



# ACQSIM™

## Therapy Simulation CT System

A full-function CT Imaging System that offers effective radiation treatment port location.



### Description

The ACQSIM therapy simulation CT system provides capabilities for locating tumors and placing precise reference markers on the skin of radiation therapy recipients. This is accomplished by calculating the scanner-space coordinates of a lesion's isocenter, and positioning the patient relative to laser lights. ACQSIM achieves accurate port location without recourse to a conventional X-ray simulator, for increased radiation treatment confidence and effectiveness.

ACQSIM components include a Picker ACQSIM CT imaging system, a simulator display console, and a patient marking system based on a set of three laser lights. (All Q series scanners may be upgraded with the ACQSIM option). To perform therapy simulation using ACQSIM, pilot

scans and a set of axial images are obtained on the scanner and transferred to the console in background mode. Tumors and critical structures are outlined using ACQSIM's extensive contouring software package. Scanner-space coordinates of the lesion's isocenter are also determined. The scanner couch is moved to the position indicated by the coordinates, and lasers are used to indicate where the patient's skin should be marked.

In addition, ACQSIM provides capabilities for full-function multi-dimensional image analysis, including multiplanar reformatting and three-dimensional reconstruction. All images and contours are stored on disk and can be transferred to an external therapy planning system.

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### Product Data

## Components

- ACQSIM CT Imaging System, including I.Q.<sup>®</sup> gantry, patient support and control center.
- ACQSIM Therapy Simulation System, including tower enclosure, monitor, keyboard, mouse, 8 mm cartridge tape drive and software.
- Laser Light System

## Specifications

### ACQSIM CT Imaging System

Please refer to the I.Q. TIC CT Imaging System Product Data brochure for specifications.

### ACQSIM Therapy Simulation System

#### Components

##### Tower Enclosure

Narrow, desk-height enclosure houses system CPU, Voxel Processor three-dimensional imaging accelerator, disk drive, 8 mm tape drive and power supply.

##### Video Display/Monitor

Full color (24-bit RGB) image viewport; 1024 x 1408. Monitor: 19" Full color (RGB); 60 Hz, non-interlaced; line frequency: 64 kHz; dot clock: 125 MHz.

##### Keyboard

Full alphanumeric keyboard with custom function keys.

##### Optical Mouse and Pad

Used for selecting menu items, drawing contours and manipulating images.

##### Modem

Internal, Hayes<sup>®</sup> compatible, 2400 baud.

##### Computer System

###### SPARC<sup>®</sup> Computer System

Embedded 32-bit host with 16 Mbyte memory, floating point processor; SunOS<sup>™</sup>

###### Voxel Processor<sup>™</sup>

High powered accelerator for rapid multi-dimensional image display.

###### System Disk

The 600 Mbyte disk drive allows for the storage of up to 1000 512 x 512 images on-line. At 30 images per study, this represents a capacity of 33 patient studies.

###### Image Storage

The 32 Mbyte processor and display memory holds approximately 60 512 x 512 slices on-line.

###### Cartridge Tape Drive

Provides 8mm cartridge output, with capacity of up to 2.5 Gbytes. Used for archiving and service.

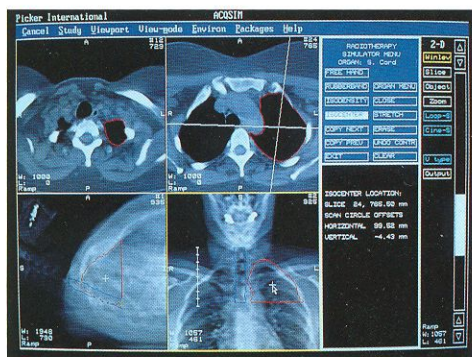
### Optional Interfaces

#### Ethernet<sup>®</sup>—TCP/IP

Available for digital networking between the ACQSIM and an external treatment planning system. Capable of data transfer at a speed of 10 million bits per second.

#### 9-Track Magnetic Tape Drive

Available for transferring data via magnetic tape between the ACQSIM and an external treatment planning system. Provides auto-loading of all standard tape sizes, and reads densities of 1600 and 3200 bpi.



### Laser Light System

The laser light system consists of three diode lasers; each mounted on a specially designed plate which allows adjustment in the three major planes for precise calibration. Two lasers are mounted on the scanner room walls parallel to the patient support system, and the third is mounted on a movable track opposite the scanner gantry. This laser can be moved to the left or right of the scanner's central axis via an analog servo-controller.

A calibration phantom is also provided to ensure proper alignment of the scanner and lasers.

### Mounting Limits

Rotational Movement	$\pm 7$ degrees
Translational Movement	$\pm 1$ inch

### Movable Laser Unit

Total Lateral Movement	58 cm total ( $\pm 29$ cm about scanner gantry axis)
Positional Accuracy	0.1 mm

### Laser Beam Output

Power	Less than 1mW through an 80 mm aperture at 200 mm distance. Complies with CDRH, class II lasers
Wavelength	$670 \pm 10$ nm (visible red)
Line Length	2 m at 3 m distance (FOV = 33 degrees)
Range	Up to 7 m
Stability	Less than 0.1 mm drift at 3 m distance

### Adjustment

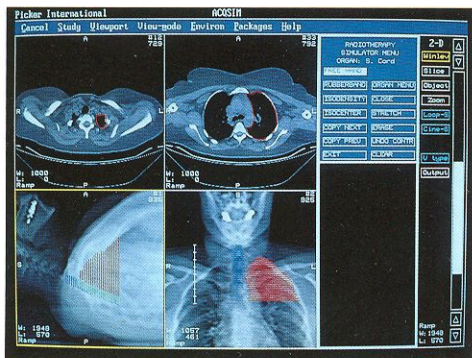
Focus	1 to 7 m
Line Rotation	360 degrees
Alignment	$\pm 250$ mm at 3 m distance (with mounting plate)

## Features

To perform therapy simulation using ACQSIM, two pilot scans (A/P-P/A and lateral) and a set of axial images are obtained with the patient in the treatment position.

The ACQSIM screen is divided into four equally sized viewports. The bottom two viewports display the pilot scans and the top two initially display the first two axial slices of the study. Segmented marker grids show the exact position of the displayed axial slices on the pilot scans.

All images may be enhanced via window/level and magnification adjustment for maximum contrast and clarity.



### Contouring Package

ACQSIM includes a full-feature contouring package with extensive editing capabilities for defining tumor volumes and surrounding critical structures. A variety of options are provided for drawing contours freehand or automatically. As each contour is defined, it is posted onto the pilot scans.

### Patient Marking System

A preliminary isocenter of the tumor and/or the tumor's edges are determined, relative to the original axial images and the pilot scans. The following coordinates are provided: couch position, table height and position of sagittal laser light.

Once the couch is moved into position, the lasers can be used to indicate where to mark the skin's surface relative to the tumor's isocenter or edges.

**Features**  
(continued)

**Visualization and Analysis Tools**

ACQSIM also enables complete multiplanar reformatting and three-dimensional analysis of the tumor and surrounding structures, including tumor volume analysis in cc's.

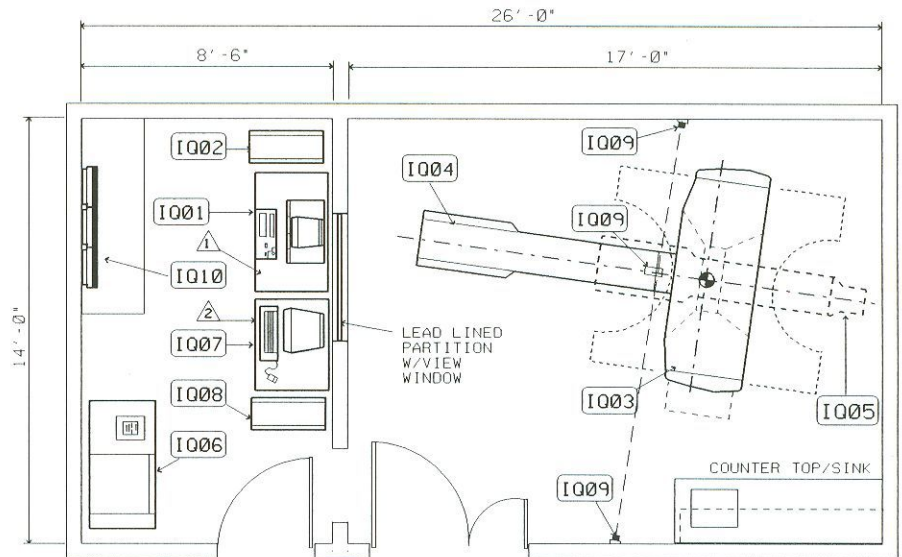
**Site Requirements**

- Main incoming power supply: 208 VAC (nominal) 45 kVa 3-phase distribution source, 50/60 Hz, and 15 amp 120 VAC single phase line.
- Suggested ambient room requirements are 68 degrees to 75 degrees F at 30% to 60% R.H. (non-condensing). The btu/hr. ratings listed below are estimations based on an average hourly duty cycle and standby modes of equipment operation:

Exam Room	15,000
Control Area	10,000
Camera (optional)	2,200 btu/hr.
	27,200 btu/hr.

- Contact the Picker Architectural Planning Department for specific requirements pertaining to imaging/viewing equipment floor space, special instructions for laser installation, and electrical, mechanical, structural and environmental specifications.
- Recommended ceiling height 9'-0" (2.74 m) minimum
- 27 square meters of floor space are required
- Two dedicated phone lines for the modem must be available at the time of installation
- Image quality may be adversely affected by the proximity of the ACQSIM monitor to sources of strong magnetic fields.

CODE	EQUIPMENT	W	D	H	LBS.
IQ01	CT Control	24"	28"	22"	80 lbs.
IQ02	CT Computer	9"	30"	29"	200 lbs.
IQ03	Gantry Stand	88"	34"	77"	3,400 lbs.
IQ04	Patient Couch	23"	165"	40"	550 lbs.
IQ05	Head Holder	-	-	-	-
IQ06	Laser Imager	51"	26"	48"	686 lbs.
IQ07	Simulation Station	19"	26"	16"	60 lbs.
IQ08	Simulation Computer	9"	30"	29"	200 lbs.
IQ09	Laser Lights	-	-	-	-
IQ10	Film Viewers	-	-	-	-
▲	Picker Table	48"	30"	29"	-
▲	Picker Table	36"	30"	29"	-



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