ion chamber calibration factors, facilitate entry of temperature and pressure values for air density correction, allow bias voltage selection, threshold level, timer control, and choice of display screens. The user-customized display screens can simultaneously show dose, exposure time, dose rate, effective exposure time, average current/rate, accumulated charge/dose, bias voltage, leakage, and other important information that ensures the validity of the instrument.

The customization software allows design of 16 screens that display conditions, parameters, values and text. Up to 32 chamber factors, 11 bias voltages can be programmed. It is PC compatible and connects via a RS-232 cable.

Features

- Wide measurement range, up to 1.000 μA and 19.999 mC for HDR Brachytherapy applications
- Automatic reset and hold of measured values between exposures
- Front panel adjustment of exposure threshold and user disable of threshold to permit manual operation
- Thirty-two ion chamber calibration factors
- Automatic power-down after user-specified time period, when operating from battery supply
- Annunciators warn of low battery, low bias, and operational errors
- Large capacity battery provides eight hours of continuous operation; fast recharge in less than three hours, even during operation
- AC line operation over the range 100 to 240 VAC and 47 to 63 Hz without operator intervention
- Charge and current calibration factors entered by calibration laboratories at user's option
- Front and rear panel ion chamber connections
- Optional carrying case (Model 37780)

Front Panel Features

- **Power On/Off key** All front panel settings are stored at power-down and recalled at power-up
- **Test Function key** Sequence of screens to display firmware revision, last calibration date, leakage and current, bias voltage and battery voltage level, and charge and current calibration factors, and times settings
- **Detector Select key** User selection of one of 32 user-programmed ion chamber calibration factors with descriptive text, units, and calibration factors
- **Air Density key** User entry of ambient temperature and pressure; displays calculated air density corrections; symbol appears on screen when air density correction is active
- **Units Select key** User selection of rate measurement time base (s, min, and hr)
- **Bias Select key** User selection of one of 11 user-programmed ion chamber bias voltage settings from - 500 to + 500 V; displays measured output bias voltage
- **Reset/Measure key** Displays measurement screen; resets displayed charge and dose measurement values to zero, re-initializes the measurement system, and starts/stops the time dose measurement. Up and down arrows select one of 16 user-designed measurement screens
- **4-line by 20-character vacuum fluorescent display** Provides excellent visibility in all lighting conditions

Specifications

Dose and rate display

Charge full scale	Charge sensitivity	Current* full scale	Current* sensitivity
200.00 pC	0.01 pC	200.0 pA	0.1 pA
2.0000 nC	0.0001 nC	2.000 nA	0.001 nA
20.000 nC	0.001 nC	20.00 nA	0.01 nA
200.00 nC	0.01 nC	200.0 nA	0.1 nA
2.0000 µC	0.0001 µC	1.000 µA	0.001 µA
20.000 µC	0.001 µC		
200.00 µC	0.01 µC		
2.0000 mC	0.0001 mC		
20.000 mC	0.001 mC		

**Average current is displayed with ten times greater resolution.*

Effective exposure time ranges

Full scale range	Display resolution
59.99 s	0.01 s
5 hr 33 min 19.9 s	0.1 s

Specifications (continued)

Stability Designed for ultra long-term stability error of approximately 0.1% per five years

Leakage Virtually removes effects of total system leakage during measurement. Uncorrected leakage < 10 fA over temperature range

Linearity Maximum non-linearity variation from straight line of 0.1% of all charge and current ranges

Resolution 0.005% of range (4.5 digits) for charge, dose, average rate and average current; 0.05% of range (3.5 digits) for current and rate

Warm-up Fully meets specifications within five minutes of applying power

Measurement accuracy 64° to 82°F (18° to 28°C)

Charge ± (0.20% reading plus two counts)

Current ± (0.20% reading plus two counts)

Bias Eleven user-programmable steps from - 500 to + 500 V in 0.1 volt increments

Accuracy ± 0.3 V for loads < 0.2 mA

Front panel selectable

Ion chamber calibration factors Thirty-two user-programmable calibration factors

Front panel selectable

Display units All practical radiation and electrical units

RS-232 computer configuration For customizing and data transfer

Power requirements Internal Lead Acid Battery

Integral Charger operates 100 to 240 VAC (47 to 63 Hz)

Connectors Triax BNC front/rear 35040

Triax TNC front/rear 35040TNC

Dimensions 9.4 (w) x 10 (d) x 4 in (h) (21.6 x 26 x 8.9 cm)

Weight 10 lb (4.6 kg)

Optional accessories

Carrying Case (Model 37780)

Extension Cable, 20 ft, Triax BNC to BNC (Model 86120)

Adapter, Triax BNC plug to TNC jack (Model 500-111)

Available model(s)

35040 Advanced Therapy Dosimeter

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CE Tested. Meets applicable standards.

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35040-ds rev 2 26 mar 03

Advanced Therapy Dosimeter (ATD) Limited Series

Model 560



Radiation Oncology



- Single, high value electrometer
- 4½-digit LCD display
- Internal electronic bias: full, half and reverse polarity
- Powered by a rechargeable battery
- Extended 20,000 nC range for HDR
- Internal timer

Introduction

Model 560 is a high quality, compact and affordable dosimetry electrometer that will meet the needs of most therapy applications, including brachytherapy. A unique, simple design eliminates many of the current leakage problems associated with more complicated electrometer designs.

Applications

The Model 560 electrometer meets or exceeds the requirements of the AAPM ADCLs and has features found in electrometers costing far more.

Standard range setup suits most teletherapy applications, including HDR brachytherapy. Standard units are nC and nA.

The Model 560 includes a built-in timer circuit for accumulation of charge vs. time. Timing periods of 50, 100 and 200 seconds have been chosen for convenient conversion of nC to nA.

The bias supply is electronic, and the unit is powered by an internal rechargeable battery. The standard input connector is triaxial BNC, but TNC is available by request.

Features

- $\pm 0.1\%$ accuracy
- $\pm 0.1\%$ linearity
- Compact affordable design
- Standard range set-up suits most teletherapy applications, including high dose rate (HDR) brachytherapy

Specifications

Units	Low	High	Application
nA, nC	0.001 to 19.999	0.01 to 199.99	Teletherapy
20,000 nC	none	1 to 19999	HDR

Accuracy $\pm 0.1\%$ of reading, + 1 digit

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

Timer Can be preset for 50, 100 or 200 seconds

Leakage $< 5 \times 10^{-14}$ A

Display 4½-digit LCD

Temperature stability 20 ppm/°C

Warm-up time 15 minutes

Input Triaxial BNC (TNC optional)

Output Analog, 2 V corresponds to full scale

Bias Internal electronic bias supply 300 V, - 50%, - 100%, off, + 100%, + 50%, selectable on back panel. Bias voltage may be read on display. 400 V bias potential also available

Power Internal rechargeable 12 V lead acid battery, voltage may be read on display. Low battery indicator on front panel. 120 VAC UL listed adapter provided

Dimensions 8.25 (w) x 9 (d) x 3.25 in (h) (21 x 22.9 x 8.25 cm)

Weight 3.75 lb (1.7 kg)

Available model(s)

560 Advanced Therapy Dosimeter (ATD) Limited Series

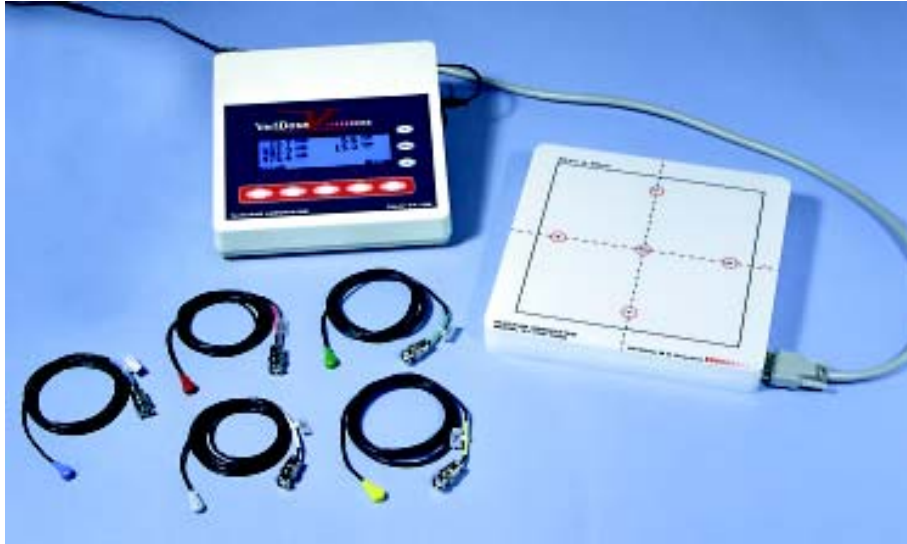
For additional information, please contact the Radiation Management Services business of Cardinal Health at 440.248.9300, fax 440.349.2307 or e-mail rmsinfo@cardinal.com; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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560-ds rev 1 20 aug 04

VeriDose® PDMQC System

Model 37-705



Pictured Model 37-705-7777 with optional diodes

Introduction

Our innovation and leading-edge technology combines the powerful performance capabilities of patient dose monitoring and linear accelerator quality control into one compact, easy-to-use product.

We give you this powerful combination of technology and versatility for a lower price than you would expect to pay for one unit alone.

Applications

Use VeriDose PDMQC as a patient dose monitor and when needed, just simply plug in the VeriDose QC Module and VeriDose PDMQC is transformed into a precision linear accelerator quality control device.

Two radiation oncology products in one:

- It's a linear accelerator quality control device (it measures beam constancy, which includes flatness and symmetry).
- It's a five-channel patient dose monitoring system that records patient dose verification data from actual radiation measurements made on the patient during treatment.

Two systems in one

- VeriDose PDMQC is a five-channel patient dose monitor and a linear accelerator quality control device
- Measures beam constancy, flatness, and symmetry
- Optional diodes available in a variety of photon energy ranges, polarity, and electrons

Features

Accuracy

- Measurements and updates are provided in real time, accurate to within 1% or better
- Automatically adjusts the proper offset voltage for each detector, resulting in up to ten times less drift than other products

Time-savings

- VeriDose PDMQC stores up to 25 separate calibration sets. (A calibration set can be created for up to five diodes at a time.) As a result, the frequency of calibrations you do is significantly reduced. Setup time and error potential are also dramatically reduced, leaving more time for patient treatment

Documentation

- When interfaced with a standard printer, you can print:
 - Patient treatment dose reports
 - Date and time of the procedure
 - Diode detector group and serial number
- In vivo measurements with the VeriDose PDMQC as a patient dose monitor are reimbursable under CPT-4 Section 77331 Special Dosimetry

Specifications

Electrometer

Input circuitry Five electrometer channels with digital zeroing and gain control; bi-polar

Rate range 1.0 to 1000 cGy/min

Dose range 0.1 to 1000 cGy

Sensitivity adjustment 0.1 to 10 nC/cGy

Display 240 x 64 dot LCD

8 lines x 40 characters, with CCF backlight

Clock Real time clock, battery operated, US or European format

Alarm User-selectable level for each channel

User controls On-Off switch, 5-column select soft-keys for control functions, scroll-up, scroll-down, and enter key for data entry

User setup parameters Stored in nonvolatile, battery-backup RAM

Computer interface RS-232, 19.2 BAUD, 8, N, 1

Data format: standard decimal points or Euro-commas

Printer interface Parallel, selectable drivers for LaserJet in ASCII format only

Environmental

Storage temperature 32° to 158°F (0° to 70°C)

Operating temperature 50° to 86°F (10° to 30°C)

Relative humidity 5% to 95%, non-condensing

Power requirements

120 VAC, 60 Hz or 230 VAC, 50 Hz to 12 VDC @ 1A

AC adapter, UL, CSA, CE

Dimensions 9 (w) x 8.5 (d) x 2.5 in (h) (22.9 x 21.6 x 6.4 cm) (EMI shielded)

Weight 2.5 lb (1.2 kg)

Phantom

Detector Five diode detectors

Energy range

Photon 4 to 25 MV

Electron 5 to 25 MeV

Sensitive volume 0.25 mm³

Sensitivity 1.5 nC/cGy

Diode polarity Negative

Rad damage at 10 kGy < 15%

Detector configuration

Flatness/Symmetry One central axis

Four orthogonally-positioned at 8 cm off central axis in the transverse and radial dimensions

Off-axis detectors are positioned at 80% of field size for flatness and symmetry measurements

Energy constancy

Detector Depth Positions: 4.5, 12.5, and 20.5 cm

Interface cable 50 ft (15 m)

Buildup 1.9 cm acrylic (2.3 g/cm²)

Dimensions 9.85 (w) x 9.85 (d) x 1.5 in (h) (25 x 25 x 3.8 cm)

Weight 5.25 lb (11.6 kg)

Optional accessories

VeriDose Excel Add-In Software, 3.5 inch disk (Model 37-705-2100)

Diode Holder, with five slots (Model 30-492-1000)

Calibration Jig, with six slots (Model 30-492-5200)

VeriDose Solid-State Diode Detectors (Model 30-471). (*See next page for diode specifications*)

Available model(s)

37-705 VeriDose V Electrometer

37-705-7777 VeriDose PDMQC System, consists of electrometer, Excel add-in software, and VeriDose PDMQC Phantom

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

CE Tested. Meets applicable standards.

Specifications are subject to change without notice.

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37-705-ds rev 3 11 mar 03

VeriDose® Solid-State Diode Detectors

Nuclear Associates Model 30-471



Radiation Oncology

- Designed to provide superior response, reliability, and performance
- Long-lifetime diodes. Tested to 2×10^6 cGy in a high-energy electron beam, the most damaging radiation
- Very low dose rate and temperature dependence
- Hemispherical shape improves isotropic response and reduces angular and field-size dependencies

Introduction

Using the VeriDose Patient Dose Monitor Quality Control (PDMQC) System or the VeriDose V Patient Dose Monitor in conjunction with VeriDose Solid-State Diode Detectors, you can verify the given dose quickly and accurately during treatment, thus avoiding potential misadministration of radiation.

Applications

VeriDose Solid-State Diode Detectors are solid-state silicon-based radiation detectors that utilize a p-n junction. These rugged diodes are encased within a biocompatible polystyrene material. A low noise coaxial cable is used to connect the diode to an electrometer. When attached to an electrometer, these diodes provide enhanced sensitivity and instantaneous response time.

Specifications

Photon and electron diode detectors

Nominal sensitivity 1.5 nC/cGy

Sensitivity volume 0.25 mm³

Output polarity Positive/Negative

Linearity < 0.1% for dose ranges from 0.01 to 10 Gy; < 0.1% for dose rates 3 to 5 Gy/min

Reproducibility 0.2%

Angular dependence

< 2% ± 60° for lower energy diodes (Models 30-471 & 30-472); < 2% ± 10°; < 5% ± 60° (for higher energy photon diodes and electron diodes)

Sensitivity loss at 10 kGy < 15%

Cable length 10 ft (3 m)

Dimensions 8 mm Ø

Weight 42 gm

Optional accessories

Diode Extension Cable, 30 ft (9 m)
(Model 88-490)

Diode Extension Cable, 10 ft (3 m)
(Model 88-490-1000)

Available model(s)

Model	Range	Polarity/Color	Buildup type	Buildup (g/cm ²)	Electrometer
30-471	1-4 MV	Positive/Blue	Cu	0.732	37-720
30-471-8000	1-4 MV	Negative/Blue			37-705
30-472	5-11 MV	Positive/Yellow	Cu	1.359	37-720
30-472-8000	5-11 MV	Negative/Yellow			37-705
30-473	12-17 MV	Positive/Red	W	2.606	37-720
30-473-8000	12-17 MV	Negative/Red			37-705
30-474	18-25 MV	Positive/Green	W	3.574	37-720
30-474-8000	18-25 MV	Negative/Green			37-705
30-475	5-25 MeV	Positive/Grey		0.284	37-720
30-475-8000	5-25 MeV	Negative/Grey			37-705

Features

- Waterproof design with appropriate buildup for all clinical photon and electron energies
- Flat bottom permits secure, easy placement on the patient
- Color-coded for ease of identification
- Dose rate independent
- Responds to photons and electrons
- Responds to dose rates of 1.0 to 1000 cGy/min
- Can be used on continuous (⁶⁰Co) x-ray beams, pulsed (linear-accelerator) x-ray beams, and electron beams
- Optimized for use with all Nuclear Associates' Patient Dose Monitors and high-quality medical-grade ionization chamber electrometers
- All diodes are supplied with a non-crimp repairable cable with a coax BNC connector

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

CE Tested. Meets applicable standards.

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30-471-ds rev 2 11 mar 03

Dual-Diode Dosimeter Patient Dose Monitor

Nuclear Associates Model 37-720

- Provides instant patient data on radiation exposure to sensitive organs and rapid checks of equipment output
- Prevents the potential for misadministration
- Battery operated



Features

- Prevents the potential for misadministration
- Provides instantaneous readings on the radiation dose being delivered to the patient
- Can qualify a facility for reimbursement under CPT-4 Section 77331 Special Dosimetry
- Is economical, highly accurate, and an essential instrument for today's busy facilities
- Designed for use with positive polarity diodes only

Introduction

Excessive radiation exposure (mismadministration) to the patient is always a matter of concern in radiation therapy. The Dual-Diode Dosimeter eliminates this concern by providing a dosimetry system specifically designed to verify the amount of radiation received by the patient during treatment.

Applications

Measurements are presented on a large digital display with a range of 0 to 2000 Rad or Rad/minute. The electrometer accepts either one or two diode detectors, which are selected using a front-panel switch. Calibration and zero adjustments, as well as dose or dose rate selection, are all readily accessible on the front panel.

While the Dual-Diode Dosimeter is not intended as a primary calibration device, it can also be used to accurately determine therapy machine output.

Specifications

Accuracy $\pm 5\%$

Reproducibility $\pm 5\%$

Range 0 to 2000 Rad or Rad/minute

Readout 0.50 inch high digits on display

Front controls On/Off, Dose/Rate, Detector A/Detector B, reset, Trimpots for Zero, and Calibration for Detectors A and B

Rear connections Detector A and B input

Power requirements 9 V battery or equivalent

Dimensions 6 (w) x 6.5 (d) x 2.75 in (h)
(15.24 x 16.51 x 7 cm)

Weight 2 lb (0.90 kg)

Optional accessories

Diode Detector Holder (Model 30-492): this 7 x 7 x 0.5 inch thick clear acrylic plate is routed to hold six diodes in a level, reproducible position during field measurements

Available model(s)

37-720 Dual-Diode Dosimeter Patient Dose Monitor

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

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37-720-ds rev 2 11 mar 03

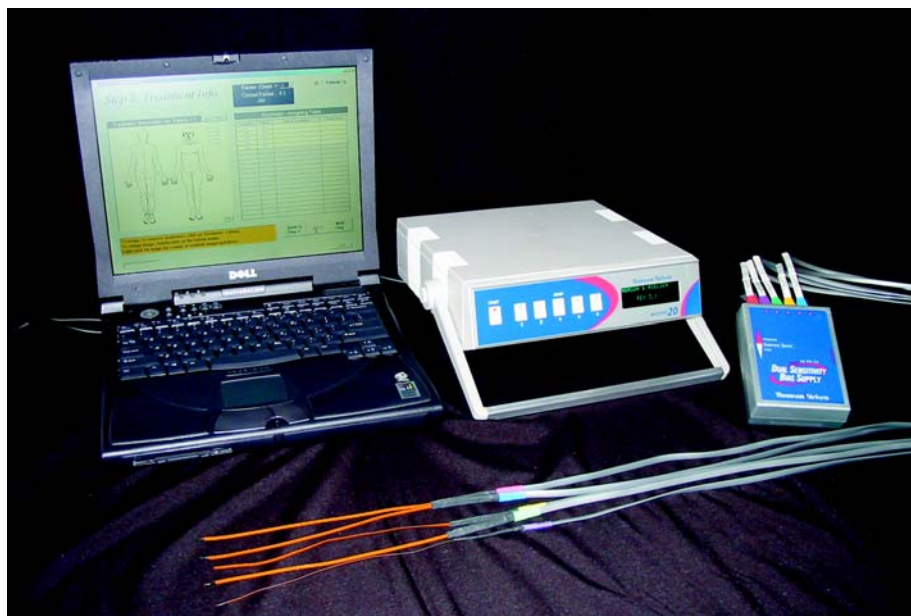
MOSFET 20

Dose Verification System

Model 37-100



Radiation Oncology



- Small, isotropic, direct read dose verification system
- 1 to 20 dosimeters
- Accurate, non-shielding
- Brachytherapy, IMRT
- Radiosurgery, TBI (total body irradiation), diagnostic x-ray

Introduction

The MOSFET 20 patient dose verification system is a high-performance, cost-effective dosimetry system. It combines pinpoint accuracy with the convenience of instant dose readout. MOSFET dosimeters, with an active area of less than 0.04 mm^2 do not attenuate the beam and make pinpoint dose measurement a reality. The same MOSFET is suitable for both photons and electrons in all radiotherapy and radiology applications. There is no need to purchase separate dosimeters for various energies. MOSFET dosimeters are also dose-rate and temperature independent.

Applications

In addition to regular patient dose verification and QA applications, these isotropic dosimeters are used in IMRT, brachytherapy, and intracavitary dosimetry. The high performance system is expandable from a standard configuration of 1-5 dosimeters to a maximum of 20. Dose readings are available in user-selected units, including cGy, mV, or R. Battery backup preserves up to 20 calibration factors, time and date settings after power-down.

The standard MOSFET 20 system includes a self-contained reader, an external bias supply with five dosimeter ports, a power adapter, five MOSFET dosimeters, and connecting cables. TABULA™ Dose Reporter Software provides a user-friendly Graphic User Interface (GUI) to the system using Windows® 95, 98, 2000, and NT® platforms. It expands the system by giving the medical physicist an effective tool to plan, execute, and record patient dose measurement in one operation. The report generated by TABULA contains all the data input by the user on the patient, radiation machine, MOSFET system, dosimeter sites (graphical and descriptive), target doses, measured doses, deviation between measured and target doses, calibration and correction factors, and comments added by the user.

Features

- Active region of $0.2 \times 0.2 \text{ mm}$
- Suitable for photons and electron modalities
- Dose-rate and temperature independent
- Isotropic ($\pm 2\%$ for 360°)
- Immediate reading of dose and computer record
- Multiple dosimeter capability with one Reader
- Unobtrusive in procedures
- Lightweight and flexible

Specifications

Dosimeter

0.04 mm² active detection area

Standard size is 2 mm wide

microMOSFET is 1 mm wide

Permits pinpoint measurement without patient shielding

Lightweight and flexible

Isotropic response of $\pm 2\%$ for 360°

Temperature and humidity effects are negligible

Reader

Vacuum fluorescent display

Direct readout in user-selected units – cGy, mV, R

Resolution of one unit up to a total accumulated dose of 20,000 mV

Battery backup retains calibration factors and time/date settings after power down

Stores up to 20 operator-entered calibration factors

Readings automatically scaled

Internal clock stores time and date with battery backup

System dose-to-dose reproducibility at 1

Dose	Bias supply	
	Standard	High
200 cGy	< 2%	< 0.8%
100 cGy	< 3%	< 1.2%
20 cGy	< 8%	< 3%

Sensitivity

Under full buildup

1 mV/cGy on standard bias

2.7 mV/cGy on high-sensitivity bias

Higher sensitivities available

X-ray energies

9 mV/R on high-sensitivity bias

Software

TABULA software This Dose Reporter Software provides an interface to the Reader in order to record dose information and provide a final dose report for patient records and QA

Operating system Microsoft® Windows 95, 98, 2000, and NT

Standard system components (Model 37-100)

Model	Description
	Reader
37-100-2000	TABULA Dose Reporter Software, includes two years software support, reader to PC cable, and one license (for extra licenses, see Optional Accessories)
37-100-1002	MOSFET Dosimeters, package of five
37-100-5000	Dual Bias Supply
37-100-3001	Bias Supply to Reader Cable, 3 ft (1 m)
	Power Adapter

Optional accessories

Model	Description
37-100-1001	MOSFET Dosimeters, package of two
37-100-1002	MOSFET Dosimeters, package of five
37-102-1001	High Sensitivity MOSFET Dosimeters, package of two
37-102-1002	High Sensitivity MOSFET Dosimeters, package of five
37-103-1001	microMOSFET Dosimeters, package of two
37-103-1002	microMOSFET Dosimeters, package of five
37-104-1001	High Sensitivity microMOSFET Dosimeters, package of two
37-104-1002	High Sensitivity microMOSFET Dosimeters, package of five
37-100-2000	TABULA Dose Reporter Software, includes 2 years software support, reader to PC cable, and 1 license
37-100-2001	Extra licenses for TABULA Dose Reporter Software (cable to be purchased separately if required)
37-100-3000	Reader to PC Cable, RS-232, 3 ft (1 m)
37-100-3001	Bias Supply to Reader Cable, 3 ft (1 m)
37-100-3003	Bias Supply to Reader Cable, 10 ft (3 m)
37-100-3005	Bias Supply to Reader Cable, 16 ft (5 m)
37-100-3008	Bias Supply to Reader Cable, 26 ft (8 m)
37-100-3010	Bias Supply to Reader Cable, 33 ft (10 m)
37-100-4000	XWU-IMRT Phantom, for a minimum of 9 dose points and film (only to be used with the MOSFET System)
37-100-5000	Dual Bias Supply, supports five dosimeters

Available model(s)

Model	Description
<i>Standard configurations</i>	
37-100	MOSFET 20 Standard Dose Verification System
37-101	MOSFET 20 XWU-IMRT Dose Verification System, includes XWU-IMRT Phantom
<i>Non-standard configurations</i>	
37-102	MOSFET 20 High Sensitivity Dose Verification System, includes High Sensitivity dosimeters instead of Standard dosimeters
37-103	MOSFET 20 microMOSFET Dose Verification System, includes microMOSFET dosimeters instead of Standard dosimeters
37-104	MOSFET 20 High Sensitivity microMOSFET Dose Verification System, includes High Sensitivity microMOSFET dosimeters instead of Standard dosimeters

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

Check for availability outside US.

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37-100-ds rev 1 11 mar 03

IntelliCheck™ Daily Check Device

Model 7600



Radiation Oncology

- Daily check device including 10 air-vented ion chambers
- Bright, clear, easy to use color touch screen display
- QA tests by machine, day or week reduce errors and increase staff efficiency
- Pressure and Temperature sensors provide automatic atmospheric beam corrections
- Wireless state-of-the-art technology - optional

Introduction

The Model 7600 IntelliCheck is a portable, easy-to-use, daily check device for therapy beam quality assurance. Ten ion chambers are positioned to simultaneously check beam constancy, symmetry, flatness, and energy constancy. Nine ion chambers are used for verification of flatness, symmetry, and dose constancy while a special filtered ion chamber provides energy constancy information. The bright color LCD touch screen display and user interface, internal and external Flash memory for measurement storage and computer interface provide for ease of use, comparison, and record keeping.

Applications

The IntelliCheck consists of a detector array and software for performing linear accelerator quality assurance using physicist preferred air ion chamber technology for dose measurement, avoiding the radiation damage issues of diode detectors.

Windows® CE based software acquires beam profile data from the detector array. The beam profile is displayed numerically or graphically. Beam profile analysis such as flatness and symmetry is performed and is saved in a database resident on the unit, facilitating daily, weekly, yearly checks, aiding in following the guidelines in TG-40. The data is also available for correlation to TG-51 data.

Features

- Windows CE based user interface
- Removable flash memory
- Tabular and graphical reports
- Optional USB keyboard input mode
- On-board level

Preliminary

Specifications

Display

Operating temperature Minimum 0°C, maximum 50°C

Dot pixels 320 x 3 [RGB] (w) x 240

Dot size 0.10 (w) x 0.34 mm (h)

Dot pitch 0.12 (w) x 0.36 mm (h)

Viewing area 122.0 (w) x 92.0 mm (h)

LCD type F-STN/color-mode/transmissive

Backlight Cold cathode fluorescent lamp

Detector

Material Acrylic

Standard field size 20 x 20 cm or 10 x 10 cm

External chamber cavity Side cavity provided for farmer-type ion chamber (0.6 cc), allowing central axis calibration

Ion chamber buildup (all chambers) 5 mm acrylic, 0.375 g/cm²; 0.8 mm polyethylene, 0.146 g/cm²

Ion chambers Ten air vented

Ion chamber configuration One central axis; four - 4 cm off-axis; four - 8 cm off-axis; energy constancy chamber for external filters@ 9 cm off-axis

Ion chamber nominal bias voltage 300 VDC

Ion chamber diameter/volume 1.27 cm/0.65 cc

System

Dose range 50 to 1000 rad/min; 0.50 Gy to 10 Gy/min

Beam type energy

Photons 2 to 25 MV

Electrons 2 to 25 MeV

Dimensions 9 (w) x 18.9 (d) x 2.3 (h) in. (23 x 47.9 x 5.8 cm)

Weight 6.34 lb (2.88 kg)

Optional accessories

Keyboard (Model 1300037000)

75 ft (23m) Communications Cable (Model 1090026000)

System components (Model 7600)

IntelliCheck (Model 7600)

6 ft USB Cable (Model 105-264)

Stainless Steel Filter Set: 0.46, 0.61, 0.76, 0.91, 1.5, 1.9, 3.0, 3.6, 5.0, 10, 15, 30 mm (Model 7200-50)

Buildup Plates, 1 cm, 3 each (Model 171063)

AC Power Adapter (see chart below)

Available model(s)

7600 IntelliCheck Daily Check Device

Available AC adapters (specify with order)

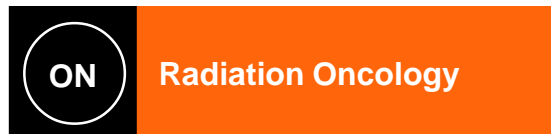
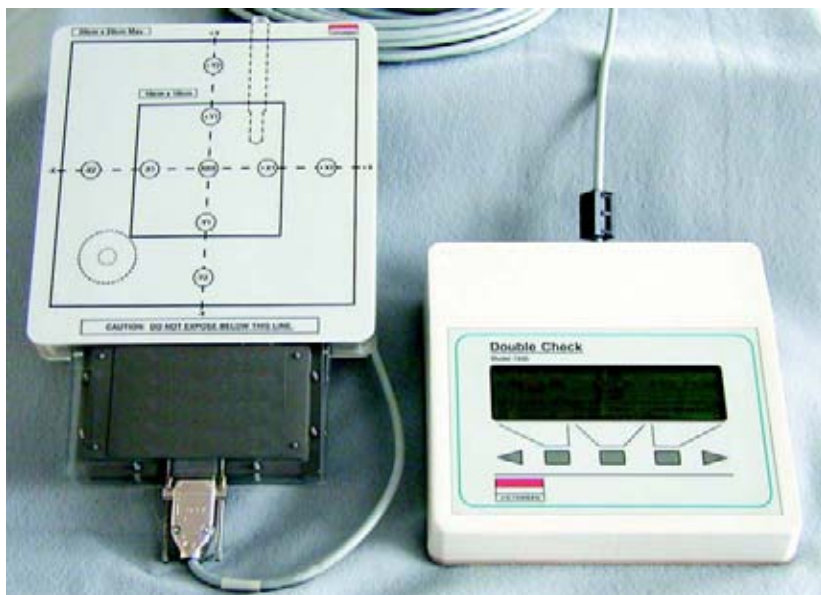
Model	Description	Typical geo. region
14-328	110 VAC 12 VDC 1000 mA	USA, Japan
14-401	230 VAC 12 VDC 1000 mA	Europe
14-414	230 VAC 12 VDC 1000 mA	UK
14-414 and 14-416 adapter	230 VAC 12 VDC 1000 mA	Australia

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

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7600-ds rev 2 09 aug 04

Double Check[®] Daily Check Device Victoreen[®] Model 7200



- 10 ion chambers measure photons or electrons
- Detachable detector array with 50 foot cable for remote operation
- Calibration and data storage for 6 machines, 12 energies, 31 days
- Permits immediate comparison of daily reading to baseline measurement
- Simultaneously checks symmetry, flatness, beam and energy constancy
- Accommodates standard 20 x 20 cm and 10 x 10 cm field sizes
- Cavity for use with farmer-type (0.6 cm³) ion chambers
- Excel Add-in for data collection and analysis

Introduction

The Model 7200 Double Check is a portable, easy-to-use, daily check device for therapy beam quality assurance. Ten ion chambers are positioned to simultaneously check beam constancy, symmetry, flatness, and energy constancy. Nine ion chambers are used for verification of flatness, symmetry, and dose constancy while a special filtered ion chamber provides energy constancy information. Its unique, detachable detector and the included 50 ft (15 m) cable allow the Model 7200 to be used as a single module or a two-piece, remote readout device. The large LCD, accessible internal measurement storage, and computer interface provide for ease of use, comparison, and record keeping.

Applications

The Double Check performs quality assurance tests for linear accelerators and ⁶⁰Co therapy machines. The quick setup and operational ease of the system make it ideal for daily checks of beam constancy, symmetry, and flatness.

Consulting physicists and service engineers will appreciate the Double Check System's portability. An optional carrying case eases transport and storage.

Features

- Large high contrast display for automatic dose and rate measurement
- Real-time information display
- Permits "tweaking-on-the-fly"
- Easy flow menu
- Data can be transferred to a printer or a computer
- Temperature & pressure compensation
- Buildup material supplied

01-02-98	07:00a	1.023	Machine 1	
		1.015		
0.993	0.997	255.7 rad	1.002	1.018
	0.572	0.984		
		0.991	Energy01	
DETECTORS ACTIVE- - - - -ADVANCE				
<	Select	Enter temp.	Send	>
<	energy	& pressure	reading	>

Specifications

Readout

Display LCD, 8 line x 32 character; center axis displays exposure; off-axis displays ratio to center

User controls On/Off, 3 soft keys, 2 menu scroll keys, and user determined programmable alarm points

Real time clock Automatic time/date stamping of log files

Symmetry and flatness Automatically calculated

Measurement modes/units

Dose rad, Gy

Rate rad/min, Gy/min

Log file storage 72 stored calibrations for 6 machines, 12 energies. User entered file labels, baseline for each file for measurement comparison. Typical, 6 machines, 12 energies, 31 days + baseline

Temperature and pressure Manual entry with automatic calculation and correction

User output RS-232 serial output, ASCII, sends selected file to computer or printer

Dimensions 9 (w) x 8.5 (d) x 2.4 in (h) (23 x 21.5 x 6 cm)

Power requirements Rechargeable batteries with 120 VAC adapter

Detector paddle

Material Acrylic

Dimensions 9 (w) x 12.5 (d) x 1.3 in (h) (23 x 32 x 3.3 cm)

Standard field size 20 x 20 cm or 10 x 10 cm

External chamber cavity Side cavity provided for farmer-type ion chamber (0.6 cc), allowing central axis calibration

Ion chamber buildup (all chambers) 4.2 mm acrylic, 0.375 g/cm²; 0.8 mm polyethylene, 0.146 g/cm²

Number of ion chambers Ten ion chambers

Ion chamber configuration One central axis; four - 4 cm off-axis; four - 8 cm off-axis; energy constancy chamber for external filters @ 9 cm off-axis

Ion chamber nominal bias voltage 500 VDC

Ion chamber diameter/volume 1.27 cm / 0.65 cc

System

Dose rate range 50 to 1000 rad/min; 0.50 Gy to 10 Gy/min

Dose 0 to 2000 rad; 0 to 20 Gy

Beam type energy

Photons 2 to 25 MV

Electrons 2 to 25 MeV

Dimensions mated 9 (w) x 18 (d) x 2.4 in (h) (23 x 45.7 x 6 cm)

Weight 20 lb (9 kg)

Optional accessories

Cable, 8 ft (2.4 m) (Model 7200-8)

Cable, 100 ft (30 m) (Model 7200-67)

Carrying Case (Model 7200-69)

System components (Model 7200)

Readout (Model 171305)

Detector Paddle (Model 171340)

7200 Assistant for Excel (Model 7200EXL)

Cable, 50 ft (15 m) (Model 7200-68)

Stainless Steel Filter Set (Model 7200-50): 0.46, 0.61, 0.76, 0.91, 1.5, 1.9, 3.0, 3.6, 5.0, 10, 15, and 30 mm

Buildup Plates, 1 cm (Model 171063) (3 each)

RS-232 Interface Cable, 7 ft (2 m) (Model 802013)

Adapter, 9-pin (Model 169072)

Instruction Manual (Model 7200-1)

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

CE Tested. Meets applicable standards.

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7200-ds rev 4 27 mar 03

7200 Assistant for Excel

Victoreen® Model 7200EXL

ON

Radiation Oncology

- Automatically collects stored or real time measurement data and places them in an Excel worksheet
- Automatically performs symmetry and flatness calculations
- Automatically calculates differences from baseline measurements
- Automatically sorts data by machine/energy and by date in descending order

Introduction

The 7200 Assistant for Excel is designed for use with the Victoreen Model 7200 Double Check® Daily Check Device for linear accelerator QA.

The 7200 Assistant for Excel is an Excel add-in that enables the user to download saved measurements or real time measurements from the Model 7200 Double Check directly to an Excel workbook. An Excel add-in is a program that adds optional commands and features to Microsoft® Excel. Since the 7200 Assistant for Excel is an Excel Add-In, it is automatically loaded with Excel once it is installed.

When downloading saved or real time measurements from the Model 7200 Double Check, new worksheets will be created automatically based upon the machine/energy information stored in the daily check device. If worksheets already exist for the machine/energy data that is downloaded, the measured data will automatically be placed in the corresponding energy worksheets.

The downloaded data is automatically sorted by date in descending order; flatness and symmetry are then calculated and automatically compared to a set of baseline measurements. The energy, type (photons or electrons), field size, test limits for flatness and symmetry, and difference from baseline can be specified for each individual beam worksheet. In addition, what chambers to use for flatness and symmetry (inner or outer) and correction factors for the off axis chambers may be entered.

An Auto Measure feature may be used to automatically step the user through a user-defined sequence of beam measurements.

Features

- Automatically creates worksheets based upon machine/energy information stored in the Model 7200 Double Check
- Auto Measure mode allows the user to define a measurement sequence
- Supports correction factors for off axis ion chambers for each energy worksheet
- User entered limits for flatness, symmetry, difference from baseline for flatness and symmetry for each energy worksheet
- Compatible with Windows® 98, ME®, 2000, XP®, and Microsoft Excel 97, 2000, XP

Specifications

Controls

The 7200 Assistant for Excel menu and toolbar provide the interface that allows the user to configure machine and energy files, download stored data and start real time data acquisition.



New Machine

Creates a new workbook for a specific facility and machine

New Energy

Adds a new energy worksheet to an existing workbook. If no energy worksheets are created, they will be created automatically based upon the machine/energy information stored in the Model 7200 Double Check

Setup

Set up energy name, type (photons or electrons), field size, test limits for flatness and symmetry, and difference from baseline. In addition, what chambers to use for flatness and symmetry and correction factors to outer chambers can be added

Start Real Time Measurement

Starts real time data acquisition. Real time means the Model 7200 Double Check is connected to the computer and will download data into Excel after completion of the exposure. If an Auto Measure sequence has been defined and enabled for the open workbook, the Auto Measure sequence will begin

Stop Real Time Measurement

Stops the computer from accepting data from the Model 7200 Double Check. If an Auto Measure sequence has been started, the Auto Measure sequence will be halted. Pressing the Start button again restarts Auto Measure data acquisition from the beginning of the Auto Measure sequence

Pause Real Time Measurement

Pauses real time data acquisition. When an Auto Measure sequence has been started, the Auto Measure sequence will be paused and the computer will not accept any data from the Model 7200 Double Check. Pressing the Start button again resumes Auto Measure data acquisition from the point at which it was paused

Start Stored Measurement

Enables the 7200 Assistant for Excel to accept data already stored in the Model 7200 Double Check's memory

Stop Stored Measurement

Stops the 7200 Assistant for Excel from accepting stored data

% Difference From Baseline

Calculates the difference in % between the baseline reading and all other subsequent readings for flatness and symmetry

Chart

Graphs the difference between the baseline and daily values for flatness and symmetry

Communications

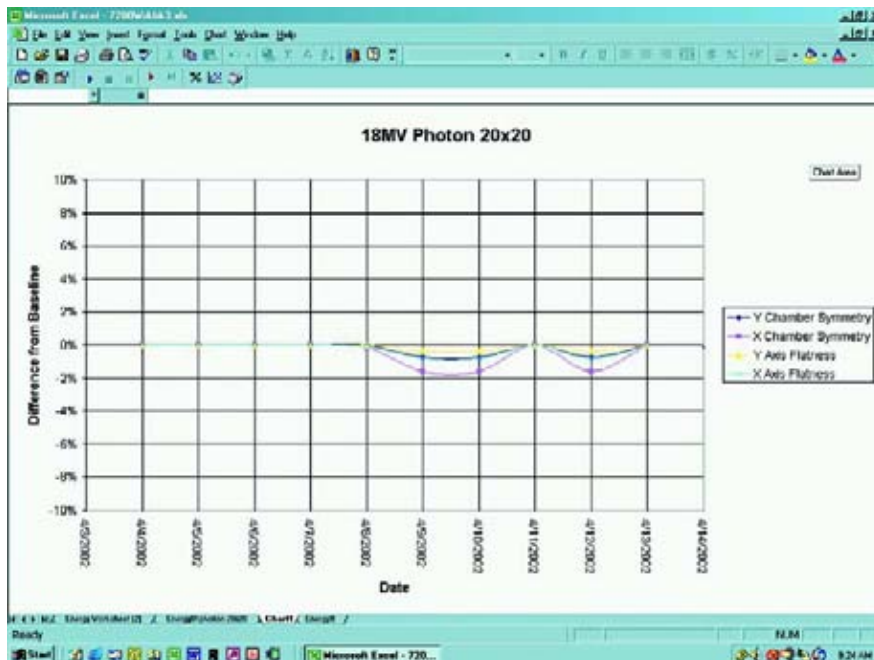
Selects the communication (COM) port

System requirements

- Windows 98, ME, 2000, XP
- Microsoft Excel 97, 2000, XP
- One serial port (COM1 through COM4)

Available model(s)

7200EXL 7200 Assistant for Excel, includes CD with electronic instruction manual



Baseline comparison chart

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

Specifications are subject to change without notice.

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TRACKER™

Model 90100



Introduction

The TRACKER Therapy Beam Evaluation System, Model 90100, is a quality assurance system that measures high energy accelerators and ^{60}Co dose and dose rate, enabling user calculation of beam constancy, flatness, and symmetry. The system consists of the Model 35300A detector and Model 35360A display.

The Model 35300A TRACKER detector array incorporates four orthogonally-placed ion chambers on a 10 cm radius from a fifth isocentrally-located ion chamber allowing ratio-to-center dose measurement. Each ion chamber, which is identical to the others and vented to the atmosphere, is a circular, parallel-plate configuration and is fully guarded for low leakage. The entrance surface indicates ion chamber locations for alignment with a therapy beam light field system. The Model 35360A TRACKER display contains five electrometers and a microprocessor-controlled, 4-line by 20-character, vacuum fluorescent display (VFD) that provides excellent readability of dose and dose rate measurements in virtually any lighting condition.

Applications

The TRACKER Therapy Beam Evaluation System performs quality assurance tests for linear accelerators and ^{60}Co . The system's quick setup and operational ease make it ideal for daily checks of beam constancy, symmetry, and flatness.

A five-channel electrometer enables measurement of dose or dose rate in either absolute or ratio-to-center. Dose measurement values may be displayed in units of R, rad, Sv, or Gy. Dose rate measurement values may be displayed in units of R/min, rad/min, Sv/min, or Gy/min.

The TRACKER System may be operated from either AC line power or from its high capacity internal battery. The battery is charged automatically when the unit is connected to AC line power, either during use or when idle.

Consulting physicists and service engineers will appreciate the TRACKER System's portability. An optional carrying case eases transport and storage. Other optional accessories include buildup plates and a buildup retaining hardware kit.

ON

Radiation Oncology

- Therapy Beam Evaluation System
- Superior stability verified by years of customer satisfaction
- Simultaneously measures dose or dose rate from five detectors
- Absolute and percent-of-center display modes
- Corrections for temperature and pressure
- 4-line by 20-character VFD for excellent readability in all lighting conditions
- User selectable gain factors

Features

- Measurement values from peripheral ion chambers displayed in either absolute dose measurement units or as percentage of center ion chamber's measurement value
- Microprocessor-controlled, 4-line by 20-character VFD displays measurement results directly in user's choice of radiological units corrected for air density
- Precision five channel electrometer provides $\pm 0.03\%$ linearity
- High performance rechargeable system allows eight hours of continuous operation from a three-hour charge
- Low battery annunciator indicates when < 30 minutes of operation remains
- Levels of internal 300 V electronic bias supply and rechargeable battery supply are continuously monitored
- Annunciators indicate abnormal bias or low battery voltage

Specifications

Nominal dose and rate display

Dose full scale	Dose sensitivity	Rate full scale	Rate sensitivity
3093 rad	0.1 rad	3093 rad/min	0.1 rad/min
3520 R	0.1 R	3520 R/min	0.1 R/min
30.93 Gy	1 mGy	30.93 Gy/min	1 mGy/min

Electrometer Accuracy 1% of reading (1 count)

Stability < 0.25% of reading per year

Zero drift (1 count 10° to 35°C)

Nominal ion chamber characteristics

Window area density 600 mg/sq cm (0.5 cm acrylic plastic)

Sensitivity 3.52 R/nC at 22°C and 760 mmHg

Active cross-sectional area 1.06 sq cm

Collection efficiency > 99% at 500 rads/min pulsed

> 99.9% at 500 rads/min continuous

Ion chamber factory calibration method Each of the five ion chambers within the detector array is calibrated by comparison with a reference standard ion chamber in a ⁶⁰Co beam. The comparison is performed in free air and results in a R/nC calibration factor for each of the five ion chambers

Source modes and energies

Photons 300 keV to 25 MeV, with suitable buildup material

Electrons 2 MeV to 25 MeV, with suitable buildup material

Recommended operation conditions

Source distance 100 cm

Collimated field size 25 x 25 cm

Source dose rate range 50 to 500 rads/min

RS-232 receptacle (RJ-45 style) User customization and field calibration via supplied MS-DOS® Customization Program

Fully remote and automated operation

AC line power receptacle AC line input range of 100 to 240 VAC without operator switching

IEC 320/C13 style receptacle enables worldwide operation by simply switching line cords

Physical

Detector dimensions

13.25 (w) x 17.25 (d) x 0.875 in (h) (33.7 x 48.8 x 2.2 cm)

Display dimensions

10 (w) x 4 (d) x 9.4 (h) (21.6 x 26 x 8.9 cm)

Total weight 26 lb (11.7 kg)

Optional accessories

Carrying Case (Model 37780)

Buildup Retainer Kit (Model 37825)

Buildup Plate (Model 37051)

System components (Model 90100)

Display (Model 35360A)

Detector (Model 35300A)

Detector to Display Interface Cable, 49 ft (15 cm) (Model 37783-15)

AC Line Cord (Both US and European styles available)

Instruction Manual (Model 37825)

Customization Kit (Model 37827)

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

CE Tested. Meets applicable standards.

Specifications are subject to change without notice.

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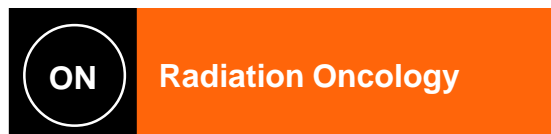
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90100-ds rev 3 11 mar 03

Primalert® 10 Teletherapy Radiation Monitor

Model 05-433



The Model 05-433 Primalert 10 Teletherapy Radiation Monitor is a compact monitor that responds to scatter radiation and can be mounted anywhere in the teletherapy room. A pair of bright red lamps on the instrument face flash a warning when the source is exposed, and will continue to flash, until safe conditions are re-established. The flashing green Operation Indicator light continuously monitors the background radiation and provides visible indication that the instrument is functioning. Primalert 10 comes with a self-stick wall-mounting bracket and an AC adaptor/power converter.



- Flashing lights indicate source is exposed
- Line-operated
- Optimized for use with Primapak II Backup Battery Pack

Specifications

Detector Energy-compensated GM tube

Accuracy $\pm 20\%$ from 60 keV to 2 MeV

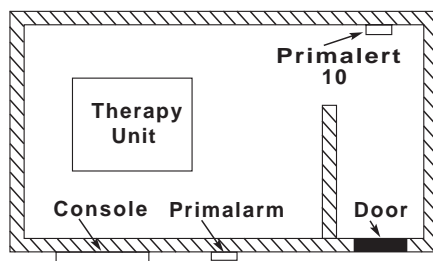
Alarm trip level Switch-selectable at 2.5 or 20 mR/hr

Alarm Two flashing red lamps with a 180° field of view. Alarm ceases when radiation falls below trip level

Power requirements Line-operated with UL-listed converter (105 to 125 VAC, 60 Hz to 12 VDC). Also can be powered by Primapak II

Dimensions 6 (h) x 3.5 (w) x 1.5 in (t) (15.24 x 8.89 x 3.81 cm)

Weight 2 lb (0.91 kg)



CE Tested. Meets applicable standards.

Optional accessories

Check Source, ¹³⁷Cs, 10 μ Ci. Flat Disc, 1 inch diameter (Model 62-103)

Available model(s)

05-433 Primalert 10 Teletherapy Radiation Monitor

Available AC adapters (specify with order)

Model	Description	Typical Geo. Region
14-314	110 VAC 12 VDC 500 mA	USA, Japan
14-400	230 VAC 12 VDC 500 mA	Europe
14-417	230 VAC 12 VDC 580 mA	UK
14-436	230 VAC 12 VDC 580 mA	Australia

Primalarm™ Remote Alarm

Specifications

Alarm trip level Controlled by Primalert 10

Alarms Two flashing red lamps with a 180° field of view. The aural alarm is switch-selectable

Power requirements Line-operated with UL-listed converter. Also can be powered by Primapak II (Model 05-441). 220 V with optional converter

Dimensions 6 (h) x 3.5 (w) x 1.5 in (t) (15.24 x 8.89 x 3.81 cm)

Weight 1 lb (0.45 kg)

Available model(s)

05-434 Primalarm Remote Alarm

Available AC adapters (specify with order)

Model	Description	Typical Geo. Region
14-314	110 VAC 12 VDC 500 mA	USA, Japan
14-400	230 VAC 12 VDC 500 mA	Europe
14-417	230 VAC 12 VDC 580 mA	UK
14-436	230 VAC 12 VDC 580 mA	Australia



CE Tested.
Meets applicable standards.

Primapak™ II Backup Battery Pack

Specifications

Dimensions 6 (h) x 4.5 (w) x 2.75 in (t) (15.24 x 11.43 x 7 cm)

Weight 4.5 lb (1.8 kg)

Available model(s)

05-441 Primapak II Backup Battery Pack, 110 V

05-441-2200 Primapak II Backup Battery Pack, 220 V



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

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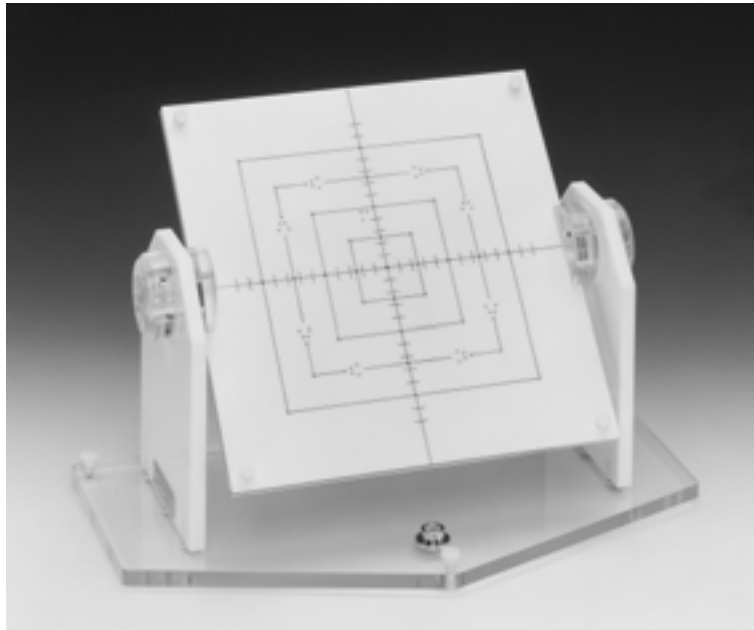
05-433-ds rev 1 11 mar 03

Precision Isocentric QC Beam-Checker II

Model 37-731

For checks of:

- Radiation and light-field congruence
- Collimator isocentricity
- Collimator field-size accuracy
- Gantry isocentricity
- Table isocentricity
- ODI accuracy
- Isocenter rotational stability
- Laser alignments

**Specifications**

Material White and clear acrylics

Markers Tungsten spheres; 2 mm Ø

Screen dimensions 12 x 12 in (30.5 x 30.5 cm)

Overall dimensions 6 (w) x 18 (d) x 13 in (h)
(15.2 x 45.7 x 33 cm)

Weight 6.1 lb (2.7 kg)

Available model(s)

37-731 Precision Isocentric Beam-Checker II

This precision quality control tool is ideal for daily, weekly and monthly quality control assessments of all mechanical and geometrical parameters of linear accelerators or teletherapy units.

The Precision Isocentric Beam Checker II consists of a large opaque acrylic screen backed by a secondary plate, both supported by two uprights. The screen is inscribed with lines precisely defining the corners, edges and center of the screen's 10 x 10 cm and 20 x 20 cm 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 in diameter are embedded in the center and corners of the fields.

A 10 x 12 inch ready-pack film can be sandwiched between the two plates. When exposed, the tungsten markers project a sharp image on the film, thus eliminating the inaccuracy and need to prick holes into the film.

The device's acrylic base-plate has an attached bubble level and non-slip leveling legs that allow it to be quickly and conveniently set up for use.

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

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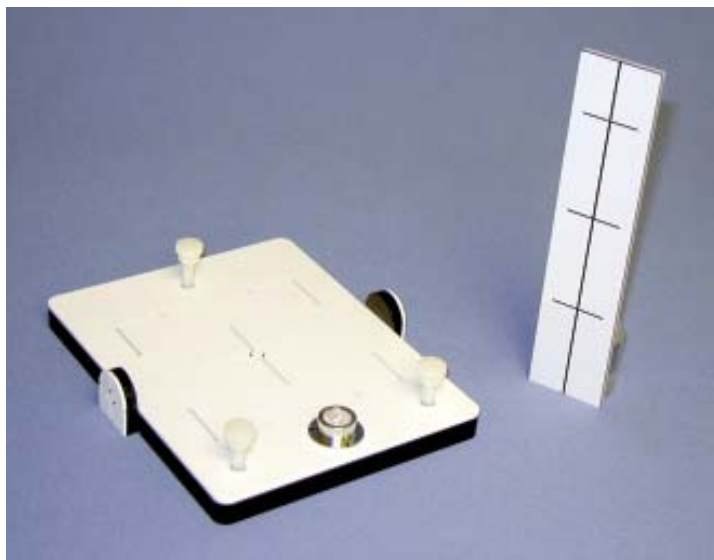
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37-731-ds rev 1 11 mar 03

TEL-ALIGN™

Teletherapy Alignment Gauge*

Model 37-001



Introduction

Accuracy begins with beam alignment. It is impossible to deliver the carefully calculated plan if the beam position is not verified. TEL-ALIGN verifies the coincidence of the light and radiation fields and checks the isocenter variation and the optical back pointer when the gantry is rotated $\pm 90^\circ$.

Applications

TEL-ALIGN consists of a rectangular plastic base with a removable vertical scale. The top surface of the base contains lead markers that form a square (10 x 10 cm) for visualization on film. A crosshair in the center of the square lines up with two additional sets of crosshairs, one on each outer edge of the base.

After the machine field size (10 x 10 cm) has been set, the table height should be adjusted until the base surface is at the isocenter distance. The collimator rotation angle is set at 0° . When positioned properly, the edges of the light field should coincide with the inscribed square. The field center should intersect the center crosshair, and the side lights should agree with the corresponding crosshairs at the edges of the base.

The vertical scale is placed on the base to check the optical distance indicator, or a film can be placed under the base to check the light field versus the radiation field. By rotating the gantry angle at $\pm 90^\circ$, the isocenter variation and optical back pointer are also checked. If adjustment of machine geometry is needed, it can be done quickly and easily, with the TEL-ALIGN Teletherapy Alignment Gauge (Model 37-001) in place.

* Designed and developed by the Medical Physics Department, Memorial Sloan Kettering Hospital, New York, NY 10021.



Radiation Oncology

Permits checks of:

- Optical distance indicator (over a 15 cm range)
- Collimator and central crosshair
- Head rotation and pitch
- Isocenter variation
- Side lights and optical back pointer
- Light field vs. radiation field

Specifications

Dimensions

Base 5.51 (w) x 7.09 (d) x 0.79 in (h)
(14 x 18 x 2 cm)

Vertical scale 7.09 in (h) (18 cm)

Weight 2 lb (0.91 kg)

Available model(s)

37-001 TEL-ALIGN Teletherapy Alignment Gauge

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

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37-001-ds rev 2 21 may 04

GARD™

Model 37-013

Introduction

The GARD* (Geometric Accuracy Radiotherapy Device) 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.

Applications

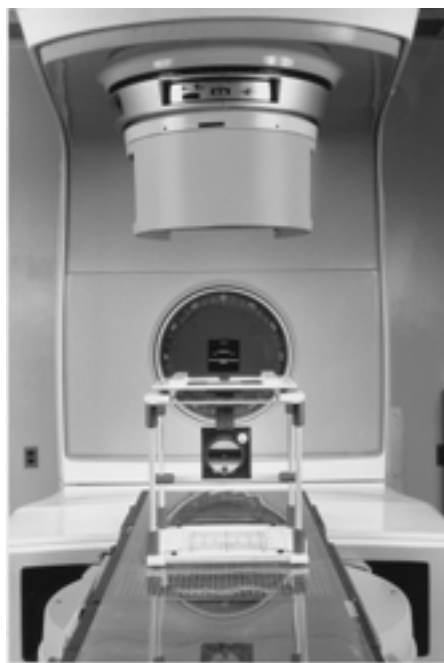
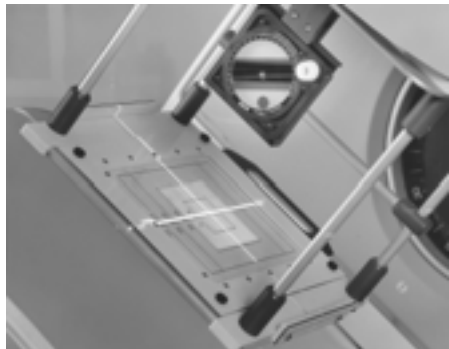
Gantry and collimator angle indicators

By using a high-precision goniometer, indicators of gantry and collimator angle can be visually verified. The goniometer is mounted so that it can check any collimator angle.



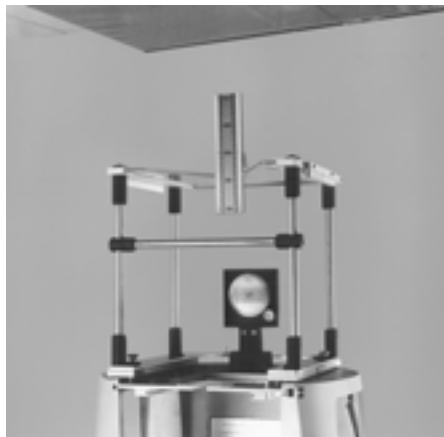
Light and radiation field coincidence

The included film cassette (8 x 10 inch) fits the accessory mount of 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.



Optical distance indicator laser alignment

An acrylic tray with a distance scale is supplied with GARD. Simply slide the tray into the accessory mount of GARD and turn on the machine distance indicator. The distance markers from the machine will be visible on GARD's distance indicator, and should coincide. The sides of 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.



Radiation Oncology

- Geometric Accuracy Reproducibility Device
- Designed to verify geometric accuracy of linear accelerators and simulators
- Provides quick visual verifications
- Helps eliminate errors
- Custom-manufactured to fit any machine

You can check:

- Gantry and collimator angle indicators
- Optical distance indicator laser alignment
- Light and radiation field coincidence

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

Dimensions 13.5 (w) x 13.5 (d) x 14.5 (h)

Optional accessories

Film Cassette, 8 x 10 inch (Model 37-013-2000)

Available model(s)

37-013 GARD. Custom-manufactured to fit the shadow tray of any therapy machine. Specify manufacturer's model number when ordering. Includes one 8 x 10 inch film cassette

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

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37-013-ds rev 1 11 mar 03

* Designed by A. Kalend, Ph.D., and L. Reinstein, Ph.D., State University of New York at Stony Brook.