# BrightSpeed 8

(BrightSpeed Edge Select Edition-US naming)

Product Data Sheet –Ver7. May 2007

GE Healthcare

The **BrightSpeed 8** brings you multi-detector CT capabilities with maximum convenience in an ultra-compact design. Built with LightSpeed VCT inside, the **BrightSpeed 8** provides high quality image across a wide range of applications and allows you to perform new clinical applications.

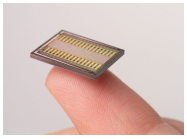
## Ideal Convenience and Improved Comfort

***Ultra compact form:*** BrightSpeed Series optimize the speed, power and resolution needed for all kind of CT routine applications. Yet it fits in the same space as a single slice for an easier installation.

***Freedom Workspace:*** Innovative hardware and software create a convenient, ergonomic working environment. It offers sit/stand and horizontal/vertical monitor flexibility. It can also help reduce noise and heat with remote location of the console.

## Innovation in Image Quality and Dose Optimization

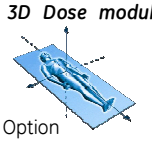
- ***Volara™ Digital DAS***: Data Acquisition System, with sampling rate increased of up to 20% and noise reduced of up to 33%, resulting in outstanding image quality in signal starved areas (shoulder, hip, large patient, metal) and soft tissue low contrast (body, neuro, cardiac) as well as pediatric.



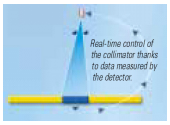
New ***Extended OptiDose* suite**, including

- **Unique *"Color Coding for Kids" protocols***, providing pediatric scan protocols based on the Broselow-Luten™ Pediatric System, designed to facilitate pediatric emergency care and reduce medical errors.

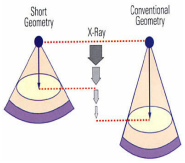
- ***3D Dose modulation***. Before the scan, clinicians can select the desired Noise/IQ: CT then tailored automatically exposure parameters, patient to patient and real-time x-y-z during each scan, resulting in up to 30% dose reduction.



- ***Beam Tracking*** techniques, providing real-time X-ray follow-up, guarantying that high spatial resolution is reached with **no post-patient collimation and no dose penalty.**

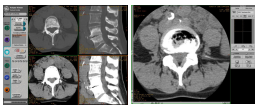



- ***Dose Report capacity***, in conjunction with **Prospective display** of $CTDI_{vol}$, DLP and Dose Efficiency, helping the clinicians reach ALARA dose, and keep track of it.
- **Short gantry geometry**, in conjunction with *Hyper* generator and the ***Solarix Tube*** affords to **get up to 350mA and seamless throughput.**




## Innovation in Workflow

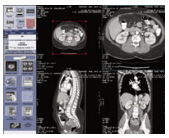
***Xtream FX suite*** workflow management, including:



- ***One-touch protocol*** workflow, delivering tailored visualization mode for exams review, directly built in the protocols, and available in "1 click" on the Operator Console or the Post-processing workstation.

- *Up to **3fps(6fps*)** recon speed*

- ***Direct MPR*** with Auto-Batch feature, affording automatic real-time direct reconstruction and transfer of fully corrected multi-planar images, in any plane.



- Up to 10 ***fps transfer speed*** of images, real-time during acquisition, to up to 4 different destinations.
- ***DVD interchange*** capability, for archiving of image data into DVD-R media(4.7GB).
- ***Data Export*** capability, ensuring the relevant images and reports can be visualized by the referrals in PC friendly format (MPEG, AVI…)
- ***Auto Transfer by Series*** to distribute images where you need them when you need them.
- ***Exam Split**** allows multi-anatomic exams to be read in separate anatomic sections. This allows specialists to review only those images needed for a given requisition
- ***Gray Scale Presentation State*** saves display presentation of WW, WL, flip, rotate, zoom, roam , user annotation and measurements for transfer to a remote viewing station using DICOM GSPS object.

* Option

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- ***Direct Connect*** allows remote Advantage Workstation (AW) access to the Xtream FX console's thin-slice data, eliminating unnecessary network traffic and storage duplication. (AW4.3* and later)
- **291GB Disk** (system, images, scan disks) stores up to1,500 scan data files.
- Extensive portfolio of ***Advanced Clinical Applications**** Advanced Vessel Analysis with AutoBone, Neuro, Liver and Body Tumor Perfusion, CT Colonography with Virtual Dissection and auto-segmentation capability**.**

## Ease-of-use and quality

- **Continuous improvement,** with the exclusive ***GE Continuum**** contract.
- **Compact system design**, Minimum installation in only 19.6 $m^2$ (210.3 square feet) for exam room, 10 $m^2$ (112 square feet) for control room with side-by-side desktop table. Actual final room size determined by siting.
- New ***2xLCD monitor 19"inch,*** standard, for maximum comfort in images review.

- **Up to 1400 mm scannable range**.

  **Note: variable depends on table height**
- **Productivity features designed for the CT** Technologist: In- Room Start, Remote Gantry Tilt, Breathing Lights with countdown timer, Controls Panel mounted on two corners ( four corners *) of the Gantry, Integrated IV Pole* and Table Tray* at the foot of the table.

**Isotropic image quality, 0.35mm isotropic microvoxel**™ image resolution.

- Recon algorithms, ***Hyperplane***™ and ***Crossbeam***™, providing virtually artefact-free images and optimized slice profile at any pitch, by solving the technical challenges of cone beam and high pitch helical scanning.

## Clinical Performance Examples

With the BrightSpeed 8, users can routinely use a 0.8 second scan speed in conjunction with high pitch helical up to 1.675:1,affording, for the same image quality, to reduce breath-hold, perform better thin-slice CT angiography exams, use thinner slices for most exams, and perform longer helical exams without tube cooling delays.

### *Chest / Abdomen / Pelvis*

| | |
|---|---|
| Coverage | 600 mm |
| Rotation | 0.8 sec |
| Mode | 8 x 2.5 mm |
| Pitch | 1.675:1 |
| mA | 260 |
| mAs | 208 |
| Speed | 42 mm/s |
| Scan Time | 15seconds |

### *Peripheral Run-Off*

| | |
|---|---|
| Coverage | 1,400 mm |
| Rotation | 0.8 sec |
| Mode | 8 x 2.5 mm |
| Pitch | 1.675:1 |
| mA | 240 |
| mAs | 192 |
| Speed | 42 mm/s |
| Scan Time | 34 seconds |

### *High Resolution Chest*

| | |
|---|---|
| Coverage | 200 mm |
| Rotation | 0.8 sec |
| Mode | 8 x 1.25 mm |
| Pitch | 1.675:1 |
| mA | 275 |
| mAs | 220 |
| Speed | 21 mm/s |
| Scan Time | 10 seconds |

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# System Specifications

**Helical**

- Continuous 360° scanning with table incrementation and no interscan delay;
- Scans can be acquired with a wide variety of speeds.

**Axial**

- Up to 8 contiguous axial planes acquired simultaneously with each 360° rotation, with the time between scans set by the user-selected interscan delay (ISD) or intergroup delay (IGD);
- Scans may be easily clustered in groups to allow multiple scans in a single breath hold;
- Minimum scan-to-scan cycle time of only 1.8 sec with table moves of ≤ 10 mm;

**Scout™**

- Single radiographic plane for scan localization and graphical prescription of prospective reconstruction;
- Extended range matches helical scannable range.

## *Helical Scans*

Slip ring technology has advanced axial scanning by enabling scans with simultaneous table movement.

## *Helical Multi-slice Prescription*

Streamlined prescriptions and easy-to-use default protocols make the BrightSpeed 8 fast and efficient in patient set up.

Multi-slice acquisitions and short intergroup delays helps to reduce potential mis-registration between scans by increasing the number of scans possible in a patient breath hold. .

Helical protocols are almost identical to "classical" axial scan protocols. At the beginning of a study, the operator selects the type of exam with the anatomical programmer, and indicates the desired scan range - either manually, or from a Scout.

After completing the prescribed exam, the system remains ready to continue with additional helical scans or a set of axial scans.

The operator may reconstruct helical scans prospectively, and retrospectively, at any arbitrary table location in 0.1 mm increments.

## *Helical Multi-slice Modes*

The complex nature of helical multi-slice scanning has been simplified by grouping all critical acquisition parameters within 7 basic scan modes, all optimized for image quality and speed. For eight-slice acquisition: 0.625:1; 0.875:1; 1.35:1 and 1.675:1. These clinically derived multi-slice scan modes offer a wide range of selections that carefully balance acquisition speed, image thickness, and retrospective image reconstruction flexibility.

This simplified user interface guides the user in the choice of scan parameters. The user selects a pitch mode, a desired image slice thickness and table travel per rotation. The user interface also displays the resulting choice of retrospective image thicknesses available for each choice of acquisition parameters.

The 8 slice helical acquisition modes provide table speeds from 3.12 mm/rotation up to 33.5 mm per rotation.

**4-slice Helical Mode**

The Pitch 1:1 multi slice mode provides sub mm scanning capability by utilizing a 2 x 0.63mm detector configuration.

The Pitch 0.75:1 multi-slice mode provides unique combinations of table speed and image thickness. In general, this scan mode provides helical images with image quality comparable to single-slice systems at 1:1 to 1.5:1 pitch, but at 1.5 to 4.5 times faster table speeds, and at about 50-60% of the mAs.

The Pitch 1.5:1 multi-slice mode provides helical images at table speeds that are 3 to 9 times faster than for 1:1 pitch helical single-slice scans with image quality comparable to 1.5:1 to 2:1 pitch on a single-slice system.

**8-Slice Helical Mode**

The Pitch 0.625:1 multi-slice mode provides unique combinations of table speed and image thickness. In general, this scan mode provides helical images with image quality same or better than single-slice systems at 1:1 pitch, but at 3 to 7.5 times faster table speeds.

The Pitch 0.875:1 multi-slice mode provides unique combinations of table speed and image thickness. In general, this scan mode provides helical images with image quality comparable to single-slice systems at 1:1 to 1.3:1 pitch, but at 3 to 10 times faster table speeds.

The Pitch 1.35:1 multi-slice mode provides helical images at table speeds that are 6 to 15 times faster than for 1:1 pitch helical single-slice scans with image quality comparable to 1.4:1 to 1.6:1 on a single-slice system.

The Pitch 1.675:1 multi-slice mode provides helical images at table speeds that are 6 to 20 times faster than for 1:1 pitch helical single-slice scans with image quality comparable to 1.7:1 to 2.0:1on a single-slice system.

The 7 helical scan modes provide table speeds from 1.25 mm/rotation up to 33.5 mm per rotation enabling scan speeds that are up to 20 times faster than single-slice helical scanners and up to 2.2 times faster than 4-slice scanners.

| **4-SLICE HELICAL MODES** | | |
|---|---|---|
| **Table Speed (mm/rotation)** | | |
| **Image Thickness** | **0.75:1** | **1.5:1** |
| 0.63mm** | 1.25 | N/A |
| 1.25 mm | 3.75 | 7.5 |
| 2.5 mm | 3.75, 7.5 | 7.5, 15 |
| 3.75 mm | 7.5, 11.25 | 15 |
| 5 mm | 7.5, 11.25, 15 | 15, 22.5, 30 |
| 7.5 mm | 11.25, 15 | 22.5, 30 |
| 10 mm | 15 | 30 |

**0.63mm Image Thickness at 1.25 mm/rotation available by utilizing a 2x0.63 detector configuration.

| **8-SLICE HELICAL MODES** |
|---|

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| Table Speed (mm/rotation) | | | | |
|---|---|---|---|---|
| **Image Thickness** | **0.625** | **0.875** | **1.35** | **1.675** |
| 1.25 mm | 6.25 | 8.75 | 13.5 | 16.75 |
| 2.5 mm | 6.25<br>12.5 | 8.75<br>17.5 | 13.5<br>27 | 16.75<br>33.5 |
| 3.75mm | 6.25<br>12.5 | 8.75<br>17.5 | 13.5<br>27 | 16.75<br>33.5 |
| 5.0 mm | 6.25<br>12.5 | 8.75<br>17.5 | 13.5<br>27 | 16.75<br>33.5 |
| 7.5 mm | 12.5 | 17.5 | 27 | 33.5 |
| 10 mm | 12.5 | 17.5 | 27 | 33.5 |

## *Prospective Multiple-Thickness Reconstruction*

For all helical scan modes, the operator can choose to reconstruct images prospectively in any of the defined nominal image thicknesses.

In addition to the initial reconstructed slice thickness, the operator has the option to prospectively specify additional images to be reconstructed from a single raw data set. These images can be reconstructed at any of the defined nominal image thicknesses available for a given table speed and scan mode.

This effectively facilitates later, more detailed image analysis without additional patient scans and subsequent dose and image registration concerns.

The following table illustrates the reconstruction image thicknesses available for each acquisition table speed and scan mode:

| 4-SLICE HELICAL MODES | | |
|---|---|---|
| **Table Speed (mm/rotation)** | | |
| **0.75:1** | **1.5:1** | **Thickness** |
| 1.25 | | 0.63mm** |
| 3.75 | 7.5 | 1.25, 2.5mm |
| 7.5 | 15 | 2.5, 3.75, 5mm |
| 11.25 | 22.5 | 3.75***, 5, 7.5mm |
| 15 | 30 | 5, 7.5, 10mm |

**0.63mm Image Thickness at HQ 1.25 mm/rotation available by utilizing a 2X0.63 detector configuration.

***3.75 mm not available at 22.5 mm/rotation

| 8-SLICE HELICAL MODES | | | | |
|---|---|---|---|---|
| **Table Speed (mm/rotation)** | | | | |
| **0.625** | **0.875** | **1.35** | **1.675** | **Thickness** |
| 6.25 | 8.75 | 13.5 | 16.75 | 1.25, 2.5, 3.75, 5mm |
| 12.5 | 17.5 | 27.0 | 33.5 | 2.5, 3.75, 5, 7.5, 10 mm |

## *Helical Scan Parameters*

Scan Speed:
- Full 360° rotational scans in 0.8s, 1.0s,
- can Technique:
- KVp :80,100,120,140 KVp
- mA: 10 to 350mA,5 mA increments with 120KV
- Power:42 kW with 120KV

Focal Spot Selection:
- Small spot for up to 19.2 kW with 120KV
- Larger spot for greater than 19.2 kW with 120KV

Single Acquisition Max. Scan Time:

120s

Helical Tilt: helical acquisition is possible with the gantry tilted to a maximum of 30 degree, in half degree increments.

Multiple Acquisition Maximum Scan Time: Multiple scans can be acquired in one series to produce up to 3000 contiguous helical images. Up to 4000 rotation helical coverage are possible in multiple series.

Minimum Inter-Group Delay (IGD): 5 sec between adjacent helical scans

Scan Fields of View:
- 25 cm for adult head
- 25, 50 cm for body
- 25 cm for pediatric head

## *Helical Scan Enhancements*

Full simultaneity allows complete image display, processing and analysis, as well as image archival and filming concurrent with scanning and reconstruction -- even when acquiring helical images in a multi-slice mode.

Confirm Rx to X-rays on: < 15 sec for any state of tube and gantry; < 10 sec with the gantry rotating

AutoScan™: Fully automates longitudinal table movement and start of each scan.

AutoVoice™: 3 preset languages in 9 user selectable languages and user-recorded messages automatically deliver patient breathing instructions, especially useful for multiple helical scans

Trauma Patient: Allows patient scans and image display/analysis without entering patient data before scanning.

Biopsy: Simplified prescription for single or multiple scans around an arbitrary table position aids biopsy studies.

## *Helical Image Reconstruction*

Reconstruction Algorithms: Soft Tissue, Standard, Detail, Bone, Bone Plus, Lung and Edge

Reconstruction Matrix: 512

Display Matrix: 1024

Display FOV: Freely variable center/off-center, prospective/retrospective target selection.

CT Number Scale: -1024 to 3071 HU or extended -31743 to 31743

* Option

Helical Reconstruction Times:
- Up to 3 frames per second reconstruction time.
- Iterative bone processing, which is always enabled for head scanning, reduces image artifacts in head scans stemming from X-ray beam hardening effects.

Minimum DFOV:9.6 cm

Minimum Pixel Size:0.19 mm

Queued Recon: Requests will be processed continuously and simultaneously with other processes on the system including scanning. Prospective recon will be prioritized over retrospective recon.

Priority Recon Queuing: One touch selection marks most recent rotation for next available recon. Available during or after scanning.

Images annotated to indicate continuous scan acquisition with table incrementation:
- HE (helical) + Pitch
- Table speed

Prospective Multiple Reconstruction (PMR): Up to 3 sets of reconstructions can be pre-programmed as part of the scan protocol prior to acquisition. The operator can select different start/end location, slice thickness, interval, reconstruction algorithms and display fields of view for each reconstruction. Unique series descriptions can be entered for each set of reconstructions to facilliate hanging protocols on PACS display. This frees the operator from sitting at the console and directly contributes to increased productivity.

Prospective Recon: Operator may initiate full recons at any table location in increments of 1/10 the image thickness; image thickness remains constant.

Retrospective Recon**:** Operator may initiate full recons at any table location in 0.05 mm increments; image thickness remains constant.

Retrospective Image Decomposition: The operator has the option to retrospectively decompose the original raw data set and reconstruct additional images at any of the defined nominal image thickness available for a given table speed and scan mode.

## *Helical Scan Protocols*

All protocols assume 120 kVp scans under typical clinical conditions.

**Single Helical Scans:**

| Scan Time (sec) | Maximum mA |
|---|---|
| 10 sec | 350 |
| 20 | 310-350 |
| 30 | 260-335 |
| 40 | 225-295 |
| 50 | 200-265 |
| 60 | 175-240 |
| 70 | 145-215 |
| 80 | 135-200 |
| 90 | 120-185 |
| 100 | 110-175 |
| 110 | 100-165 |
| 120 | 90-140 |
| 120s(80KV) | 140-235 |

**Multiple Helical Scans:**

(contiguous helical coverage with 5-second IGD):

| Scan Time | IGD | No. Scans | Max mA |
|---|---|---|---|
| 10 sec | 5 sec | 3 | 275-345 |
| | | 4 | 235-305 |
| | | 5 | 210-270 |
| | | 6 | 185-240 |
| 20 sec | 5 sec | 2 | 225-295 |
| | | 3 | 180-235 |
| | | 4 | 135-195 |
| 30 sec | 5 sec | 2 | 180-235 |
| | | 3 | 120-185 |
| | | 4 | 95-140 |

**Contiguous Helical Coverage**

Multiple helical scans can be performed in succession with only 5-second delays between helical scans, providing up to 2000 contiguous rotations (with up to 1500 images in one series).

(The following chart assumes 120-sec helicals with 5-sec IGD)

| Total Scan Time (sec) | Total Elapsed Time (sec) | Max mA |
|---|---|---|
| 150 | 155 | 75-135 |
| 200 | 205 | 60-100 |
| 240 | 245 | 50-85 |

## *Helical Scan Image Quality*

### *High-Contrast Spatial Resolution*

On GE Performance phantom:I

Standard Algorithm
- 0.584 mm limiting resolution
- 4.0 lp/cm @ 50% MTF
- 6.5 lp/cm @ 10% MTF
- 8.5 lp/cm @ 0% MTF

Hi-Res Algorithm
- 0.324 mm limiting resolution
- 8.5 lp/cm @ 50% MTF
- 13.0 lp/cm @ 10% MTF
- 15.4 lp/cm @ 0% MTF

### *Low-Contrast Detectability*

Low-Contrast Detectability

On 8 inch (20 cm) CATPHAN phantom
- 5mm @0 .3% at 13.3 mGy
- 3mm @0.3% at 37.2mGy

### *Noise*

On GE Quality Assurance phantom:
- 0.32% +/- 0.03% at 28.5 mGy (2.85 Rad)

* Option

*CTDI*

On CTDI Head and Body Dose Reference Phantoms: (Calculated from Axial data and adjusted for 0.75:1 pitch and 190mAs)

**$CTDI_{vol}$** expressed in mGy/100 mAs for IEC pitch 1: (normalized to a pitch of 1).

Head 18.4mGy/100mAs

Body 9.3mGy/100mAs

## Axial Scans

Multi-slice acquisitions and short interscan delays helps to reduce potential misregistration between scans by increasing the number of scans possible in a patient breath hold.

## Axial Multi-slice Prescription

Simplified scan prescriptions and easy-to-use default protocols make the BrightSpeed 8 CT Scanner System fast and efficient in patient set-up. Axial protocols are nearly identical to helical scan protocols.

## Axial Multi-slice Modes

The BrightSpeed 8 CT Scanner System acquires axial scans in sets of 8 contiguous images in one 360° rotation.

For each rotation of the gantry, the BrightSpeed 8 collects 8 rows of scan data. There are five reconstruction modes available for creating images from the multi-slice scan data (1i, 2i, 4i, 8i, and 8i). By using 1i, 2i, 4i, and 8i reconstruction modes, scan data can be combined prior to image reconstruction to create slices with reduced partial-volume artifacts. This is particularly useful for posterior-fossa imaging.

1i Mode:

- Produces 1 image per rotation
- Nominal Thickness: 1.25, 5, 10 mm

2i Mode:

- Produces 2 images per rotation
- Nominal Thickness: 0.63, 2.5, 5, 7.5, 10 mm

4i Mode:

- Produces 4 images per rotation
- Nominal Thickness: 1.25,2.5, 3.75, 5 mm

8i Mode:

- Produces 8 images per rotation

Nominal Thickness: 1.25, 2.5 mm

In summary, the image thicknesses available are:

| Image Thickness | Number of Images per Rotation |
|---|---|
| 0.63 mm | 2 |
| 1.25 mm | 1, 4 or 8 |
| 2.5 mm | 2, 4, or 8 |
| 3.75 mm | 4 |
| 5 mm | 1, 2, or 4 |
| 7.5 mm | 2 |
| 10 mm | 1 or 2 |

* Option

## Axial Scan Parameter

Scan Time:

- 0.8, 1.0, 1.5, 2.0, 3.0, 4.0 full scans (360° acquisition)

Scan Technique:

- kVp: 80,100, 120, 140 kVp
- mA: 10 to 350 mA, 5mA increments with 120KV
- Power: 42 kW with 120KV
  - -Small spot for up to 19.2kW with 120KV
  - -Larger sport for greater than 19.2KW with 120KV

Scan Plane Geometry:

- +/- 30° angulation via gantry tilt, in 0.5° increments
- Longitudinal positioning in 0.01 mm per slice increment. Gantry display in 0.5 mm increments.

Interscan Delay (ISD):

- Minimum ISD with table moves of 0 - 10 mm: 1.0 sec.

Minimum ISD with table moves of more than 10 mm and up to 20 mm: 1.3 sec

Intergroup Delay (IGD):

- Minimum IGD is the same as minimum ISD, also user-selectable.

Scan-to-Scan Cycle:

- Minimum scan-to-scan cycle of 1.8sec possible for 0.8 sec scan speed with minimum ISD's.

Scan Fields of View

- 25 cm for adult head
- 25, 50 cm for body
- 25 cm for pediatric head

Scan with 0 table increment, contiguous image location, or skipped image location are possible. Overlapped axial scans are not possible.

## Axial Image Reconstruction

Reconstruction Algorithms:

- Soft Tissue, Standard, Detail, Bone, Bone Plus, Lung and Edge.

Reconstruction Matrix: 512

Display Matrix: 1024

Display FOV: Freely variable center/off-center, prospective/retrospective target selection.

CT Number Scale: -1024 to 3071 HU or extended -31743 to 31743

Axial Image Reconstruction:

- Up to 3 frames per second reconstruction time.
- Iterative bone processing, which is always enabled for head scanning, reduces image artifacts in head scans stemming from X-ray beam hardening effects.

Prospective Multiple Reconstruction (PMR): Up to 3 sets of reconstructions can be pre-programmed as part of the scan

protocol prior to acquisition. The operator can select different reconstruction algorithms and display fields of view for each reconstruction. Series descriptions can be entered for each set of reconstructions to facilliate hanging protocols on PACS display. This frees the operator from sitting at the console and directly contributes to increased productivity.

The operator has the option to reconstruct the original raw data set at any of the defined nominal slice thicknesses.

Reconstructions can be prescribed down to 1/8 the original acquisition image thickness for images acquired in the 1i scan mode, down to 1/4 the original thickness for 2i mode, and down to 1/2 the original thickness for 4i mode.

Similarly, additional reconstruction supports partial-volume artifact reduction by reconstructing images with 2, 4, or 8 times the acquisition image thickness.

These reconstruction features effectively facilitate later, more detailed image analysis without additional patient scans and subsequent dose and image registration concerns.

The following table illustrates the retrospective reconstruction image thicknesses available for each acquisition thickness and mode:

| Image | | Retrospective Reconstruction |
|---|---|---|
| **Thickness** | **Mode** | **Thicknesses** |
| .625 mm | 2i | 0.63 mm |
| 1.25 mm | 1i<br>4i<br>8i | 1.25 mm<br>1.25, 2.5, 5 mm<br>1.25, 2.5, 5, 10 mm |
| 2.5 mm | 2i<br>4i<br>8i | 1.25, 2.5, 5 mm<br>1.25, 2.5, 5, 10 mm<br>2.5, 5, 10 mm |
| 3.75 mm | 4i | 3.75, 7.5 mm |
| 5 mm | 1i<br>2i<br>4i | 1.25, 2.5, 5 mm<br>1.25, 2.5, 5,10 mm<br>2.5, 5, 10 mm |
| 7.5 mm | 2i | 3.75, 7.5mm |
| 10 mm | 1i<br>2i | 1.25, 2.5, 5, 10 mm<br>2.5, 5, 10 mm |

## *Axial Scan Image Quality*

### *High Contrast Spatial Resolution*

On GE Performance phantom:

Standard Algorithm
- 4.0 lp/cm @ 50% MTF
- 6.5 lp/cm @ 10% MTF
- 8.5 lp/cm @ 0% MTF

Hi-Res Algorithm
- 8.5 lp/cm @ 50% MTF
- 13.0 lp/cm @ 10% MTF
- 15.4 lp/cm @ 0% MTF

### *Low-Contrast Detectability*

On 8 inch (20 cm) CATPHAN phantom:

- 5mm @0.3% at 13.3 mGy
- 3mm @0.3% at 37.2mGy

### *Noise*

On either an AAPM water phantom or GE Quality Assurance phantom:
- 0.32% +/- 0.03% at 29.3 mGy

### *CTDI*

On CTDI Head and Body Dose Reference Phantoms:

**CTDI**$_{vol}$ expressed in mGy/100 mAs:

Head 18.4 mGy/100mAs Body

Body 9.3 mGy/100mAs

## *Scout Scans*

ScoutView™ scans provide excellent detail for anatomical localization in conjunction with scan prescription.

Scan locations may be prescribed at the operator console either graphically (via mouse), or explicitly (keyboard entry) from a Scout scan.

Prescription of scans with multiple tube angles are also available on a single Scout.

## *Scout Scan Parameters*

Aperture: 1.25 mm×4 effective aperture

Table speed: 100 mm/sec.

Scan Technique:
- kVp: 80, 100,120, 140 kVp
- mA: 10 to 350mA, 5 mA increments with 120KV
- Power: 42 kW with 120KV

Orientation: AP, RLAT, PA, LLAT (preset); or any angle from 0° - 359° with 1° inclement (manually selected).

Axial scan prescription lines indicate scan location to nearest 1 mm table position.

Scouts longer than 1000 mm are auto minified to fit the display.

## *SmartView™ Fluoro**

Offers real-time 12 frames per second CT fluoroscopy with image latency of less than about 200ms. Detailed targeting is supported by multiple acquisition modes, up to and including high-resolution acquisition at 2.5 mm. High dose efficiency is made available with continuous and quick check scan modes. A simple and efficient user interface provides six user-selectable display layouts, in-room image review and WW and WL control Flip, rotate, roam and zoom capabilities maintained

* Option

during acquisition. Features ceiling-mounded in-room LCD monitor and full-featured handheld / cradle-mounted controller. B79352CA is a prerequisite for this option.

## User Interface

The BrightSpeed 8 Operator Console utilizes a computer workstation with the following user interface features:

- Two 19-inch LCD monitors
  - Scan/recon monitor for scan and recon control with no image display
  - Image monitor for image display, analysis, processing, and management
  - Each monitor provides a 1280 x 1024 high resolution, flicker-free display
- Scan control keyboard assembly with intercom speaker, microphone and volume controls
- Three button mouse with mouse pad
- BrightBox (trackball assembly) *
- Two wide work surfaces

All these devices are free-standing and can be easily moved to accommodate a large variety of working conditions and individual operator preferences.

Split table top allows unrestricted patient viewing while still supporting 2 monitors. Each work surface can be adjusted at installation to help accommodate a variety of siting requirements.

Multi-language UIF capability (including Chinese and Japanese)

Multi-language Auto voice capability with 9 user selectable languages.

## Desktop Overview

The user interface utilizes the paradigm of managed work environments for a more intuitive clinical workflow.

Virtually all clinical operations are managed through three "virtual desktops" or applications managers: Exam Rx, ImageWorks and Learning Solutions. Operators can effortlessly move back and forth between these environments simply by clicking on an icon. **Xtream™ technology** enhances multi-tasking architecture and maintains simultaneously all processes so no work is lost or disrupted as desktops are switched.

### *Exam Rx*

The Exam Rx desktop environment provides the clinical tools necessary for comfortable, efficient control of patient studies.

These tools include patient scheduling and data entry, exam protocol selection, protocol viewing and editing, scan data acquisition, image reconstruction, image display and routine analysis, AutoFilm or manual filming, AutoStore and AutoTransfer.

### *ImageWorks*

ImageWorks is a desktop environment designed to take advantage of the BrightSpeed 8 CT Scanner System computer and image processor.

Standard features include archive, network and manual film control, as well as some advanced image processing such as multi-planar reformatting (MPR), multi-projection volume rendering (MPVR), and MR image display. It also has optional add-on packages for Volume Viewer*, CT Perfusion* and DentaScan*.

The ImageWorks desktop also provides a gateway for DICOM 3.0 image transactions, either through a local area network, or via DICOM-formatted MOD media.

### *Computer Based Training*

The BrightSpeed 8 provides an on-screen, on-line operator manual via a multi-media CD-ROM player integrated into the operator's console. Learning Solutions is also viewable on a stand-alone PC providing flexibility and productivity for on-demand learning of system operation..

### *Exam Rx*

### *Patient Scheduling*

Patient demographics and exam protocols can be pre-programmed in advance of patient arrival by selecting Schedule Patient from the scan/recon monitor. This productivity enhancement allows entry of all or some of a patient's demographic data, as well as pre-selection of the exam protocol.

This feature is available any time a patient exam is not currently underway.

This feature uses the same interface as New Patient selection for simplified, consistent programming.

Patient information can be easily recalled to set up an immediate exam via List/Select Scheduled Patient on the scan/recon monitor. Pre-programmed patient exams can also be recalled from the New Patient screen automatically by entering the patient ID number.

### *Patient Data Entry*

Patient data can be entered as part of New Patient set-up, or can be recalled from the list of pre-scheduled patients.

Presets for Referring Physician, Radiologist and Operator can be saved on the system reducing data entry required by the user.

Trauma Patient ID allows patient scans and image display/analysis without entering patient data before scanning.

### *Exam Protocol Selection*

One of the main contributions of the BrightSpeed 8 CT Scanner System to department productivity is its streamlined exam set-up.

- Exam parameter set-up has been streamlined through the exclusive use of protocols
- Protocols can be easily selected in one of three convenient ways:
  - A large, graphical Anatomical Programmer located on the New Patient screen
  - A default list of the "top 10" most commonly used protocols located near the anatomical programmer
  - A numerical entry

* Option

- Two Anatomical Programmers - one for adults and one for pediatrics - provide quick and easy access to 6,840 user-programmable protocols (total). Each programmer has ten anatomical regions.
- Default protocols have been expanded through Protocol Pro - a "behind the scenes" protocol manager - that allows preselection of automated features like AutoVoice, AutoFilm, AutoStore and AutoTransfer on a per-series basis.
- Protocol Pro also provides preselection of different window/level settings for AutoFilm and can automatically display the 1024 Localizer each time a new series is requested.
- Default protocols also include preset scan time, kVp, mA, slice thickness, scan mode, table speed, image interval, gantry tilt, scan field-of-view, display field-of-view and center, recon types, and breath timing parameters.
- Any scan parameter can be edited for each scan or all scans either before or during an exam. Scans can be easily added or removed from the prescription.
- Scan/recon control uses only 2 screens to set up first scan - New Patient and Protocol View/Edit.

## *Protocol View/Edit*

- A single, full screen View/Edit table allows fast and easy examination and modification of exam parameters before scanning begins
- Exam parameters can be changed for just one scan, or for all scans in a series
- When used in conjunction with the 1024 Localizer, changes made in the View/Edit table that affect the number of scans, image interval, starting/ending locations, tilt, or display FOV are automatically shown on the 1024 Localizer
- Any changes made directly on the 1024 Localizer display using the mouse and the on-screen cursor controls are also reflected automatically in the View/Edit table
- View/Edit Wizard intuitively adjusts dependent parameters automatically in response to operator-initiated changes and highlights them for quick review. It also alerts the operator to incompatible dependencies requiring operator intervention.

Tab card groupings for Timing, Recon and Filming help organize the large number of parameters available within each protocol.

## *Scan Data Acquisition*

- Full-screen DynaPlan Plus illustrates scan status graphically, with real-time feedback while the exam is underway. Scans, programmed delays (prep, breathing, inter-group), and even AutoVoice announcements are clearly shown before and during scanning.
- AutoScan: Fully automates longitudinal table movement and the start of each scan
- AutoVoice: 3 preset languages in 9 user selectable languages and user-recorded messages automatically deliver patient breathing instructions, especially useful for multiple or multi-pass helical scans
- Full Simultaneity allows scan and recon to work concurrently with image display, processing and analysis (including computationally intensive features such as MPR, MPVR and 3D*/MIP) while still running image archival, filming and networking processes.
- Remote Gantry tilt allows the operator to adjust scan angle from the control room and minimize trips between the scan room and operators workstation.

## *Dose Computation & Display*

- Volume CTDIw (CTDIvol), DLP (Dose Length Product), and Dose Efficiency computation and display during scan prescription provides patient dose information to the operator.
- Volume CTDIw (CTDIvol) is a dose index defined by IEC60601-2-44. This index is computed automatically by the BrightSpeed 8 CT System and reported on the Exam Rx screen. Volume CTDIw is a single number consisting of 2/3 of the CTDI100 peripheral dose plus 1/3 of the CTDI100 central dose that is adjusted by the helical or axial pitch factor.
- CTDI100 is a dose index based upon CTDI dose measurements over a 100 mm volume, as defined in IEC 60601-2-44.
- Dose Length Product (DLP) is given in mGy*cm and is computed and displayed for each group prior to the scan. Additionally, an accumulated DLP is displayed for the entire exam, as the exam prescription progresses. The final exam accumulated DLP provides a convenient measure for maintaining patient or procedure dose management statistics.
- Dose Efficiency is automatically computed and displayed on the Exam Rx screen. The dose efficiency is a measure of how much of the Z-axis X-ray beam is used by the system, as defined in IEC 60601-2-44.
- **Dose Reporting** saves the $CTDI_{vol}$ and DLP in the patient record as a DICOM secondary screen capture. Series and cumulative exam values are saved. Saved values can be networked, filmed and archived

## *AutoView Layouts*

- Eight powerful AutoView layouts provide exceptional flexibility in tailoring the 1,024 image display to the user or the application at hand - without the complexity of free-form "windows."
- AutoView Layouts include:
  - 1024 AutoView image
  - 768 AutoView image (matches the image size shown on the HiSpeed Advantage 2.X Series OC monitor)
  - 512 AutoView image + 512 Localizer Scout with cut lines automatically showing the location of the AutoView image on the Scout
  - Two 512 AutoView images (same image but at different window/level settings) + 512 Localizer Scout with cut lines automatically showing the location of the AutoView images on the Scout
  - 512 AutoView image + 512 AutoFilm image
  - Last two 512 AutoView images
  - Last four 512 AutoView images
  - AutoLink which links the current series to a view port
- Basic image review features such as window/level, magnification and flip/rotate are available for AutoView images.
- Any window not used for AutoView is available to independent, simultaneous review of other exams.
- Special BrightBox, a three-button trackball device, provides independent control of image next, prior, manual paging and trackball window/level for any review images in focus. This helps make two person operation practical.
- Regardless of the AutoView Layout used, AutoFilm viewing is available anytime via an on-image selection - without disrupting other image processes in progress. Background filming allows full use of the image display monitor for AutoView and image review/processing without interruption during AutoFilm.

* Option

## *Image Review Layouts*

- Five flexible Image Review Layouts are provided for those applications where greater than 512 image display may be desired and AutoView is not required.
- Image Review Layouts include:

*Note: uses short notation for screen options*

- 1024 single image display
- 768 single image display
- Two 512 image display, horizontal format
- Two 512 image display, vertical format
- Four 512 image display

- Each image display window can be further subdivided into four more images, increasing the total number of images that can be displayed at once to 8.
- BrightBox image control is also available for Image Review Layouts.

## *Image Access*

- Point and click interface along with a pictorial directory (browser) allows for easy selection by exam, series or image

## *Routine Image Display*

- Image display features provided within Exam Rx:
  - Zoom/Roam
  - Explicit Magnify
  - Flip/Rotate
  - ProView
  - Display Normal
  - List/Select
  - Ellipse ROI
  - Measure Distance
  - Grid On/Off
  - Cross Reference
  - User Annotation
  - Exam/Series Page
  - Hide Graphics
  - Erase
  - Screen Save
  - Gray Scale Enhancement
- ProView visualization algorithms are available to enhance anatomical structures without additional reconstruction time:
  - Four Selections for enhancement of high contrast objects where fine detail is required without aliasing (such as lungs)
  - Three Selections for modifying perceived levels of noise and low contrast discrimination
- Seven ways are provided to adjust window/ level of images in focus in order to meet a variety of clinical work environments and user preferences:
  - Five user-programmable keys on the scan control keyboard (F6 - F11), plus one key for returning to prior setting (F5)
  - On-image through middle mouse button
  - BrightBox trackball

## *Routine Measurements*

- Image measurement features provided within Exam Rx:
  - Box ROI
  - Ellipse ROI
  - Trace ROI
  - Measure Distance
  - Measure Angle
  - Grid On/Off
  - Hide Graphics
  - Erase
  - Screen Save
  - MIROI (Multiple Image ROI)
  - Report Pixels

## *Display Preferences*

- Display settings available to tailor the overall display (settings apply to all images in all exams):
  - Annotation Levels
  - Inverse Video
  - Next/Prior Each View Port
  - Next/Prior Series Binding
  - Continuous Report Cursor

## *Auto Image Management*

The Exam Rx work environment conveniently provides for selection of AutoFilm, AutoStore (to local or remote MOD), and AutoTransfer (across a network). Auto Transfer capability can be specified by Image, Series or Exam.

An AutoFilm Composer provides a simple programming interface for automated filming set-up.

Batch Filming is accomplished through a single keystroke which automatically prints an entire series at a time.

## *Manual Image Filming*

- On-screen filming is available for any digital camera using a 3M-952 protocol.
- Images may be individually filmed manually via "drag and drop" to the on-screen Film Composer.
- Print Series permits automatic printing of an entire series with one keystroke.
- Page filming permits creation of an entire film with one keystroke.
- Multiple image formatting allows filming of multiple images in a single film frame.
- Film formats supported are 1:1, 2:1, 4:1, 6:1, 8:1, 9:1, 12:1, 15:1, 8:1, 20:1, 24:1 and 35-mm slide (depends on capability on imager side)

Important note: The BrightSpeed 8 CT Scanner comes standard with a DICOM Print Interface configurable for multiple DICOM Print destinations. Connections with cameras that do not support DICOM Print may require a filming interface (purchased separately).

To save further filming cost, the Operator Console can directly print to a postscript printer such as the GE Color Printer available as an option.

## *ImageWorks*

ImageWorks software is designed to take advantage of the BrightSpeed 8 CT Scanner's computer and image processor. This desktop environment includes image management and networking.

* Option

Because some of the image analysis and display features of ImageWorks replicate those in Exam Rx, the next section describes only features that are incremental or significantly different.

## *Image Analysis*

• Multi-Projection Volume Reconstruction (**MPVR**): Quick and easy way to generate volumetric images for CT angiography without thresholding data or removing unwanted anatomy. An entire volume is used to generate images in any plane, creating real-time frames of reference at the same time;

• Clinical utility is extended via two additional modes:
- MIPS - enhances contrast and improves visualization of calcifications
- Average - generates 2D radiographic images;

• Multi-planar Reformation (**MPR**): Provides real-time assessment of anatomy in offaxis planes. Sagittal, coronal, oblique and curved planar reformations available;

• **Batch reformatting** can also be defined and executed for later viewing if desired;

• Image Addition and Subtraction: Includes image addition of more than two images at a time.

## *Volume Viewer **

Volume Viewer on OC is an innovative and powerfull suite of productivity enhanvers (Volume Rendering, Volume Analysis and Navigator) that includes :

- Dynamic Volume Review™ for Fast Screening
- Curved Volume Of Interest
- Protocol Management and Loading
- Review Layout Presets
- Multiple VR Objects Merge
- Pseudo Surface Shading Mode
- Predefined Cut Planes
- Volume Rendered Navigator views
- VR Preset save/recall
- 3D Rendered Lumen View
- Automatic Path Tracking
- Path Bridging (in case of occlusions)
- SmartCursor™ for Easy Navigation
- Synchronized Reformatted Views
- Cut visualization mode

## *Advanced Vessel Analysis **

Advanced Vessel Analysis is the ultimate tool to assess and quantify vascular structures, including stenosis analysis, stent planning procedures, post stenting or vascular surgery follow-up.

- protocol driven tools to perform quick, flexible and accurate quantitative analysis of vascular anatomy
- provides maximum, minimum and mean intraluminal diameter measurements
- provides cross-sectional areas of true orthogonal sections of the aortoiliac systems at selected anatomical points
- clinical benefits include: stenosis sizing, pre- and post- surgical assessment, stent planning
- Measurements in % stenosis or mm of stenosis, and measurement of length and dimension of stenosis.

## *Image Display*

- Magnifying Glass allows quick 2X mag window that can be moved over an image.
- Image Scroll moves an image within its' own window.
- Groupings allow application of window/level values, magnification/ minification, image scroll or flip and rotate to a user-defined image set.
- Save State stores user-selected image orientation and window/level with each data set.
- Window/Level values may be:
  - Preset to provide six on-screen instant window/level settings
  - Set independently for up to 8 images on the screen
  - User-modified in discrete or variable steps
  - Adjusted real-time on-image by holding down the middle mouse button and moving the mouse
- Cine mode provides paging in up to 4 view ports of up to 128 previously-stored CT or MR images at full selected display frame rate. For more than 128 images, display frame rate may be reduced.
- Cine mode also provides temporal, spatial or manual playback loops.
- Text Page

## *Image Annotation*

- Image annotation and cursor are shadowed to permit ease in reading.
- Large Font configuration doubles the size of the Patient Name, Patient ID and Accession Number for image display and filming.

## *Image Management*

- Images may be stored and retrieved via Magnetic Optical Drive (MOD)* media using DICOM 3.0 format. This allows interchange with other imaging systems supporting DICOM 3.0 MOD media. Not all vendors implementation of DICOM 3.0 are identical, so please check with the manufacturer for compatibility.
- Off-line retrieval of all image files. Images may be viewed as soon as they are restored from MOD*.

## *Image Networking*

Exams can be selected and moved between the BrightSpeed 8 CT Scanner System and any imaging system supporting the DICOM 3.0 protocol for network send, receive and pull/query(also depends on capability on imaging system side). GE systems that support this interoperability include CT BrightSpeed, HiSpeed CT/i, X/i, NX/i, QX/i, MR Signa LX, and Advantage Windows 3.x or later.

Image transfer time using DICOM 3.0 protocols is approximately 0.1 second per 512 image on giga-bit Ethernet.

* Option

Network History Log with sort and search capabilities for image transfer confirmation.

## *Computer Based Training*

The BrightSpeed 8 provides an on-screen, on-line operator manual via a multi-media CD-ROM player integrated into the operator's console. Learning Solutions is also viewable on a stand-alone PC providing flexibility and productivity for on-demand learning of system operation.

# Industry Standards

- The BrightSpeed 8 CT Scanner System complies with a wide variety of industry standards to facilitate more rapid adoption of features and performance improvements as the computing and medical imaging industry evolves.

## *DICOM Conformance Standards**

- DICOM 3.0 Storage Service Class
  - Service Class User (SCU) for image send
  - Service Class Provider (SCP) for image receive
- DICOM 3.0 Query/Retrieve Service Class
- DICOM 3.0 MOD Media Service Class on 1.2- and 2.3-GB MOD media*
- DICOM 3.0 Storage Commitment Class Push
- DICOM 3.0 Modality Worklist (including Performed Procedure Step) *(through ConnectPro option)
- DICOM 3.0 Print
- DICOM Gray Scale Presentation state for image presentation

## *HIPPA*

- Password protected User login and Authentification
- Image annonimization tool
- Product Network Filters restricts access to scanner system by IP address, services type ( IE ftp, telnet) and DICOM port number. User configurable.

## *Filming Protocol*

- 3M-952 Standard

# System Components

## *Gantry*

Advanced slip ring design continuously rotates generator, tube, detector and data acquisition system around the patient.

- Aperture: 70 cm
- Tilt: ± 30°
- Tilt Speed: 1°/sec.
- Maximum SFOV: 50cm
- Rotational Speeds: 360° in 0.8,1.0,1.5,2.0,3.0 and 4.0 sec.
- Remote Tilt from Operator's Console.
- Integrated breathing lights and countdown timer.

Scan plane toward front of gantry for improved positioning access.

A more streamlined gantry shroud, bilateral table/gantry controls, and gantry display maximize maneuverability while working next to the gantry.

Laser Alignment Lights:

- Define both internal and external scan planes to ± 1 mm accuracy.
- Operate over full range of gantry tilt; activated any time during exam (with tube stationary).
- Coronal light remains perpendicular to axial light as gantry tilts.

Visual readout is easy to read from the table side or from the operator console.

Gantry tilt controls are located on the side of the gantry.

## *Table*

- Single table, cantilever design with wide height range
- Vertical Range: 44.1 cm to 99.1 cm
- Vertical Scannable Range77.7 cm to 99.1cm
- Horizontal Range: Up to 162cm
- Horizontal Scannable Range: Up to 134.6cm, 126cm (helical & Scout ) at 140mm below ISO center with 300m extender
- Horizontal Speed: Up to 100 mm/sec
- Table automatically re-centers on scan plane with changes in vertical position (after setting internal landmark with alignment lights on)
- Table Load Capacity:
  205Kg with 0.5mm range of position repeatability
- Controls on gantry for elevation and cradle incrementation. Foot pedals on both sides of table for elevation. Cradle position controlled from OC for prescribed scans.
- IV Pole* integrated at the foot-end of the table helps prevent IV lines from becoming crossed and tangled, and helps ensure that the lines stay securely in place on the patient.

## *X-Ray Tube*

Solarix 350 Tube Unit. Design optimized for exams requiring a large number of scans with less tube cooling.

- Heat Storage Capacity: 3.5 MHU
  -
  -
- Dual Focal Spots:
  - Small Focal Spot:
    0.9mm (W) x 0.62mm(L) ( Traditional methodology)
    0.8mm(W) x 0.5mm(L) Nominal Focal Spot Size ( IEC 60336:2005)
    Loading factors 120kv 125mA
  - Large Focal Spot:
    1.2mm(W) x1.2mm (L) ( Traditional methodology)
    1.1mm(W) x 1.0mm(L) Nominal Focal Spot Size ( IEC 60336:2005)
    Loading factors 120kv 250 mA
- Maximum Power: 42 kW
- Fan Angle 56.8° minimum.

* Option

imagination at work



*GE Healthcare – America: Milwaukee, USA*
*GE Healthcare – Asia: Tokyo, Japan ; Beijing, China*
*GE Healthcare – Europe: Buc, France;; Paris, France*

# BrightSpeed 8

(BrightSpeed Edge Select Edition-US naming)

Product Data Sheet –Ver7. May 2007

GE Healthcare

## High Voltage Generation

- High-frequency on-board generator. Continuous operation during scans.
- 42 kW output power.
- kV: 80, 100,120, 140

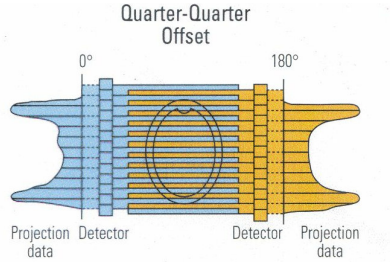
mA: 10 to 350 mA, 5mA increments with 120KV

Maximum mA for each KV selection:

| KVp | Max mA |
|---|---|
| 80 | 350 |
| 100 | 350 |
| 120 | 350 |
| 140 | 300 |

## HiLight Matrix Detector

- 16 rows of 1.25 mm thickness, each containing 880 active patient elements; 32 reference elements.
- 1.0-mm detector element spacing.
- Quarter-Quarter offset doubles the effective detector number.
  - 1,776 imaging detection channels per detector row




## Data Acquisition System

- Resulting of 4 years of development, the Global Data Acquisition System (**Volara™**) integrated circuit (IC) is a 64-channel charge-to-digital converter (C/D). Each channel accepts detector photo-current as input, integrates the current for a CT-view period, and outputs a 30-bit mixed-radix representation (channel fold counts) of the integrated charge. The result is very linear C/D conversion with constant charge resolution and wide dynamic range.

## Scan/Control Unit

Located in base of Operator Console.

## Host Computer

- Dual SMP 3.2 GHz Intel Xeon processors with 1MB L2 cache.
- Intel Hyper-threading technology.
- 2GB DDR-2 400 ECC memory, dual-channel architecture.
- Memory throughput at 6.4GB/sec.

## Image Processor

- Nvidia QuadroFX 1400 with 128MB 256-bit DDR Memory
- Graphics Memory Bandwidth 19.2GB/sec
- PCI express interface

## Image Reconstruction Engine(GRE)

- Custom-designed special purpose CT Image Generator
- Custom CT back projection hardware *
- Intel Hyper-threading Technology.
- 32-bit floating point data format
- 2GB DDR226 ECC Dual Channel Memory Standard (4.2 GB/sec).

## Software Architecture

- Software architecture based on industry standards and client-server design

## Peripherals

Total of 291 GB system:

- Main system (host) disk drive:
  - High Performance Drive
  - 73 GB, 3.5 inch form factor
  - 15,000 RPM
  - Ultra320 SCSI interface
  - Assigned to applications software and image files
- 2 system disk drives (Image Disk)
  - High Performance Drive
  - 73 GB, 3.5 inch form factor each.
  - 15,000 RPM
  - Ultra320 SCSI interface
  - Assigned to image files only
  - 250,000 uncompressed 512 images
- Scan data disk drive:
  - High Performance Drive
  - 36 GB, 3.5 inch form factor
  - UltraSCSI interface
  -
- MOD driver*:
  - Magnetic Optical Disk Drive
  - Erasable, rewritable media
  - 2.3 GB, 5.25 inch form factor
  - Assigned to DICOM 3.0 format image file.
  - Stores 4,700 lossless JPEG compressed 512 image files per side
  - Off-line retrieval of image. Images may be viewed as soon as they are restored from MOD
- Standard **DVD-R** / CD-R:
  - 4.7 GB for DVD-R/650MB for CD-R
  - Store up to 788/1200 uncompressed images.

* Option

- **2 x Color monitors**:
  - LCD Color Monitor
  - 19 inch diagonal width
  - 1280 x 1024 dot resolution
- Scan control **keyboard** (English language) assembly with intercom speaker, microphone and volume controls.
- Global **modem*** to allow InSite connectivity
- 3-Button **Mouse**
- 3-Button **Trackball***

## *Image Networking*

- Standard auto-configuring 100BaseT/10BaseT Ethernet (UTP connection).
- Supports gigabit ethernet capability.
- Direct network connection; multi-suite ethernet card not required for gateway out of suite
- Protocols supported:
  - DICOM 3.0 network send (one IP address at a time) and receive, pull/query, and storage commitment push;
  - InSite point-to-point;
  - TCP/IP (for system administration)

## Compatible Options

- A DICOM Print Interface is standard on the system
- Chinese UIF & Keyboard
- English UIF &Keyboard
- French UIF & Keyboard
- German UIF& Keyboard
- Scandinavian UIF & Keyboard
- Short Cable
- Long Cable
- Single-piece desktop kit?
- Side-by-side desktop kit?
- Table Convenience Kit (IV Pole, Table Tray and other accessories)
- ConnectPro HIS/RIS Interface with Performed Procedure Step (PPS)
- Volume Viewer (including Virtual Endoscopy, 3D, Volume Rendering)
- DentaScan
- SmartScore
- CT Perfusion Neuro Package for Operator Console
- CT Perfusion Multi-Organ for Operator Console
- SmartStep (CT Interventional kit)
- SmartView™ Fluoro
- AutoBone for CT Operator Console
- Advanced Vessel Analysis
- Coronal Head Holder
- Gantry Rear Raceway
- Exam Split FX
- UPS

# Sitting Requirements.

## *Recommended Suite Size*

***Recommended Suite Size***

Exam Room w/o Limited access option:

Minimum Size

3. 91m x 5.87 m (12' 10"x 19` 3")

Recommended Size:

3.96 m x 6.30 m (13' x 20 ' 8").

Exam Room w/ Limited access option:

Minimum Size

3.31 m x 5.92 m (10'10" x 19'5")

Control Room:

single piece desktop table:

2.74 m x 3.91 m (9' x 12'10")

side-by-side desktop table.

3.86 m x 2.49 m (12'8" x 8'2")

Equipment Room: **Not required**. Power Distribution Unit heat and noise output under all operating conditions with all available options is low enough to allow inclusion in the patient scanning suite with the table and gantry.

Actual final room size determined by siting.

## *Temperature and Humidity*

Exam and Control Rooms: 60°-75°F (15°-26°C) at 30%-60% relative humidity (non-condensing).

Equipment Room: If a separate equipment room is used to house the PDU, the allowable temperature range is 60°-84°F (15°-29°C) at 30%-60% relative humidity (non-condensing).

Temperature Rate of Change: 3°C/hour max.

Relative Humidity Rate of Change: 5% RH/hour max.

## *Power Requirements*

The only facility input to the system is 200 to 240 V and 380 to 480 V nominal, 3 phase Delta or Wye, 50/60 Hz, 50kVA / 75kVA* service, 20 kVA average power; main disconnect to be located within 5 feet (1.5 m) of the PDU. The facility must also provide a protective disconnect device with low voltage, low energy local and multi-point remote capability, in the line feeders to the PDU.

Complete, detailed specifications of all power requirements are available upon request. For most installations, the BrightSpeed 8 CT Scanner System does not require any power conditioning equipment to be used in conjunction with the PDU. Regulators are not recommended for use with this system. For those sites with known large power line transients, a suppresser filter for the system computer and peripherals may be useful. In general, suppresser filters are not recommended.

* Option

## ***Cooling Requirements***

The cooling requirements do not include cooling for the room lighting, personnel or non-CT equipment present. Cooling requirements are listed by subsystem to allow planning for each room of the CT suite.

Cooling requirements are given for minimum, recommended and growth allowance scenarios.

- The minimum cooling figures assume patient throughput of 3 patients per hour and 75 scan rotations per patient.
- The recommended cooling requirements assume patient throughput limited by the tube cooling algorithm.
- The suite cooling can be sized for future developments by using the growth allowance figures. This cooling will accommodate more patients per hour and/or potential future system enhancements.

| | Minimum Allowance | |
|---|---|---|
| **Subsystem** | **Watts** | **BTU/hr** |
| Gantry | 5500 | 18766** |
| Table | 200 | 682 |
| PDU | 1500 | 5118 |
| Operator Console | 2400 | 8189 |

Recommended cooling values should not be used for calculating system input power requirements.

** Recommended Allowance: 7,200/24,566
Growth Allowance: 9,825/33,520

## System Components Dimensions

| | Width+/-10 | Depth+/-10% | Height+/-10% | Weight+/-10% |
|---|---|---|---|---|
| **Gantry** | 2040 mm | 1018 mm | 1930 mm | 1770 kg |
| **Table** | 650 mm | 2347mm*** | 1043 mm | 320 kg |
| **Power Distribution Unit** | 700 mm | 550 mm | 1062 mm | 350 kg |
| **Operator Console with single-piece desktop** | 1240 mm | 1135-1235mm | 680-885mm | 195kg(W/O monitor, 1 IG) |
| **Operator Console w/o single-piece desktop** | 1240mm | 705mm | 680-810mm | 160kg(W/O monitor, 1 IG) |
| **Side-by-side desktop** | 1295mm | 660mm | 686mm**** - 1092mm | 39kg |

- ***ELEC, up limit
- ****Excluding monitor arm

## Warranty

The published Company warranty in effect on the date of shipment shall apply. The Company reserves the right to make changes.

All specifications are subject to change.

* Option

## Regulatory Compliance

This product is designed to comply with applicable standards under the Radiation Control for Health and Safety Act of 1968.

Laser alignment devices contained within this product are appropriately labeled according to the requirements of the Center for Devices and Radiological Health.


This product is a CE-compliant device which satisfies regulations regarding Electro-Magnetic Compatibility (EMC) and Electro-Magnetic Interference (EMI), pursuant to IEC-60601-1-2.