North Carolina Department of Health and Human Services
Division of Health Service Regulation

Pat McCrory
Governor

Aldona Z. Wos, M.D.
Ambassador (Ret.)
Secretary DHHS

Drexdal Pratt
Division Director

July 18, 2014

John H Gizdic
New Hanover Regional Medical Center
2131 South 17th Street
Wilmington, NC 28402

No Review
Facility or Business: New Hanover Regional Medical Center
Project Description: Replace four CT Scanners and Relocate two CT Scanners
County: New Hanover
FID #: 943372

Dear Mr. Gizdic:

The Certificate of Need Section (CON Section) received your letter of June 13, 2014 on June 19, 2014 regarding the above referenced proposals, which are described more fully in the following tables.

Replace 4 CT Scanners

	Existing Equipment	Replacement Equipment
NHRMC Main Campus	GE 4-slice CT Scanner Model GE Lightspeed QXi w/ fluoro Serial #350735cn7	GE 16-slice CT scanner with fluoroscopy Model Brightspeed Elite 16 SL w/ fluoro
NHRMC Medical Mall	Philips 2-slice CT Scanner Model Philips Tomoscan Serial #0401073	GE 16-slice CT scanner Model Brightspeed Elite 16 SL
NHRMC Orthopedic Hospital ED	Seimens 4-slice CT Scanner with fluoroscopy Model Siemens Volume Zoom 4 Serial #400-120261	GE 64-slice CT scanner with fluoroscopy Model GS VCT-64 w/ 1700 mm table
NHRMC Main Campus ED	GE 4-slice CT Scanner Model Brightspeed Elite 16 SL Serial #277492hm5	GE 64-slice CT scanner Model GS VCT 64 with 2000 mm table

Relocate 2 CT Scanners

Site (from)	Site (to)	Equipment
NHRMC Main Campus ED	Brunswick Forest H&D	GE 16-Slice
Brunswick Forest H&D	Zimmer Cancer Center	GE 4-slice

Based on the CON law **in effect on the date of this response to your request,** the proposals described in your correspondence are not governed by, and therefore, do not currently require a certificate of need. However, please note that if the CON law is subsequently amended such that the above referenced proposal would require a certificate of need, this determination does not authorize you to proceed to develop the above referenced proposal when the new law becomes effective.

Moreover, you need to contact the Construction, Radiation Protection and Acute and Home Care Licensure and Certification Sections of the Division of Health Service Regulation to determine if they have any requirements for development of the proposed project.

It should be noted that this determination is binding only for the facts represented by you. Consequently, if changes are made in the project or in the facts provided in your correspondence referenced above, a new determination as to whether a certificate of need is required would need to be made by the Certificate of Need Section. Changes in a project include, but are not limited to: (1) increases in the capital cost; (2) acquisition of medical equipment not included in the original cost estimate; (3) modifications in the design of the project; (4) change in location; and (5) any increase in the number of square feet to be constructed. Please contact the CON Section if you have any questions. Also, in all future correspondence you should reference the Facility I.D. # (FID) if the facility is licensed.

Sincerely,

Gregory F. Yakaboski, Project Analyst

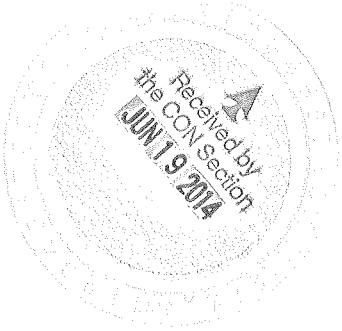
Martha J. Frisone

Martha J. Frisone, Interim Chief
Certificate of Need Section

cc: Medical Facilities Planning Branch, DHSR
Construction Section, DHSR
Acute and Home Care Licensure and Certification Section, DHSR
Radiation Projection Section, DHSR

New Hanover
Regional Medical Center

June 13, 2014



Martha Frisone, Interim Chief
Certificate of Need Section
Division of Health Service Regulation
N.C. Dept. of Health & Human Services
2704 Mail Service Center
Raleigh, NC 27699-2704

RE: ***Notice of Exempt Acquisition by New Hanover Regional Medical Center***

Dear Ms. Frisone:

New Hanover Regional Medical Center ("NHRMC"), proposes to replace four of its multi-slice computed tomography (CT) machines, details of which are found in the tables below. The purpose of this letter in connection with this transaction is to notify the Division of Health Service Regulation (the "Division") of NHRMC's plans for these replacements and to explain briefly the reasons for their acquisition. Finally, NHRMC is requesting confirmation from the Department that the transactions as described below do not constitute a new institutional health service subject to certificate of need ("CON") review.

CT Replacements (via acquisition):

Site	Equipment (from existing to replacement)	Trade-in of Existing	Total Project Cost
NHRMC Main Campus	From GE 4-slice to GE 16-slice	Y	$195,246
NHRMC Medical Mall	From GE 4-slice to GE 16-slice	Y	$173,956
NHRMC Orthopedic Hospital ED	From Seimens 4-slice to GE 64-slice	Y	$355,433
NHRMC Main Campus ED	From GE 16-slice to GE 64-slice	N (see below)	$330,646

CT Relocations:

Site (from)	Site (to)	Equipment
NHRMC Main Campus ED	Brunswick Forest H&D	GE 16-slice
Brunswick Forest H&D	Zimmer Cancer Center*	GE 4-slice*

**Phillips 2-slice at Zimmer that is replaced by above GE 4-slice from Brunswick Forest will be traded in; therefore a total of 4 CTs traded-in*

NHRMC is seeking standardization in the provision of its CT services in order to provide the most appropriate care for its patients. To that end, it is seeking to utilize 64-slice technology at both of its current Emergency Departments and 16-slice technology for its provision of inpatient and outpatient diagnostic CT services. Finally, it will be upgrading the CT simulator utilized for the sole provision of radiation oncology services from a 2-slice to a 4-slice. GE is the manufacturer of all replacement CT equipment and was chosen because of compatibility with existing equipment, minimal down-time impact, and minimal staff training. A brochure on both the 64- and 16-slice technology is provided as Exhibit A for reference and additional detail.

As set forth in the equipment comparison forms, quotes, and purchase orders for each of the 4 CTs NHRMC will be acquiring (attached as Exhibit B), the maximum cost (including trade-in allowance of $30,000) and fair market value of the equipment for any of these replacements is $355,433, inclusive of delivery and installation charges. NHRMC will not be purchasing any of the itemized options set forth in the price quotation. There are no construction costs to prepare space for this equipment, and only other fees to be incurred as part of this installation are for the radiation shielding plan assessment and maintenance fees. Accordingly, the total cost for all 4 acquisitions is $1,055,281, and the acquisitions will not constitute "major medical equipment" as defined in N.C.G.S. § 131E-176(14o), as each of the distinct replacements remains less than $750,000. Further, this equipment is not regulated pursuant to N.C.G.S. § 131E-176(16)(f1). The capital cost forms for these acquisitions are enclosed as Exhibit C.[1]

Finally, the CTs to be traded in are all currently in use and will be taken out of service upon arrival and installation of their replacement units. See attached letter (Exhibit D) from GE indicating compliance with CON requirements for these trade-in units.

For the reasons set forth above, NHRMC respectfully requests that the Agency confirm that this acquisition does not require CON review. If you need any further information on this matter, please let me know. I will look forward to hearing from you soon.

With best wishes, I am

Very truly yours,

John H. Gizdic

John H. Gizdic

JHG:kkh
Enclosures

[1] Although it is, in fact, replacing existing equipment, NHRMC is not seeking a replacement exemption at this time because the per unit replacement equipment costs less than $750,000 and would not otherwise constitute a new institutional health service. The acquisition would, however, otherwise qualify for an equipment replacement exemption.

New Hanover
Regional Medical Center

EXHIBIT B

New Hanover Regional Medical Center
GE BSD Elite 16-slice CT Quote: PR2-C7399 V8
Net Selling Price: $185,246 Exhibit: B1

	EXISTING EQUIPMENT	REPLACEMENT EQUIPMENT
Type of Equipment (List Each Component)	4-slice CT scanner with fluoroscopy	16-slice CT scanner with fluoroscopy
Manufacturer of Equipment	GE Medical	GE Medical
Tesla Rating for MRIs	N/A	N/A
Model Number	GE Lightspeed QXi w/ fluoro	**3.** Brightspeed Elite 16 SL w/ fluoro
Serial Number	350735cn7	
Provider's Method of Identifying Equipment	910343nhct2	
Specify if Mobile or Fixed	Fixed	Fixed
Mobile Trailer Serial Number/VIN #	N/A	N/A
Mobile Tractor Serial Number/VIN #	N/A	N/A
Date of Acquisition of Each Component	**2004**	2014
Does Provider Hold Title to Equipment or Have a Capital Lease?	Title	Title
Specify if Equipment Was/Is New or Used When Acquired	Refurbished	Refurbished
Total Capital Cost of Project (Including Construction, etc.) <Use Attached Form>		$195,246
Total Cost of Equipment	$472,070	$185,246
Fair Market Value of Equipment	$30,000	
Net Purchase Price of Equipment	$472,080	$185,246
Locations Where Operated	NHRMC - 17th Street	NHRMC - 17th Street
Number Days In Use/To be Used in N.C. Per Year	365	365
Percent of Change in Patient Charges (by Procedure)	No change	No change
Percent of Change in Per Procedure Operating Expenses (by Procedure)		
Type of Procedures Currently Performed on Existing Equipment	Routine Adult CT exams	Routine CT exams, CTA exams, Complex Orthopedic exams, Pediatric exams
Type of Procedures New Equipment is Capable of Performing	No new procedures	No new procedures

Quotation Number: PR2-C7399 V 8

New Hanover Regional Medical Center
2131 S 17th St
Wilmington NC 28401-7407

Attn: Noel Rhodes
Director of Radiology
2131 S 17th St
Wilmington NC 28401

Date: 02-05-2014

This Agreement (as defined below) is by and between the Customer and the GE Healthcare business ("GE Healthcare"), each as identified herein. GE Healthcare agrees to provide and Customer agrees to pay for the Products listed in this GE Healthcare Quotation ("Quotation"). "Agreement" is defined as this Quotation and the terms and conditions set forth in either (i) the Governing Agreement identified below or (ii) if no Governing Agreement is identified, the following documents:

1) This Quotation that identifies the Product offerings purchased or licensed by Customer;

2) The following documents, as applicable, if attached to this Quotation: (i) GE Healthcare Warranty(ies); (ii) GE Healthcare Additional Terms and Conditions; (iii) GE Healthcare Product Terms and Conditions; and (iv) GE Healthcare General Terms and Conditions.

In the event of conflict among the foregoing items, the order of precedence is as listed above.

This Quotation is subject to withdrawal by GE Healthcare at any time before acceptance. Customer accepts by signing and returning this Quotation or by otherwise providing evidence of acceptance satisfactory to GE Healthcare. Upon acceptance, this Quotation and the related terms and conditions listed above (or the Governing Agreement, if any) shall constitute the complete and final agreement of the parties relating to the Products identified in this Quotation. The parties agree that they have not relied on any oral or written terms, conditions, representations or warranties outside those expressly stated or incorporated by reference in this Agreement in making their decisions to enter into this Agreement. No agreement or understanding, oral or written, in any way purporting to modify this Agreement, whether contained in Customer's purchase order or shipping release forms, or elsewhere, shall be binding unless hereafter agreed to in writing by authorized representatives of both parties. Each party objects to any terms inconsistent with this Agreement proposed by either party unless agreed to in writing and signed by authorized representatives of both parties, and neither the subsequent lack of objection to any such terms, nor the delivery of the Products, shall constitute an agreement by either party to any such terms.

By signing below, each party certifies that it has not made any handwritten modifications. Manual changes or mark-ups on this Agreement (except signatures in the signature blocks and an indication in the form of payment section below) will be void.

- Terms of Delivery: FOB Destination
- Quotation Expiration Date: 03-30-2014
- Billing Terms: 40% Upon delivery - 50% Upon installation - 10% Upon acceptance
- Payment Terms: NET 30
- Governing Agreement: MedAssets Group Buy

Each party has caused this agreement to be signed by an authorized representative on the date set forth below. Please submit purchase orders to GE Healthcare
Please submit Purchase Orders to: General Electric Company, GE Healthcare, 3000 N. Grandview Blvd., Mail Code WT-897, Waukesha, WI 53188

GE HEALTHCARE

James Benecki
02-05-2014
Product Sales Specialist

US
Phone: +1 615 390 3634
Fax: (910) 401-1049
Jim.Benecki@ge.com

CUSTOMER

Authorized Customer Date

Print Name and Title

PO #

Desired Equipment First Use Date

GE Healthcare will use reasonable efforts to meet Customer's desired equipment first use date. The actual delivery date will be mutually

INDICATE FORM OF PAYMENT:

(If there is potential to finance with a lease transaction, GE HFS or otherwise, select lease.)

____ Cash * ____ Lease ____ HFS Loan

If financing please provide name of finance company below*:

*Selecting Cash or not identifying GE HFS as the finance company declines option for GE HFS financing.

agreed upon by the parties.

Quotation Number: PR2-C7399 V 8

Qty	Catalog No.	Description
		NH Main Rad GoldSeal BSD Elite 16
1	S9316AA	Refurbished BrightSpeed Elite 16 slice CT Scanner with the Volara digital DAS One year full warranty - System & Xray Tube With a total of 16 slice acquisition per rotation, and 32 slices per second the BrightSpeed Elite Scanner provides tremendous scan speed, good image quality and productive workflow. Combining these new capabilities with proven reliability of the HiLight Matrix II detector and Performix X-ray tube. BrightSpeed maintains the optimal speed, power and resolution needed for all kinds of CT applications. Yet it fits in the same space as a single slice for an easier installation. System components: Gantry: Advanced slip ring design continuously rotates the generator, Performix tube, Matrix II detector and Volora digital data acquisition system around the patient. o Aperature: 70cm o Maximum SFOV: 50cm o Full 360 degree Rotation speeds of 0.5,0.6 0.7,0.8,0.9,1.0,2.0,3.0,4.0 seconds o Tilt: +/- 30 degrees at 1 degree/second o Remote tilt from operator console o Integrated breathing lights & countdown timer o Integrated start scan button with countdown timer to indicate Xray on Table: Cantilever design for easy access,and stability o Vertical range: 51.6 cm to 99.1 cm o Vertical scannable range: 77.7 cm to 99.1 cm o Horizontal range: 170 cm o Horizontal Scan Range: Up to 170cm metal free (axial) & 160cm metal-free (helical & Scout) o Horizontal speed: up to 100 mm/sec o Table automatically re-centers on scan plane with changes in vertical position o Table load capacity: 180kg (400 lb) +/-0.25mm positional accuracy" X-ray Tube Performix metal-ceramic tube unit offers an optimized design for exams requiring a large number of scan without tube cooling. Performix tube with 6.3 MHU of storage and capability of 53.2 kw operation provides increased helical performance with greater patient throughput and reduced tube cooling. Advanced technology in the tube includes a metal ceramic frame and high speed bearing for long life at sub-second scanning, a high efficiency motor to accelerate the anode and efficient cooling for high throughput and superior helical performance. * Wide range of technique (10 ma to 440 ma, in 5 ma increments) gives technologist and physician flexibility to tailor protocols to specific patient needs, while optimizing patient dose, and providing the power needed to perform a broad spectrum examinations. High Voltage Generator High Frequency on-board generator allows for continuous operation during scan. o 53.2kw Output power o kVp: 80, 100, 120, 140 kVP o mA: 10 to 440 mA, 5 mA Increments" Maximum mA for Each kVp Selection: - 400mA @ 80kVp - 420mA @ 100kVp - 440mA @ 120kVp - 380mA @ 140kVp " HiLight Matrix Detector: The HiLight Matrix detector was designed for high performance imaging. The BrightSpeed Elite allows up to 16 slices per rotation, and 32 slices per second. The

Qty	Catalog No.	Description
		HiLight Matrix detector benefits are: " o Increased coverage per rotation with thinner slices routine o Solid Image Quality from the use of GE's patented HiLight material, a ceramic scintillator specifically engineered for CT applications. Leveraging over 12 years of GE HiLight detector production. o 24 detector rows, each containing 888 active patient elements, 24 reference elements. 4 Modes of Data Output: - 8 x 1.25 mm (uses center 16 rows) - 8 x 2.5 mm (uses all 24 rows) - 16 x 1.25 mm (uses all 24 rows) - 16 x 0.625 mm (uses center 16 rows)" Volara Digital DAS (Data Acquisition System): The Volara digital DAS dramatically reduces noise and improves image quality, especially in low dose exams, large patient, or areas of the anatomy that are difficult to image such as shoulder and hips o 1968Hz maximum sample rate o Effective analog to digital conversion range greater than 2,000,000:1 " Operator Console: o Xtream FX, the next evolution of GE's workflow platform built on the LINUX operating system and delivering fast reconstruction of up to 6 fps with full fidelity images at network transfer rates o The 19 inch color LCD monitors support scan and recon, as well as image display, processing, analysis, and management. Image Networking: e423s can be selected and moved between the BrightSpeed Elite CT Scanner System and any imaging system supporting the DICOM 3.0 protocol for network send, receive and pull/query." o Standard Auto-configuring Ethernet o Direct Network Connection o Supports 1GB or 10/100 BaseT Supported Protocols e468COM 3.0 Network - InSite Point-to-Point - TCP/IP (for System Administration) " 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. " 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 trequirements of the Center for Devices and Radiological Health. This product satisfies regulations regarding Electro Magnetic Compatibility(EMC) and Electro Magnetic Interference (EMI), pursuant to IEC-60601-1-2. Availability Since Gold Seal Preowned Equipment may be offered Simultaneously to Several Customers, its Sale to You is Subject to Availability and Subject to Prior Sale at the Time You Offer to Purchase It. If the Equipment is no Longer Available, (1) We Will Attempt to Identify Other Gold Seal Preowned Equipment in Our Inventory Thats Meets Your Needs, and (2) if Substitute Equipment is Not Acceptable to You,GE Will Cancel Your Order and Refund Any Deposit You Have Paid us for the Canceled Order. Subject to Prior Sale at the Time You Offer to.
1	B7864SM	SmartStep for CT Scanner Systems (Includes In -Room Monitor & Boom) SmartStep Enables an Imaging Mode for Performing Biopsies and Other Interventional Procedures. An In-room Monitor, Hand Held Controller, X-ray Exposure Foot Pedal and Cradle Handle Provide In-room Control for Image Acquisition and Image Review. The Hand Held Controller Provides the Operator with Controls to Prepare the Scanner for Imaging, to Turn Alignment Lights On and Off, to Move the Cradle, Review Images and Adjust the Window Width and Level; and the Foot Switch Provides In-room Control of X-ray On.

Qty	Catalog No.	Description
		A Highly Functional Image Display Presents a Set of 3 Interventional Images in 3 Viewports, a Free Viewport, and Timers for the Remaining and Accumulated Time. The Display Control Panel Provides Roam, Zoom, Magnify, Measurement, Annotation, Grid, Image Orientation, and Save Screen Image Review Capabilities. Data Acquisition Includes a 4i Data Acquisition Mode Using 4x1.25 mm, 4x2.25 mm, and 4x3.75 mm Detector Configurations and a 3i Reconstruction Mode to Create 2.5, 3.75 and 7.5 mm Thick 512 Matrix Images. All Scan Fields of View and Reconstruction Algorithms are Available with 0.8s and 1.0s Gantry Rotation Speed. System Includes the In-room Monitor & Boom
1	B7864KH	FX Exam Split Pre-requisite: ConnectPro Exam Split simplifies anatomy-specific physician review and billing by providing customers with the capability to split a series of patient images back into individual procedures or groups. With Exam Split the user retrospectively selects the first and last image in a group and attaches them to one of the accession numbers in the exam They then select the next group of images for attaching to each successive accession numbers. This accession number is what ties the exam to billing codes, and comes from the customer RIS (Radiology Information System). Exam Split FX integrates the image groups pre-defined in the scan order with your RIS, and notifies physicians when their image groups are ready to read. Ther new smaller image groups can then be networked to seperate review locations for multiple "reads" and appropriate billing on select patient exams. This application can be run in one of two modes (hard and virtual) to support hosts that do and do not support Gray Scale Presentation State (GPSPS). Virtual mode provides ability to send window level values, flip & rotate images, and has compatibility with MPPS. Customers using Exam Split also require Radiology Information System or Modality Worklist support.
1	B7500PL	ConnectPro HIS/RIS Interface Option for LightSpeed and BrightSpeed with Linux (includes bar code reader) ConnectPro Offers New Levels of Productivity to LightSpeed Users by Providing a Connection Between the Facilities Hospital (HIS) or Radiology (RIS) Information System. ConnectPro Simplifies and Eliminates Errors in Patient Data Entry. Data Available at the Operator Console When Using ConnectPro Includes: • Procedure Step Code/Description • Requested Procedure Code/Description • Performed Procedure Step Compatibility • Demographic Data - Name, ID, Age, Birthday, Sex, etc.

Qty	Catalog No.	Description
		• Study UID - Unique ID Number • Scheduling Info - Dept, Modality, Station Address, Accession #, Date, Time The Operator has Three Convenient Ways to Enter Patient Information: • Scan Barcode • Type in Unique Identification Number • Select From a List of Patients All of This Results in: • Enhanced Productivity • Direct Patient Data Entry • On-line Access to Schedules • Display of Patients Scheduled for Current Time of Day • Full Simultaneity with All Scanner Operations • Eliminates Errors Critical for "Filmless" Operation • Enhances Quality of Care • Obtain Key Data From Your HIS/RIS via Modality Worklist - Allergies, Pregnancy Status, Medical Alerts • User-selectable Filtering and Sorting • Seamless Integration with LightSpeed • Performed Procedure Step Compatibility Note: May Require Interface Box for Conversion of HL7 to Dicom.
1	E4502KY	2 Phase 10 KVA Partial UPS for CT Lightspeed and Lightspeed PRO The 2 Phase 10 KVA Partial System UPS kit has been specifically designed to coordinate with the BrightSpeed, LightSpeed and LightSpeed PRO 16 families of CT scanners. In the event of a power outage, a partial system UPS provides continuous back-up power to the scanner host and control computers, thus assuring no loss of usable scan data. In addition, critical circuits in the gantry and table remain powered which facilitate the safe removal of the patient from the scanner. If power is restored within the battery hold-up time, the operator can continue scanner operations without the need to reboot the system. When longer power outages are anticipated, the UPS provides time for the operator to complete an orderly shutdown of the system software. FEATURES/BENEFITS • True double-conversion, online technology provides reliable operation and uninterrupted glitch free power. • Automatic voltage and frequency selection eases startup, i.e., 50 or 60 Hz compatible

Qty	Catalog No.	Description
		• Integral Static Bypass switch means zero transfer time • Integral Manual Bypass switch facilitates continued scanner operation while UPS is being serviced • Single input connect utilized for both UPS input and static switch • Maintains system electronics and allows critical scanner operations to continue for 10 minutes (typical) after loss of power • Advanced Battery Management (ABM) software monitors / indicates battery health and doubles battery service life SPECIFICATIONS • Dimensions (H x W x D): 32.7" x 12" x 32" • Weight: 350 lbs. • Rating: 10 kVA • Input Voltage Range: 85-144V / ph; 2 Phase • Output Frequency: 50 or 60 Hz, auto-sensing COMPATIBILITY • HiSpeed Advantage-RP, CT/I, Lightspeed QXi, LightSpeed Plus, LightSpeed Ultra, LightSpeed 16, BrightSpeed Systems, LightSpeed Pro 16 and RT Systems, Discovery NM 670 (Nuc) NOTES: • Customer is responsible for rigging and arranging for installation with a certified electrician • ITEM IS NON-RETURNABLE AND NON-REFUNDABLE
1	E8016AM	Slicker - CT Lightspeed and Brightspeed Power Systems (2 Piece Set) FEATURES/BENEFITS • Increase system uptime by protecting table from spills • Recommended for trauma centers and sites concerned with blood and fluid borne disease • Thermally sealed cushion in clear, micro-matte vinyl cover protects against contamination • Easy to install and comfortable for patients SPECIFICATIONS • Shipping Weight: 6 lbs. • Clear micro-matte vinyl construction • 2 piece set - slicker and table cushion COMPATIBILITY

Qty	Catalog No.	Description
		• CT LightSpeed and BrightSpeed Systems with H-Power Table
1	E8016AE	Footswitch Cover - HiSpeed Advantage/PET Advance and LightSpeed Systems • Protect footswitch from damage caused by blood and fluids seeping behind the footswitch • Simplifies cleanup and prevents possible damage • Velcroy holds slicker securely in place COMPATIBILITY • CT HiSpeed Advantage, PET Advance, LightSpeed Systems
1	W0100CT	6 Day CT TiP Onsite System Training CT Onsite Training for a new CT system • One 4 day onsite visit to coincide with system start-up. • One 2 day onsite follow-up visit 6-8 weeks post system start up. During the first visit, the applications specialist will work with the medical and technical staff on system operation and patient procedures. The training produces the best results when a dedicated core group of 2-4 CT technologists complete the session with a modified patient schedule. It is suggested that key physicians are available to participate in the protocol implementation and image quality review sessions. By the end of this visit, the core group should be able to perform the routine patient procedures. The 2 day revisit is suggested after the staff has run the system for 6-8 weeks, however this is flexible based on the site needs. The training will focus on the intermediate and advanced functions of the system or special needs of the customer. The training produces the best results when the same dedicated core group of 2-4 CT technologists from the initial visit complete the session with a modified patient schedule. This training program must be scheduled and completed within 12 months after the date of product delivery.

Quote Summary:

LightSpeed QXi Xtreme	**($30,000.00)**
Total Quote Net Selling Price	**$185,246.13**

(Quoted prices do not reflect state and local taxes if applicable. Total Net Selling Price Includes Trade In allowance, if applicable.)

COMPANY GLN:

Purchase Order: 1404743-0-CAP

ORIGINAL

NEW HANOVER REGIONAL MED CNTR

Page: 1
Date: 04/16/14

SHIP TERMS: FOB DESTINATION
SHIP VIA:

FREIGHT: STANDARD TRUCK

VENDOR: 6587-BAB
GE HEALTHCARE
ATTN: JULIE BABCOCK
N16 W22419 WATERTOWN RD EC-05
WAUKESHA WI 53186-1118

SHIP TO:
NEW HANOVER DISTRIBUTION CNTR
RECEIVING DOCK
2131 SOUTH 17TH ST
WILMINGTON NC 28401

Invoice To:
New Hanover Regional Medical Center
P.O. Box 1649
Wilmington, NC 28402

CONTACT:
PHONE:
FAX:

CONTACT: Joey Pedro
PHONE: 910-815-5891
FAX:
BUYER GLN:

Joseph Pedro
Sr Purchasing Agent

TERMS	DISCOUNT DAYS	RATE	NET	ACCOUNT NUMBER
Net Due 35 Days			35	

Deliver on June 18, 2014 unless specified by line
Purchase Order Currency: United States Dollar

Invoice by mail
Process Level: REG
****
Quote#: PR2-C7399 V 8...
Dated: 02-05-2014.....

(-$2,500.00) Trade-in of
Philips Tomoscan AV.....

NH Main Rad-
Refurbished BrightSpeed Elite 16 Slice CT Scanner
w/Volara digital DAS.....

All items to be configured as noted on Quote.

Activity# 120-14-009 asset tag# 51386....

Please contact Noel Rhodes,
Director of Radiology
at 910-343-7978 with any questions.
Noel.Rhodes@nhrmc.org

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY	PRICE	EXTENDED AMOUNT
1	GOLDSEAL BSD ELITE16 BRIGHTSPEED S9316AA- 40% DUE UPON DELIVERY	1 LO	74,098.45 74,098.45	74,098.45

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	GOLDSEAL BSD ELITE16 BRIGHTSPEED Continued S9316AA- 40% DUE UPON DELIVERY Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51386 Vendor Item Desc:		
2	GOLDSEAL BSD ELITE16 BRIGHTSPEED 50% DUE UPON INSTALLATION Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51386 Vendor Item Desc:	1 LO 92,623.07	92,623.07
3	GOLDSEAL BSD ELITE16 BRIGHTSPEED 10% DUE UPON ACCEPTANCE Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51386 Vendor Item Desc:	1 LO 18,524.61	18,524.61

Purchase Order Summary

Goods Total:	185,246.13
Order Total:	185,246.13

End of Purchase Order: 1404743-0-CAP

New Hanover Regional Medical Center
GE BrightSpeed Elite 16SL CT Quote: PR9-C4072 V9
Net Selling Price: $163,956 Exhibit: B2

EQUIPMENT COMPARISON

	EXISTING EQUIPMENT	REPLACEMENT EQUIPMENT
Type of Equipment (List Each Component)	2-slice CT scanner	16-slice CT scanner
Manufacturer of Equipment	Philips	GE Medical
Tesla Rating for MRIs	N/A	N/A
Model Number	Philips Tomoscan	Brightspeed Elite 16 SL
Serial Number	**0401073**	
Provider's Method of Identifying Equipment	68203	
Specify if Mobile or Fixed	Fixed	Fixed
Mobile Trailer Serial Number/VIN #	N/A	N/A
Mobile Tractor Serial Number/VIN #	N/A	N/A
Date of Acquisition of Each Component	**2.** 1998	2014
Does Provider Hold Title to Equipment or Have a Capital Lease?	Title	Title
Specify if Equipment Was/Is New or Used When Acquired	New	Refurbished
Total Capital Cost of Project (Including Construction, etc.) <Use Attached Form>	$	$173,956
Total Cost of Equipment	$362,385	$163,956
Fair Market Value of Equipment	$2,500	
Net Purchase Price of Equipment	**1.** $362,385	1. $163,956
Locations Where Operated	H&D Zimmer Oncology	**2.** H&D Med Mall
Number Days In Use/To be Used in N.C. Per Year	261	261
Percent of Change in Patient Charges (by Procedure)	No change	No change
Percent of Change in Per Procedure Operating Expenses (by Procedure)		
Type of Procedures Currently Performed on Existing Equipment	Routine Adult CT exams	Routine CT exams, CTA exams, Complex Orthopedic exams, Pediatric exams
Type of Procedures New Equipment is Capable of Performing	No new procedures	No new procedures

Quotation Number: PR9-C4072 V 9

New Hanover Regional Medical Center
2131 S 17th St
Wilmington NC 28401-7407

Attn: Noel Rhodes
Director of Radiology
2131 S 17th St
Wilmington NC 28401

Date: 02-05-2014

This Agreement (as defined below) is by and between the Customer and the GE Healthcare business ("GE Healthcare"), each as identified herein. GE Healthcare agrees to provide and Customer agrees to pay for the Products listed in this GE Healthcare Quotation ("Quotation"). "Agreement" is defined as this Quotation and the terms and conditions set forth in either (i) the Governing Agreement identified below or (ii) if no Governing Agreement is identified, the following documents:

1) This Quotation that identifies the Product offerings purchased or licensed by Customer;

2) The following documents, as applicable, if attached to this Quotation: (i) GE Healthcare Warranty(ies); (ii) GE Healthcare Additional Terms and Conditions; (iii) GE Healthcare Product Terms and Conditions; and (iv) GE Healthcare General Terms and Conditions.

In the event of conflict among the foregoing items, the order of precedence is as listed above.

This Quotation is subject to withdrawal by GE Healthcare at any time before acceptance. Customer accepts by signing and returning this Quotation or by otherwise providing evidence of acceptance satisfactory to GE Healthcare. Upon acceptance, this Quotation and the related terms and conditions listed above (or the Governing Agreement, if any) shall constitute the complete and final agreement of the parties relating to the Products identified in this Quotation. The parties agree that they have not relied on any oral or written terms, conditions, representations or warranties outside those expressly stated or incorporated by reference in this Agreement in making their decisions to enter into this Agreement. No agreement or understanding, oral or written, in any way purporting to modify this Agreement, whether contained in Customer's purchase order or shipping release forms, or elsewhere, shall be binding unless hereafter agreed to in writing by authorized representatives of both parties. Each party objects to any terms inconsistent with this Agreement proposed by either party unless agreed to in writing and signed by authorized representatives of both parties, and neither the subsequent lack of objection to any such terms, nor the delivery of the Products, shall constitute an agreement by either party to any such terms.

By signing below, each party certifies that it has not made any handwritten modifications. Manual changes or mark-ups on this Agreement (except signatures in the signature blocks and an indication in the form of payment section below) will be void.

- Terms of Delivery: FOB Destination
- Quotation Expiration Date: 03-30-2014
- Billing Terms: 40% Upon delivery - 50% Upon installation - 10% Upon acceptance
- Payment Terms: NET 30
- Governing Agreement: MedAssets Group Buy

Each party has caused this agreement to be signed by an authorized representative on the date set forth below. Please submit purchase orders to GE Healthcare
Please submit Purchase Orders to: General Electric Company, GE Healthcare, 3000 N. Grandview Blvd., Mail Code WT-897, Waukesha, WI 53188

GE HEALTHCARE

James Benecki
02-05-2014
Product Sales Specialist

US
Phone: +1 615 390 3634
Fax: (910) 401-1049
Jim.Benecki@ge.com

CUSTOMER

Authorized Customer Date

Print Name and Title

PO #

Desired Equipment First Use Date

GE Healthcare will use reasonable efforts to meet Customer's desired equipment first use date. The actual delivery date will be mutually

INDICATE FORM OF PAYMENT:

(If there is potential to finance with a lease transaction, GE HFS or otherwise, select lease.)

____ Cash * ____ Lease ____ HFS Loan

If financing please provide name of finance company below*:

*Selecting Cash or not identifying GE HFS as the finance company declines option for GE HFS financing.

agreed upon by the parties.

Quotation Number: PR9-C4072 V 9

Qty	Catalog No.	Description
		MM - Goldseal Brightspeed Elite 16SL
1	S9316AA	Refurbished BrightSpeed Elite 16 slice CT Scanner with the Volara digital DAS One year full warranty - System & Xray Tube With a total of 16 slice acquisition per rotation, and 32 slices per second the BrightSpeed Elite Scanner provides tremendous scan speed, good image quality and productive workflow. Combining these new capabilities with proven reliability of the HiLight Matrix II detector and Performix X-ray tube. BrightSpeed maintains the optimal speed, power and resolution needed for all kinds of CT applications. Yet it fits in the same space as a single slice for an easier installation. System components: Gantry: Advanced slip ring design continuously rotates the generator, Performix tube, Matrix II detector and Volora digital data acquisition system around the patient. o Aperature: 70cm o Maximum SFOV: 50cm o Full 360 degree Rotation speeds of 0.5,0.6 0.7,0.8,0.9,1.0,2.0,3.0,4.0 seconds o Tilt: +/- 30 degrees at 1 degree/second o Remote tilt from operator console o Integrated breathing lights & countdown timer o Integrated start scan button with countdown timer to indicate Xray on Table: Cantilever design for easy access,and stability o Vertical range: 51.6 cm to 99.1 cm o Vertical scannable range: 77.7 cm to 99.1 cm o Horizontal range: 170 cm o Horizontal Scan Range: Up to 170cm metal free (axial) & 160cm metal-free (helical & Scout) o Horizontal speed: up to 100 mm/sec o Table automatically re-centers on scan plane with changes in vertical position o Table load capacity: 180kg (400 lb) +/-0.25mm positional accuracy" X-ray Tube Performix metal-ceramic tube unit offers an optimized design for exams requiring a large number of scan without tube cooling. Performix tube with 6.3 MHU of storage and capability of 53.2 kw operation provides increased helical performance with greater patient throughput and reduced tube cooling. Advanced technology in the tube includes a metal ceramic frame and high speed bearing for long life at sub-second scanning, a high efficiency motor to accelerate the anode and efficient cooling for high throughput and superior helical performance. * Wide range of technique (10 ma to 440 ma, in 5 ma increments) gives technologist and physician flexibility to tailor protocols to specific patient needs, while optimizing patient dose, and providing the power needed to perform a broad spectrum examinations. High Voltage Generator High Frequency on-board generator allows for continuous operation during scan. o 53.2kw Output power o kVp: 80, 100, 120, 140 kVP o mA: 10 to 440 mA, 5 mA Increments" Maximum mA for Each kVp Selection: - 400mA @ 80kVp - 420mA @ 100kVp - 440mA @ 120kVp - 380mA @ 140kVp " HiLight Matrix Detector: The HiLight Matrix detector was designed for high performance imaging. The BrightSpeed Elite allows up to 16 slices per rotation, and 32 slices per second. The

Qty	Catalog No.	Description
		HiLight Matrix detector benefits are: " o Increased coverage per rotation with thinner slices routine o Solid Image Quality from the use of GE's patented HiLight material, a ceramic scintillator specifically engineered for CT applications. Leveraging over 12 years of GE HiLight detector production. o 24 detector rows, each containing 888 active patient elements, 24 reference elements. 4 Modes of Data Output: - 8 x 1.25 mm (uses center 16 rows) - 8 x 2.5 mm (uses all 24 rows) - 16 x 1.25 mm (uses all 24 rows) - 16 x 0.625 mm (uses center 16 rows)" Volara Digital DAS (Data Acquisition System): The Volara digital DAS dramatically reduces noise and improves image quality, especially in low dose exams, large patient, or areas of the anatomy that are difficult to image such as shoulder and hips o 1968Hz maximum sample rate o Effective analog to digital conversion range greater than 2,000,000:1 " Operator Console: o Xtream FX, the next evolution of GE's workflow platform built on the LINUX operating system and delivering fast reconstruction of up to 6 fps with full fidelity images at network transfer rates o The 19 inch color LCD monitors support scan and recon, as well as image display, processing, analysis, and management. Image Networking: e423s can be selected and moved between the BrightSpeed Elite CT Scanner System and any imaging system supporting the DICOM 3.0 protocol for network send, receive and pull/query." o Standard Auto-configuring Ethernet o Direct Network Connection o Supports 1GB or 10/100 BaseT Supported Protocols e468COM 3.0 Network - InSite Point-to-Point - TCP/IP (for System Administration) " 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. " 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 trequirements of the Center for Devices and Radiological Health, This product satisfies regulations regarding Electro Magnetic Compatibility(EMC) and Electro Magnetic Interference (EMI), pursuant to IEC-60601-1-2. Availability Since Gold Seal Preowned Equipment may be offered Simultaneously to Several Customers, its Sale to You is Subject to Availability and Subject to Prior Sale at the Time You Offer to Purchase It. If the Equipment is no Longer Available, (1) We Will Attempt to Identify Other Gold Seal Preowned Equipment in Our Inventory Thats Meets Your Needs, and (2) if Substitute Equipment is Not Acceptable to You,GE Will Cancel Your Order and Refund Any Deposit You Have Paid us for the Canceled Order. Subject to Prior Sale at the Time You Offer to.
1	B7864KH	FX Exam Split Pre-requisite: ConnectPro Exam Split simplifies anatomy-specific physician review and billing by providing customers with the capability to split a series of patient images back into individual procedures or groups. With Exam Split the user retrospectively selects the first and last image in a group and attaches them to one of the accession numbers in the exam They then select the next group of images for attaching to each successive accession numbers. This accession number is what ties the

Qty	Catalog No.	Description
		exam to billing codes, and comes from the customer RIS (Radiology Information System). Exam Split FX integrates the image groups pre-defined in the scan order with your RIS, and notifies physicians when their image groups are ready to read. Ther new smaller image groups can then be networked to seperate review locations for multiple "reads" and appropriate billing on select patient exams. This application can be run in one of two modes (hard and virtual) to support hosts that do and do not support Gray Scale Presentation State (GPSPS). Virtual mode provides ability to send window level values, flip & rotate images, and has compatibility with MPPS. Customers using Exam Split also require Radiology Information System or Modality Worklist support.
1	B7500PL	ConnectPro HIS/RIS Interface Option for LightSpeed and BrightSpeed with Linux (includes bar code reader) ConnectPro Offers New Levels of Productivity to LightSpeed Users by Providing a Connection Between the Facilities Hospital (HIS) or Radiology (RIS) Information System. ConnectPro Simplifies and Eliminates Errors in Patient Data Entry. Data Available at the Operator Console When Using ConnectPro Includes: • Procedure Step Code/Description • Requested Procedure Code/Description • Performed Procedure Step Compatibility • Demographic Data - Name, ID, Age, Birthday, Sex, etc. • Study UID - Unique ID Number • Scheduling Info - Dept, Modality, Station Address, Accession #, Date, Time The Operator has Three Convenient Ways to Enter Patient Information: • Scan Barcode • Type in Unique Identification Number • Select From a List of Patients All of This Results in: • Enhanced Productivity • Direct Patient Data Entry • On-line Access to Schedules • Display of Patients Scheduled for Current Time of Day • Full Simultaneity with All Scanner Operations • Eliminates Errors Critical for "Filmless" Operation • Enhances Quality of Care

Qty	Catalog No.	Description
		• Obtain Key Data From Your HIS/RIS via Modality Worklist - Allergies, Pregnancy Status, Medical Alerts • User-selectable Filtering and Sorting • Seamless Integration with LightSpeed • Performed Procedure Step Compatibility Note: May Require Interface Box for Conversion of HL7 to Dicom.
1	E8016AM	Slicker - CT Lightspeed and Brightspeed Power Systems (2 Piece Set) FEATURES/BENEFITS • Increase system uptime by protecting table from spills • Recommended for trauma centers and sites concerned with blood and fluid borne disease • Thermally sealed cushion in clear, micro-matte vinyl cover protects against contamination • Easy to install and comfortable for patients SPECIFICATIONS • Shipping Weight: 6 lbs. • Clear micro-matte vinyl construction • 2 piece set - slicker and table cushion COMPATIBILITY • CT LightSpeed and BrightSpeed Systems with H-Power Table
1	E8016AE	Footswitch Cover - HiSpeed Advantage/PET Advance and LightSpeed Systems • Protect footswitch from damage caused by blood and fluids seeping behind the footswitch • Simplifies cleanup and prevents possible damage • Velcroy holds slicker securely in place COMPATIBILITY • CT HiSpeed Advantage, PET Advance, LightSpeed Systems
1	W0100CT	6 Day CT TiP Onsite System Training CT Onsite Training for a new CT system • One 4 day onsite visit to coincide with system start-up. • One 2 day onsite follow-up visit 6-8 weeks post system start up. During the first visit, the applications specialist will work with the medical and technical staff on system operation and patient procedures. The training produces the best results when a

Qty	Catalog No.	Description

dedicated core group of 2-4 CT technologists complete the session with a modified patient schedule. It is suggested that key physicians are available to participate in the protocol implementation and image quality review sessions. By the end of this visit, the core group should be able to perform the routine patient procedures.

The 2 day revisit is suggested after the staff has run the system for 6-8 weeks, however this is flexible based on the site needs. The training will focus on the intermediate and advanced functions of the system or special needs of the customer. The training produces the best results when the same dedicated core group of 2-4 CT technologists from the initial visit complete the session with a modified patient schedule.

This training program must be scheduled and completed within 12 months after the date of product delivery.

Quote Summary:

LightSpeed QXi Xtreme	**($30,000.00)**
Total Quote Net Selling Price	**$163,956.45**

(Quoted prices do not reflect state and local taxes if applicable. Total Net Selling Price Includes Trade In allowance, if applicable.)

COMPANY GLN:

Purchase Order: 1404742-0-CAP

ORIGINAL

NEW HANOVER REGIONAL MED CNTR

Page: 1
Date: 04/16/14

SHIP TERMS: FOB DESTINATION
SHIP VIA:

FREIGHT: STANDARD TRUCK

VENDOR: 6587-BAB
GE HEALTHCARE
ATTN: JULIE BABCOCK
N16 W22419 WATERTOWN RD EC-05
WAUKESHA WI 53186-1118

SHIP TO:
NEW HANOVER DISTRIBUTION CNTR
RECEIVING DOCK
2131 SOUTH 17TH ST
WILMINGTON NC 28401

Invoice To:
New Hanover Regional Medical Center
P.O. Box 1649
Wilmington, NC 28402

CONTACT:
PHONE:
FAX:

CONTACT: Joey Pedro
PHONE: 910-815-5891
FAX:
BUYER GLN:

Joey Pedro
Sr Purchasg Agent

TERMS	DISCOUNT DAYS	RATE	NET	ACCOUNT NUMBER
Net Due 35 Days			35	

Deliver on June 18, 2014 unless specified by line
Purchase Order Currency: United States Dollar

Invoice by mail
Process Level: REG
****
Quote#: PR9-C4072 V 9...
Dated: 02-05-2014.....

(-$30,000.00) Trade-in of
GE LightSpeed QXI SN: 910343mmCT

Refurbished BrightSpeed Elite 16 Slice CT Scanner
w/Volara digital DAS.....

All items to be configured as noted on Quote.

Activity# 120-14-009 asset tag# 51388....

Please contact Noel Rhodes,
Director of Radiology
at 910-343-7978 with any questions.
Noel.Rhodes@nhrmc.org

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	GOLDSEAL BRIGHTSPED ELITE 16SL S9316AA- 40% DUE UPON DELIVERY	1 LO 65,582.58	65,582.58

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	GOLDSEAL BRIGHTSPED ELITE 16SL Continued S9316AA- 40% DUE UPON DELIVERY Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51388 Vendor Item Desc:		
2	GOLDSEAL BRIGHTSPED ELITE 16SL 50% DUE UPON INSTALLATION Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51388 Vendor Item Desc:	1 LO 81,978.23	81,978.23
3	GOLDSEAL BRIGHTSPED ELITE 16SL 10% DUE UPON ACCEPTANCE Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51388 Vendor Item Desc:	1 LO 16,395.64	16,395.64

Purchase Order Summary

Goods Total:	163,956.45
Order Total:	163,956.45

End of Purchase Order: 1404742-0-CAP

New Hanover Regional Medical Center
GE Cape Fear GS VCT Quote: PR11-C16214 V2
Net Selling Price: $345,433 Exhibit: B3

EQUIPMENT COMPARISON

	EXISTING EQUIPMENT	REPLACEMENT EQUIPMENT
Type of Equipment (List Each Component)	4-slice CT scanner with fluoroscopy	64-slice CT scanner with fluoroscopy
Manufacturer of Equipment	Seimens	GE Medical
Tesla Rating for MRIs	N/A	N/A
Model Number	Siemens Volume Zoom 4	GS VCT-64 w/ 1700 mm table
Serial Number	400-120261	
Provider's Method of Identifying Equipment	400-120261	
Specify if Mobile or Fixed	Fixed	Fixed
Mobile Trailer Serial Number/VIN #	N/A	N/A
Mobile Tractor Serial Number/VIN #	N/A	N/A
Date of Acquisition of Each Component	2001	2014
Does Provider Hold Title to Equipment or Have a Capital Lease?	Title	Title
Specify if Equipment Was/Is New or Used When Acquired	New	Refurbished
Total Capital Cost of Project (Including Construction, etc.) <Use Attached Form>	$	$355,433
Total Cost of Equipment	$7,828	$345,433
Fair Market Value of Equipment	$30,000	
Net Purchase Price of Equipment	$	$345,433
Locations Where Operated	NH Orthopedic Hospital	NH Orthopedic Hospital
Number Days In Use/To be Used in N.C. Per Year	365	365
Percent of Change in Patient Charges (by Procedure)	No change	No change
Percent of Change in Per Procedure Operating Expenses (by Procedure)		
Type of Procedures Currently Performed on Existing Equipment	Routine Adult CT exams	Routine CT exams, CTA exams, Complex Orthopedic exams, Pediatric exams
Type of Procedures New Equipment is Capable of Performing	No new procedures	No new procedures

Quotation Number: PR11-C16214 V 2

New Hanover Regional Medical Center
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Attn: Noel Rhodes
Director of Radiology
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Wilmington NC 28401

Date: 02-05-2014

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2) The following documents, as applicable, if attached to this Quotation: (i) GE Healthcare Warranty(ies); (ii) GE Healthcare Additional Terms and Conditions; (iii) GE Healthcare Product Terms and Conditions; and (iv) GE Healthcare General Terms and Conditions.

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- Quotation Expiration Date: 03-30-2014
- Billing Terms: 40% Upon delivery - 50% Upon installation - 10% Upon acceptance
- Payment Terms: NET 30
- Governing Agreement: MedAssets Group Buy

Each party has caused this agreement to be signed by an authorized representative on the date set forth below. Please submit purchase orders to GE Healthcare
Please submit Purchase Orders to: General Electric Company, GE Healthcare, 3000 N. Grandview Blvd., Mail Code WT-897, Waukesha, WI 53188

GE HEALTHCARE

James Benecki
02-05-2014
Product Sales Specialist

US
Phone: +1 615 390 3634
Fax: (910) 401-1049
Jim.Benecki@ge.com

CUSTOMER

Authorized Customer Date

Print Name and Title

PO #

Desired Equipment First Use Date

GE Healthcare will use reasonable efforts to meet Customer's desired equipment first use date. The actual delivery date will be mutually

INDICATE FORM OF PAYMENT:

(If there is potential to finance with a lease transaction, GE HFS or otherwise, select lease.)

____ Cash * ____ Lease ____ HFS Loan

If financing please provide name of finance company below*:

*Selecting Cash or not identifying GE HFS as the finance company declines option for GE HFS financing.

agreed upon by the parties.

Qty	Catalog No.	Description
1	L7830ST	**Cape Fear - GS VCT** GoldSeal VCT 64 with 1700 Table One year full warranty - System & Tube *Tube Performix Pro VCT 100, max heat storage capacity 8MJ *85kw Generator at 700mA, upgradeable to 100kw at 800mA *1700 table config *16 fps upgradeable to 35 fps *Xtream Workflow s/w DMPR, Exam Split *Up to .4 second scan speed/rotation *64 channel detector X .625mm acquisition with .35mm resolution *40mm coverage with .625mm thickness *Upgradeable to ASiR technology The LightSpeed VCT 64 provides technologies that deliver true clinical performance with the ability to acquire sub-mm resolution with wider coverage. o V-Res Detector technology with 40mm anatomical coverage per rotation with 0.625mm slices. o Complete workflow solutions to support the acquisition of 64 sub-mm slices per rotation including: - Xtream, GE's workflow platform built on the LINUX operating system and delivering fast reconstruction of full fidelity images and a fast network transfer. - Direct MPR that enables the move from 2D review to prospective 3D image review of axial, sagittal, coronal and oblique planes...automatically. - Exam Split delivering the capability to "split" a series of patient images into separate groups for networking. o OptiDose management features: bowtie filters optimized for cardiac applications and pediatric body exams, fully 3-Dose modulation, ECG dose modulation, color coding for kids, tracking collimator hardware and software for x-ray beam tracking to name a few. o InSite Broadband Built In - includes hardware install support essential for systems to be ready for high speed internet connection. Enables customer to access services designed to: improve quality, enhance performance, increase productivity, reduce costs, reduce downtime, expand imaging capabilities, and increase privacy and security of data transmission. NOTE: SEE PRE-INSTALLATION MANUAL FOR MINIMUM SIZE ROOM DIMENSIONS. CAN VARY DEPENDING UPON VINTAGE. 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. SITING CONSIDERATIONS See the Pre-Installation manual for details of the siting requirements for LightSpeed VCT. 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 with this product are appropriately labeled according to the requirements of the Center for Devices and Radiological Health. This product is a CT-compliant device which satisfies regulations regarding Electro-Magnetic Compatibility (EMC) and Electro-Magnetic Interference (EMI), pursuant to IEC-601.

Qty	Catalog No.	Description
		Availability Since GoldSeal Preowned Equipment may be Offered Simultaneously to Several Customers, its Sale to You is Subject to Availability and Subject to Prior Sale at the Time You Offer to Purchase It. If the Equipment is no Longer Available, (1) We Will Attempt to Identify Other GoldSeal Preowned Equipment in Our Inventory that Meets Your Needs, and (2) if Substitute Equipment is Not Acceptable to You, We Will Cancel Your Order and Refund Any Deposit You Have Paid us for the Canceled Order.
1	E4502F	3 Phase 14 KVA Partial UPS for Lightspeed VCT, Discovery ST - HP and Lightspeed Pro32. The 14KVA Partial UPS has been specifically designed to coordinate with GE Healthcare CT & PET/CT scanners. In the event of a power outage a partial system UPS provides continuous backup power to the scanner host and control computers, thus assuring no loss of usable scan data. In addition, critical circuits in the gantry and table remain powered which facilitate the safe removal of the patient from the scanner. If power is restored within the battery hold-up time, the operator can continue scanner operations without the need to reboot the system. When longer power outages are anticipated, the UPS provides time for the operators to safely remove the patient and complete an orderly shutdown of the system software. FEATURES/BENEFITS • True double-conversion, online technology provides reliable operation & uninterrupted glitch free power • Automatic voltage and frequency selection eases startup, i.e., 50 or 60 Hz compatible • Integral Manual Bypass switch facilitates continued scanner operation while UPS is being serviced • Single input connection utilized for both UPS input and static switch • Maintains system electronics and allows critical scanner operations to continue for > 10 minutes (typical) after loss of power • Protects electronics from under voltage, brownouts, line sags, over voltage and transients • Advanced Battery Management (ABM) software monitors / indicates battery health and improves battery service life SPECIFICATIONS • Dimensions (H x W x D): 49" x 12" x 32" • Weight: 620 lbs. • Rating: 14.4 kVA • Input Voltage Range: Three-Phase; 102-132V / ph • Input Frequency Range: 45-65 Hz • Output Frequency: 50 or 60 Hz, auto-sensing COMPATIBILITY

Qty	Catalog No.	Description
		• CT LightSpeed Pro 32, Lightspeed VCT, CT 750HD, PET Discovery ST & ST-HP, PET Discovery VCT, PET Discovery 600/690 NOTES: • Customer is responsible for rigging and arranging for installation with a certified electrician • ITEM IS NON-RETURNABLE AND NON-REFUNDABLE
1	E4502AE	CT Main Disconnect Panel - 125 Amp with Auto Restart FEATURES/BENEFITS • Custom panel serves as the main power disconnect between the CT system and the facility 400-480V power source Panel provides short circuit, overload, undervoltage release, automatic restart, and emergency shut down for the CT system • Reduces installation time and cost by providing a single-point power connection eliminating the need to mount and wire a number of individual components • Standardized design and testing assures high product quality and system reliability • On systems where the optional 12.5 kVA partial system UPS is ordered, the Main Disconnect Panel also provides mandated emergency power off control via a UPS output disconnect function included in the panel design • Provides a standardized platform for future UPS or other GE engineered modifications or upgrades SPECIFICATIONS • Dimensions (H x W): 30.24 in. x 19.78 in. • Enclosure Depth: 7.05 in. • Handle Depth: 10.3 in. • Weight: 110 lbs. • UL, cUL and CE labeled • Panel disconnect provides OSHA lockout/tagout provisions • Surface or semi-flush mounting • Partial system UPS sold separately (E4502F) COMPATIBILITY • CT LS Pro 16, LS Pro 32, RT Systems, LS VCT, CT 750HD, Discovery 690 VCT NOTES: • Customer is responsible for rigging and arranging for installation with a certified electrician • ITEM IS NON-RETURNABLE AND NON-REFUNDABLE

Qty	Catalog No.	Description
1	E8016AZ	Slicker - CT HD750 and VCT w/GT 1700 Table (2 Piece Set) FEATURES/BENEFITS • Two-piece, sealed slicker cushion set has comfort pads enclosed inside the slicker cover and extender cover • Durable, clear PVC plastic cover facilitates faster, more thorough cleanup of blood and fluids • Increase system uptime by protecting table from spills and particulate contaminants • Thermo-sealed seams and flaps prevent contaminate buildup in hard to clean areas COMPATIBILITY • VCT with GT 1700 Table, CT HD750
1	E8016BA	Footswitch Slicker for CT HD750 and VCT Systems The footswitch slicker for CT VCT 2000 and 1700 systems is made of durable, clear PVC plastic that protects the footswitch and facilitates faster, more thorough cleanup of contamination caused by blood and other body fluids. Cover is held securely in place with Velcro...H
1	W0100CT	6 Day CT TiP Onsite System Training CT Onsite Training for a new CT system • One 4 day onsite visit to coincide with system start-up. • One 2 day onsite follow-up visit 6-8 weeks post system start up. During the first visit, the applications specialist will work with the medical and technical staff on system operation and patient procedures. The training produces the best results when a dedicated core group of 2-4 CT technologists complete the session with a modified patient schedule. It is suggested that key physicians are available to participate in the protocol implementation and image quality review sessions. By the end of this visit, the core group should be able to perform the routine patient procedures. The 2 day revisit is suggested after the staff has run the system for 6-8 weeks, however this is flexible based on the site needs. The training will focus on the intermediate and advanced functions of the system or special needs of the customer. The training produces the best results when the same dedicated core group of 2-4 CT technologists from the initial visit complete the session with a modified patient schedule. This training program must be scheduled and completed within 12 months after the date of product delivery.

Quotation Number: PR11-C16214 V 2

Qty	Catalog No.	Description
1	B7864SM	**SmartStep flouro** SmartStep for CT Scanner Systems (Includes In -Room Monitor & Boom) SmartStep Enables an Imaging Mode for Performing Biopsies and Other Interventional Procedures. An In-room Monitor, Hand Held Controller, X-ray Exposure Foot Pedal and Cradle Handle Provide In-room Control for Image Acquisition and Image Review. The Hand Held Controller Provides the Operator with Controls to Prepare the Scanner for Imaging, to Turn Alignment Lights On and Off, to Move the Cradle, Review Images and Adjust the Window Width and Level; and the Foot Switch Provides In-room Control of X-ray On. A Highly Functional Image Display Presents a Set of 3 Interventional Images in 3 Viewports, a Free Viewport, and Timers for the Remaining and Accumulated Time. The Display Control Panel Provides Roam, Zoom, Magnify, Measurement, Annotation, Grid, Image Orientation, and Save Screen Image Review Capabilities. Data Acquisition Includes a 4i Data Acquisition Mode Using 4x1.25 mm, 4x2.25 mm, and 4x3.75 mm Detector Configurations and a 3i Reconstruction Mode to Create 2.5, 3.75 and 7.5 mm Thick 512 Matrix Images. All Scan Fields of View and Reconstruction Algorithms are Available with 0.8s and 1.0s Gantry Rotation Speed. System Includes the In-room Monitor & Boom

Quote Summary:

Siemens Volume Zoom 4	**($2,500.00)**
Total Quote Net Selling Price	**$345,432.25**

(Quoted prices do not reflect state and local taxes if applicable. Total Net Selling Price Includes Trade In allowance, if applicable.)

COMPANY GLN: Purchase Order: 1404744-0-CAP ORIGINAL

NEW HANOVER REGIONAL MED CNTR

Page: 1
Date: 04/16/14

SHIP TERMS: FOB DESTINATION FREIGHT: STANDARD TRUCK
SHIP VIA:

VENDOR: 6587-BAB
GE HEALTHCARE
ATTN: JULIE BABCOCK
N16 W22419 WATERTOWN RD EC-05
WAUKESHA WI 53186-1118

SHIP TO:
CAPE FEAR DISTRIBUTION CNTR
RECEIVING DOCK
5301 WRIGHTSVILLE AVE
WILMINGTON NC 28403

Invoice To:
New Hanover Regional Medical Cente
P.O. Box 1649
Wilmington, NC 28402

CONTACT:
PHONE:
FAX:

CONTACT: Joey Pedro
PHONE: 910-815-5891
FAX:
BUYER GLN:

Joseph Pedro
Sr. Purchasing Agent

TERMS	DISCOUNT DAYS	DISCOUNT RATE	NET	ACCOUNT NUMBER
Net Due 35 Days			35	

Deliver on June 18, 2014 unless specified by line
Purchase Order Currency: United States Dollar

Invoice by mail
Process Level: REG
****
Quote#: PR11-C16214 V2...
Dated: 02-05-2014.....

(-$2,500.00) Trade-in of
Trade-in of Siemens Volume Zoom 4.....

GoldSeal VCT 64 w/ 1700 Table - System &Tube.....

All items to be configured as noted on Quote.

Activity# 120-14-009 asset tag# 51387....

Please contact Noel Rhodes,
Director of Radiology
at 910-343-7978 with any questions.
Noel.Rhodes@nhrmc.org

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	CAPE FEAR-GS VCT 64 W/1700 TABL L7830ST- 40% DUE UPON DELIVERY	1 LO 138,172.90	138,172.90

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	CAPE FEAR-GS VCT 64 W/1700 TABL Continued L7830ST- 40% DUE UPON DELIVERY Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51387 Vendor Item Desc:		
2	CAPE FEAR-GS VCT 64 W/1700 TABL 50% DUE UPON INSTALLATION Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51387 Vendor Item Desc:	1 LO 172,716.13	172,716.13
3	CAPE FEAR-GS VCT 64 W/1700 TABL 10% DUE UPON ACCEPTANCE Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51387 Vendor Item Desc:	1 LO 34,543.22	34,543.22

Purchase Order Summary

Goods Total:	345,432.25
Order Total:	345,432.25

End of Purchase Order: 1404744-0-CAP

w Hanover Regional Medical Center
E GS VCT with 2000 mm table Quote: PR7-C4776 V11
t Selling Price: $320,646 Exhibit: B4

EQUIPMENT COMPARISON

	EXISTING EQUIPMENT	REPLACEMENT EQUIPMENT
Type of Equipment (List Each Component)	1. 4-slice CT scanner	1. 64-slice CT scanner
Manufacturer of Equipment	GE	GE Medical
Tesla Rating for MRIs	N/A	N/A
Model Number	1. Brightspeed Elite 16 SL	1. GS VCT 64 with 2000 mm table
Serial Number	1. 277492hm5	1.
Provider's Method of Identifying Equipment	910343ct3	
Specify if Mobile or Fixed	Fixed	Fixed
Mobile Trailer Serial Number/VIN #	N/A	N/A
Mobile Tractor Serial Number/VIN #	N/A	N/A
Date of Acquisition of Each Component	2011	2014
Does Provider Hold Title to Equipment or Have a Capital Lease?	Title	Title
Specify if Equipment Was/Is New or Used When Acquired	1. New	1. Refurbished
Total Capital Cost of Project (Including Construction, etc.) <Use Attached Form>		$330,646
Total Cost of Equipment	$152,000.01	$320,646
Fair Market Value of Equipment	1. $30,000	
Net Purchase Price of Equipment	$152,000.01	$320,645.75
Locations Where Operated	NHRMC - 17th Street	NHRMC - 17th Street
Number Days In Use/To be Used in N.C. Per Year	365	365
Percent of Change in Patient Charges (by Procedure)	No change	No change
Percent of Change in Per Procedure Operating Expenses (by Procedure)		
Type of Procedures Currently Performed on Existing Equipment	Routine Adult CT exams	Routine CT exams, CTA exams, Complex Orthopedic exams, Pediatric exams
Type of Procedures New Equipment is Capable of Performing	No new procedures	No new procedures

Quotation Number: PR7-C4776 V 11

Date: 02-05-2014

New Hanover Regional Medical Center
2131 S 17th St
Wilmington NC 28401-7407

Attn: Noel Rhodes
Director of Radiology
2131 S 17th St
Wilmington NC 28401

This Agreement (as defined below) is by and between the Customer and the GE Healthcare business ("GE Healthcare"), each as identified herein. GE Healthcare agrees to provide and Customer agrees to pay for the Products listed in this GE Healthcare Quotation ("Quotation"). "Agreement" is defined as this Quotation and the terms and conditions set forth in either (i) the Governing Agreement identified below or (ii) if no Governing Agreement is identified, the following documents:

1) This Quotation that identifies the Product offerings purchased or licensed by Customer;

2) The following documents, as applicable, if attached to this Quotation: (i) GE Healthcare Warranty(ies); (ii) GE Healthcare Additional Terms and Conditions; (iii) GE Healthcare Product Terms and Conditions; and (iv) GE Healthcare General Terms and Conditions.

In the event of conflict among the foregoing items, the order of precedence is as listed above.

This Quotation is subject to withdrawal by GE Healthcare at any time before acceptance. Customer accepts by signing and returning this Quotation or by otherwise providing evidence of acceptance satisfactory to GE Healthcare. Upon acceptance, this Quotation and the related terms and conditions listed above (or the Governing Agreement, if any) shall constitute the complete and final agreement of the parties relating to the Products identified in this Quotation. The parties agree that they have not relied on any oral or written terms, conditions, representations or warranties outside those expressly stated or incorporated by reference in this Agreement in making their decisions to enter into this Agreement. No agreement or understanding, oral or written, in any way purporting to modify this Agreement, whether contained in Customer's purchase order or shipping release forms, or elsewhere, shall be binding unless hereafter agreed to in writing by authorized representatives of both parties. Each party objects to any terms inconsistent with this Agreement proposed by either party unless agreed to in writing and signed by authorized representatives of both parties, and neither the subsequent lack of objection to any such terms, nor the delivery of the Products, shall constitute an agreement by either party to any such terms.

By signing below, each party certifies that it has not made any handwritten modifications. Manual changes or mark-ups on this Agreement (except signatures in the signature blocks and an indication in the form of payment section below) will be void.

- Terms of Delivery: FOB Destination
- Quotation Expiration Date: 03-30-2014
- Billing Terms: 40% Upon delivery - 50% Upon installation - 10% Upon acceptance
- Payment Terms: NET 30
- Governing Agreement: MedAssets Group Buy

Each party has caused this agreement to be signed by an authorized representative on the date set forth below. Please submit purchase orders to GE Healthcare
Please submit Purchase Orders to: General Electric Company, GE Healthcare, 3000 N. Grandview Blvd., Mail Code WT-897, Waukesha, WI 53188

GE HEALTHCARE

James Benecki
02-05-2014
Product Sales Specialist

US
Phone: +1 615 390 3634
Fax: (910) 401-1049
Jim.Benecki@ge.com

CUSTOMER

Authorized Customer Date

Print Name and Title

PO #

Desired Equipment First Use Date

GE Healthcare will use reasonable efforts to meet Customer's desired equipment first use date. The actual delivery date will be mutually

INDICATE FORM OF PAYMENT:
(If there is potential to finance with a lease transaction, GE HFS or otherwise, select lease.)
____ Cash * ____ Lease ____ HFS Loan
If financing please provide name of finance company below*:

*Selecting Cash or not identifying GE HFS as the finance company declines option for GE HFS financing.

1/

agreed upon by the parties.

Qty	Catalog No.	Description
		ED - GS VCT w 2000m table
1	L7831ST	GoldSeal VCT 64 with 2000 Table One year full warranty - System & Xray Tube *Tube Performix Pro VCT 100, max heat storage capacity 8MJ *85kw Generator at 700mA, upgradeable to 100kw at 800mA *2000 table config *16 fps upgradeable to 35 fps *Xtream Workflow s/w DMPR, Exam Split *Up to .4 second scan speed/rotation *64 channel detector X .625mm acquisition with 35mm resolution *40mm coverage with .625mm thickness *Upgradeable to ASiR technology The LightSpeed VCT 64 provides technologies that deliver true clinical performance with the ability to acquire sub-mm resolution with wider coverage. + o V-Res Detector technology with 40mm anatomical coverage per rotation with 0.625mm slices. o Complete workflow solutions to support the acquisition of 64 sub-mm slices per rotation including: - Xtream, GE's workflow platform built on the LINUX operating system and delivering fast reconstruction of full fidelity images and a fast network transfer. - Direct MPR that enables the move from 2D review to prospective 3D image review of axial, sagittal, coronal and oblique planes...automatically. - Exam Split delivering the capability to "split" a series of patient images into separate groups for networking. o OptiDose management features: bowtie filters optimized for cardiac applications and pediatric body exams, fully 3-Dose modulation, ECG dose modulation, color coding for kids, tracking collimator hardware and software for x-ray beam tracking to name a few. o InSite Broadband Built In - includes hardware install support essential for systems to be ready for high speed internet connection. Enables customer to access services designed to: improve quality, enhance performance, increase productivity, reduce costs, reduce downtime, expand imaging capabilities, and increase privacy and security of data transmission. NOTE: SEE PRE-INSTALLATION MANUAL FOR MINIMUM SIZE ROOM DIMENSIONS. CAN VARY DEPENDING UPON VINTAGE. 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. SITING CONSIDERATIONS See the Pre-Installation manual for details of the siting requirements for LightSpeed VCT. 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 with this product are appropriately labeled according to the requirements of the Center for Devices and Radiological Health. This product is a CT-compliant device which satisfies regulations regarding Electro-Magnetic Compatibility (EMC) and Electro-Magnetic Interference (EMI), pursuant to IEC-601.

Qty	Catalog No.	Description
		Availability Since GoldSeal Preowned Equipment may be Offered Simultaneously to Several Customers, its Sale to You is Subject to Availability and Subject to Prior Sale at the Time You Offer to Purchase It. If the Equipment is no Longer Available, (1) We Will Attempt to Identify Other GoldSeal Preowned Equipment in Our Inventory that Meets Your Needs, and (2) if Substitute Equipment is Not Acceptable to You, We Will Cancel Your Order and Refund Any Deposit You Have Paid us for the Canceled Order.
1	E4502F	3 Phase 14 KVA Partial UPS for Lightspeed VCT, Discovery ST - HP and Lightspeed Pro32. The 14KVA Partial UPS has been specifically designed to coordinate with GE Healthcare CT & PET/CT scanners. In the event of a power outage a partial system UPS provides continuous backup power to the scanner host and control computers, thus assuring no loss of usable scan data. In addition, critical circuits in the gantry and table remain powered which facilitate the safe removal of the patient from the scanner. If power is restored within the battery hold-up time, the operator can continue scanner operations without the need to reboot the system. When longer power outages are anticipated, the UPS provides time for the operators to safely remove the patient and complete an orderly shutdown of the system software. FEATURES/BENEFITS • True double-conversion, online technology provides reliable operation & uninterrupted glitch free power • Automatic voltage and frequency selection eases startup, i.e., 50 or 60 Hz compatible • Integral Manual Bypass switch facilitates continued scanner operation while UPS is being serviced • Single input connection utilized for both UPS input and static switch • Maintains system electronics and allows critical scanner operations to continue for > 10 minutes (typical) after loss of power • Protects electronics from under voltage, brownouts, line sags, over voltage and transients • Advanced Battery Management (ABM) software monitors / indicates battery health and improves battery service life SPECIFICATIONS • Dimensions (H x W x D): 49" x 12" x 32" • Weight: 620 lbs. • Rating: 14.4 kVA • Input Voltage Range: Three-Phase; 102-132V / ph • Input Frequency Range: 45-65 Hz • Output Frequency: 50 or 60 Hz, auto-sensing COMPATIBILITY

Qty	Catalog No.	Description
		• CT LightSpeed Pro 32, Lightspeed VCT, CT 750HD, PET Discovery ST & ST-HP, PET Discovery VCT, PET Discovery 600/690 NOTES: • Customer is responsible for rigging and arranging for installation with a certified electrician • ITEM IS NON-RETURNABLE AND NON-REFUNDABLE
1	E4502AE	CT Main Disconnect Panel - 125 Amp with Auto Restart FEATURES/BENEFITS • Custom panel serves as the main power disconnect between the CT system and the facility 400-480V power source Panel provides short circuit, overload, undervoltage release, automatic restart, and emergency shut down for the CT system • Reduces installation time and cost by providing a single-point power connection eliminating the need to mount and wire a number of individual components • Standardized design and testing assures high product quality and system reliability • On systems where the optional 12.5 kVA partial system UPS is ordered, the Main Disconnect Panel also provides mandated emergency power off control via a UPS output disconnect function included in the panel design • Provides a standardized platform for future UPS or other GE engineered modifications or upgrades SPECIFICATIONS • Dimensions (H x W): 30.24 in. x 19.78 in. • Enclosure Depth: 7.05 in. • Handle Depth: 10.3 in. • Weight: 110 lbs. • UL, cUL and CE labeled • Panel disconnect provides OSHA lockout/tagout provisions • Surface or semi-flush mounting • Partial system UPS sold separately (E4502F) COMPATIBILITY • CT LS Pro 16, LS Pro 32, RT Systems, LS VCT, CT 750HD, Discovery 690 VCT NOTES: • Customer is responsible for rigging and arranging for installation with a certified electrician • ITEM IS NON-RETURNABLE AND NON-REFUNDABLE

Quotation Number: PR7-C4776 V 11

Qty	Catalog No.	Description
1	E8016AZ	Slicker - CT HD750 and VCT w/GT 1700 Table (2 Piece Set) FEATURES/BENEFITS • Two-piece, sealed slicker cushion set has comfort pads enclosed inside the slicker cover and extender cover • Durable, clear PVC plastic cover facilitates faster, more thorough cleanup of blood and fluids • Increase system uptime by protecting table from spills and particulate contaminants • Thermo-sealed seams and flaps prevent contaminate buildup in hard to clean areas COMPATIBILITY • VCT with GT 1700 Table, CT HD750
1	E8016BA	Footswitch Slicker for CT HD750 and VCT Systems The footswitch slicker for CT VCT 2000 and 1700 systems is made of durable, clear PVC plastic that protects the footswitch and facilitates faster, more thorough cleanup of contamination caused by blood and other body fluids. Cover is held securely in place with Velcro...H

Quote Summary:

Philips Tomoscan AV	**($2,500.00)**
Total Quote Net Selling Price	**$320,645.75**

(Quoted prices do not reflect state and local taxes if applicable. Total Net Selling Price Includes Trade In allowance, if applicable.)

COMPANY GLN: Purchase Order: 1404665-0-CAP

NEW HANOVER REGIONAL MED CNTR Page: 1
Date: 04/16/14

SHIP TERMS: FOB DESTINATION FREIGHT: STANDARD TRUCK
SHIP VIA:

VENDOR: 6587-BAB
GE HEALTHCARE
ATTN: JULIE BABCOCK
N16 W22419 WATERTOWN RD EC-05
WAUKESHA WI 53186-1118

SHIP TO:
NEW HANOVER DISTRIBUTION CNTR
RECEIVING DOCK
2131 SOUTH 17TH ST
WILMINGTON NC 28401

Invoice To:
New Hanover Regional Medical Center
P.O. Box 1649
Wilmington, NC 28402

CONTACT:
PHONE:
FAX:

CONTACT: Joey Pedro
PHONE: 910-815-5891
FAX:
BUYER GLN:

Joseph Pedro
Sr Purchasing Agent

TERMS	DISCOUNT DAYS	RATE	NET	ACCOUNT NUMBER
Net Due 35 Days			35	

Deliver on June 18, 2014 unless specified by line
Purchase Order Currency: United States Dollar

Invoice by mail
Process Level: REG
****
Quote#: PR7-C4776 V11...
Dated: 02-05-2014.....

(-$30,000.00) Trade-in of
GE LightSpeed QXI SN: 910343NHCT3.....

GoldSeal VCT 64 w/ 2000 Table System
& Xray Tube.....

All items to be configured as noted on Quote.

Activity# 120-14-009 asset tag# 51385....

Please contact Noel Rhodes,
Director of Radiology
at 910-343-7978 with any questions.
Noel.Rhodes@nhrmc.org

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	ED-GS VCT W/2000M TABLE XR TUBE L7831ST- 40% DUE UPON DELIVERY	1 LO 128,258.30	128,258.30

LINE	ITEM NUMBER / DESCRIPTION	QUANTITY / PRICE	EXTENDED AMOUNT
1	ED-GS VCT W/2000M TABLE XR TUBE Continued L7831ST- 40% DUE UPON DELIVERY Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51385 Vendor Item Desc:		
2	ED-GS VCT W/2000M TABLE XR TUBE 50% DUE UPON INSTALLATION Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51385 Vendor Item Desc:	1 LO 160,322.88	160,322.88
3	ED-GS VCT W/2000M TABLE XR TUBE 10% DUE UPON ACCEPTANCE Deliver To: Margo Abbas 910-667-3492 Requesting Location: 67300 1.0000 LO Req Comp: 0010 Vendor Item Number: ASSET TAG# 51385 Vendor Item Desc:	1 LO 32,064.57	32,064.57

Purchase Order Summary

Goods Total:	320,645.75
Order Total:	320,645.75

End of Purchase Order: 1404665-0-CAP

GE Healthcare

Jim Benecki
MICT product modality leader

May 23, 2014

David Bellegante
New Hanover Medical Center
2131 S. 17 Street
Wilmington, NC 28401

RE: North Carolina Certificate of Need ("CON") requirements for Trade-in Equipment on Quotations

- PR2-C7399-V8
- PR7-C4776-V11
- PR11-C16214-V2
- PR9-C4072-V9

Dear David,

General Electric Company, by and through its GE Healthcare Division ("GE Healthcare"), sincerely thanks you for your continued business and support. GE Healthcare values the relationship that we have with New Hanover Regional Medical Center.

GE Healthcare understands and acknowledges that end-user purchasers who acquire diagnostic imaging equipment for use in North Carolina are or may be subject to Certificate of Need ("CON") requirements for such equipment. GE Healthcare agrees to use commercially reasonable efforts to help facilitate compliance with applicable CON requirements prior to resale and/or re-installation of this equipment, as applicable, but the parties acknowledge that the end-user purchaser is solely responsible for obtaining any applicable CON approvals prior to use of such equipment in North Carolina.

Thank you again for the opportunity to earn your business.
If you have any additional questions, feel free to call me at any time.

Regards,

Jim Benecki
GE Healthcare – CT / PET CT product sales specialist
Eastern Carolinas

GE Healthcare Technologies
5901 Hollyholm Trace
Wilmington, NC 28409
U.S.A.
www.gehealthcare.com

C 615-390-3634

E: jim.benecki@med.ge.com

New Hanover
Regional Medical Center

EXHIBIT C

PROPOSED TOTAL CAPITAL COST OF PROJECT

Project Name: NHRMC CT Replacement Quote: PR2-C7399 V8 Exhibit: C1

Provider/Company: New Hanover Regional Medical Center

A. **Site Costs**

(1) Full purchase price of land.....$_____
Acres _____ Price per Acre $_____
(2) Closing costs.....$_____
(3) Site Inspection and Survey.....$_____
(4) Legal fees and subsoil investigation.....$_____
(5) Site Preparation Costs
Soil Borings.....$_____
Clearing-Earthwork....$_____
Fine Grade For Slab...$_____
Roads-Paving.....$_____
Concrete Sidewalks....$_____
Water and Sewer.....$_____
Footing Excavation....$_____
Footing Backfill.....$_____
Termite Treatment.....$_____
Other (Specify).....$_____
Sub-Total Site Preparation Costs.....$_____
(6) Other (Specify).....$_____
(7) **Sub-Total Site Costs.....$_____**

B. **Construction Contract**

(8) Cost of Materials
General Requirements
Concrete/Masonry
Woods/Doors & Windows/Finishes
Thermal & Moisture Protection
Equipment/Specialty Items
Mechanical/Electrical
Other (Specify)
Sub-Total Cost of Materials.....$_____
(9) Cost of Labor.....$_____
(10) Other (Specify).....$_____
(11) **Sub-Total Construction Contract.....$_____**

C. **Miscellaneous Project Costs**

(12) Building Purchase.....$_____
(13) Fixed Equipment Purchase/Lease..... **$185,246**
(14) Movable Equipment Purchase/Lease.....$ _____
(15) Furniture.....$_____
(16) Landscaping.....$_____
(17) Consultant Fees
Architect and Engineering Fees.....$_____
Legal Fees.....$_____
Market Analysis.....$_____
Other (Specify).....**$5,000** (Physicist shielding & integrity assessment)
Other (Specify).....**$5,000** (General maintenance: floor repair, painting)
Sub-Total Consultant Fees.....$_____
(18) Financing Costs (e.g. Bond, Loan, etc.).....$_____
(19) Interest During Construction.....$_____
(20) Other (Specify)_____$_____
(21) **Sub-Total Miscellaneous.....$_____**
(22) **Total Capital Cost of Project** (Sum A-C above) **$195,246**

I certify that, to the best of my knowledge, the above construction related costs of the proposed project named above are complete and correct.

_____
(Signature of Licensed Architect or Engineer)

I assure that, to the best of my knowledge, the above capital costs for the proposed project are complete and correct and that it is my intent to carry out the proposed project as described.

(Signature of Officer Authorized to Represent Provider/Company)

VP - Facilities Services

(Title of Officer)

PROPOSED TOTAL CAPITAL COST OF PROJECT

Project Name: NHRMC CT Replacement Quote: PR9-C4072 V9 Exhibit: C2

Provider/Company: New Hanover Regional Medical Center

A. **Site Costs**

(1) Full purchase price of land.....$_____
Acres _____ Price per Acre $_____
(2) Closing costs.....$_____
(3) Site Inspection and Survey.....$_____
(4) Legal fees and subsoil investigation.....$_____
(5) Site Preparation Costs
Soil Borings.....$_____
Clearing-Earthwork....$_____
Fine Grade For Slab...$_____
Roads-Paving.....$_____
Concrete Sidewalks....$_____
Water and Sewer.....$_____
Footing Excavation....$_____
Footing Backfill.....$_____
Termite Treatment.....$_____
Other (Specify).....$_____
Sub-Total Site Preparation Costs.....$_____
(6) Other (Specify).....$_____
(7) **Sub-Total Site Costs.....$_____**

B. **Construction Contract**

(8) Cost of Materials
General Requirements
Concrete/Masonry
Woods/Doors & Windows/Finishes
Thermal & Moisture Protection
Equipment/Specialty Items
Mechanical/Electrical
Other (Specify)
Sub-Total Cost of Materials.....$_____
(9) Cost of Labor.....$_____
(10) Other (Specify).....$_____
(11) **Sub-Total Construction Contract.....$_____**

C. **Miscellaneous Project Costs**

(12) Building Purchase.....$_____
(13) Fixed Equipment Purchase/Lease..... **$163,956.45**
(14) Movable Equipment Purchase/Lease.....$ _____
(15) Furniture.....$_____
(16) Landscaping.....$_____
(17) Consultant Fees
Architect and Engineering Fees.....$_____
Legal Fees.....$_____
Market Analysis.....$_____
Other (Specify)..... **$5,000** (Physicist shielding & integrity assessment)
Other (Specify)..... **$5,000** (General maintenance: floor repair, painting)
Sub-Total Consultant Fees.....$_____
(18) Financing Costs (e.g. Bond, Loan, etc.).....$_____
(19) Interest During Construction.....$_____
(20) Other (Specify)_____$_____
(21) **Sub-Total Miscellaneous.....$_____**
(22) **Total Capital Cost of Project** (Sum A-C above) **$173,956**

I certify that, to the best of my knowledge, the above construction related costs of the proposed project named above are complete and correct.

_____
(Signature of Licensed Architect or Engineer)

I assure that, to the best of my knowledge, the above capital costs for the proposed project are complete and correct and that it is my intent to carry out the proposed project as described.

(Signature of Officer Authorized to Represent Provider/Company)

VP - Facilities Services

(Title of Officer)

PROPOSED TOTAL CAPITAL COST OF PROJECT

Project Name: NHRMC CT Replacement **Quote: PR11-C16214 V2** **Exhibit: C3**

Provider/Company: New Hanover Regional Medical Center

A. **Site Costs**

(1) Full purchase price of land.....$_____
Acres _____ Price per Acre $_____
(2) Closing costs.....$_____
(3) Site Inspection and Survey.....$_____
(4) Legal fees and subsoil investigation.....$_____
(5) Site Preparation Costs
Soil Borings.....$_____
Clearing-Earthwork....$_____
Fine Grade For Slab...$_____
Roads-Paving.....$_____
Concrete Sidewalks....$_____
Water and Sewer.....$_____
Footing Excavation....$_____
Footing Backfill.....$_____
Termite Treatment.....$_____
Other (Specify).....$_____
Sub-Total Site Preparation Costs.....$_____
(6) Other (Specify).....$_____
(7) **Sub-Total Site Costs.....$_____**

B. **Construction Contract**

(8) Cost of Materials
General Requirements
Concrete/Masonry
Woods/Doors & Windows/Finishes
Thermal & Moisture Protection
Equipment/Specialty Items
Mechanical/Electrical
Other (Specify)
Sub-Total Cost of Materials.....$_____
(9) Cost of Labor.....$_____
(10) Other (Specify).....$_____
(11) **Sub-Total Construction Contract.....$_____**

C. **Miscellaneous Project Costs**

(12) Building Purchase.....$_____
(13) Fixed Equipment Purchase/Lease..... **$345,433**
(14) Movable Equipment Purchase/Lease.....$ _____
(15) Furniture.....$_____
(16) Landscaping.....$_____
(17) Consultant Fees
Architect and Engineering Fees.....$_____
Legal Fees.....$_____
Market Analysis.....$_____
Other (Specify)..... **$5,000** (Physicist shielding & integrity assessment)
Other (Specify)..... **$5,000** (General maintenance: floor repair, painting)
Sub-Total Consultant Fees.....$_____
(18) Financing Costs (e.g. Bond, Loan, etc.).....$_____
(19) Interest During Construction.....$_____
(20) Other (Specify)_____$_____
(21) **Sub-Total Miscellaneous.....$_____**
(22) **Total Capital Cost of Project** (Sum A-C above) **$355,433**

I certify that, to the best of my knowledge, the above construction related costs of the proposed project named above are complete and correct.

_____
(Signature of Licensed Architect or Engineer)

I assure that, to the best of my knowledge, the above capital costs for the proposed project are complete and correct and that it is my intent to carry out the proposed project as described.

(Signature of Officer Authorized to Represent Provider/Company)

VP - Facilities Services

(Title of Officer)

PROPOSED TOTAL CAPITAL COST OF PROJECT

Project Name: NHRMC CT Replacement **Quote: PR7-C4776 V11** **Exhibit: C4**

Provider/Company: New Hanover Regional Medical Center

A. **Site Costs**

(1) Full purchase price of land.....$_____
Acres _____ Price per Acre $_____
(2) Closing costs.....$_____
(3) Site Inspection and Survey.....$_____
(4) Legal fees and subsoil investigation.....$_____
(5) Site Preparation Costs
Soil Borings.....$_____
Clearing-Earthwork....$_____
Fine Grade For Slab...$_____
Roads-Paving.....$_____
Concrete Sidewalks....$_____
Water and Sewer.....$_____
Footing Excavation....$_____
Footing Backfill.....$_____
Termite Treatment.....$_____
Other (Specify).....$_____
Sub-Total Site Preparation Costs.....$_____
(6) Other (Specify).....$_____
(7) **Sub-Total Site Costs.....$_____**

B. **Construction Contract**

(8) Cost of Materials
General Requirements
Concrete/Masonry
Woods/Doors & Windows/Finishes
Thermal & Moisture Protection
Equipment/Specialty Items
Mechanical/Electrical
Other (Specify)
Sub-Total Cost of Materials.....$_____
(9) Cost of Labor.....$_____
(10) Other (Specify).....$_____
(11) **Sub-Total Construction Contract.....$_____**

C. **Miscellaneous Project Costs**

(12) Building Purchase.....$_____
(13) Fixed Equipment Purchase/Lease..... **$320,646**
(14) Movable Equipment Purchase/Lease.....$ _____
(15) Furniture.....$_____
(16) Landscaping.....$_____
(17) Consultant Fees
Architect and Engineering Fees.....$_____
Legal Fees.....$_____
Market Analysis.....$_____
Other (Specify).....**$5,000** (Physicist shielding integrity and installation surveys)
Other (Specify)..... **$5,000** (General maintenance: floor repair, painting)
Sub-Total Consultant Fees.....$_____
(18) Financing Costs (e.g. Bond, Loan, etc.).....$_____
(19) Interest During Construction.....$_____
(20) Other (Specify)_____$_____
(21) **Sub-Total Miscellaneous.....$_____**
(22) **Total Capital Cost of Project** (Sum A-C above) **$330,646**

I certify that, to the best of my knowledge, the above construction related costs of the proposed project named above are complete and correct.

_____
(Signature of Licensed Architect or Engineer)

I assure that, to the best of my knowledge, the above capital costs for the proposed project are complete and correct and that it is my intent to carry out the proposed project as described.

(Signature of Officer Authorized to Represent Provider/Company)

VP - Facilities Services

(Title of Officer)

New Hanover
Regional Medical Center

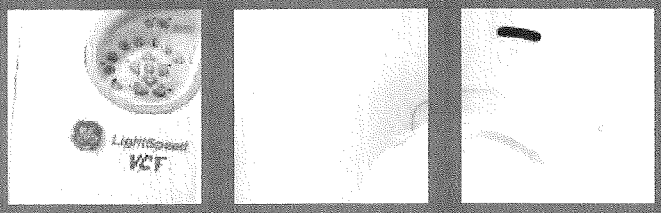
EXHIBIT D

New Hanover
Regional Medical Center

EXHIBIT A

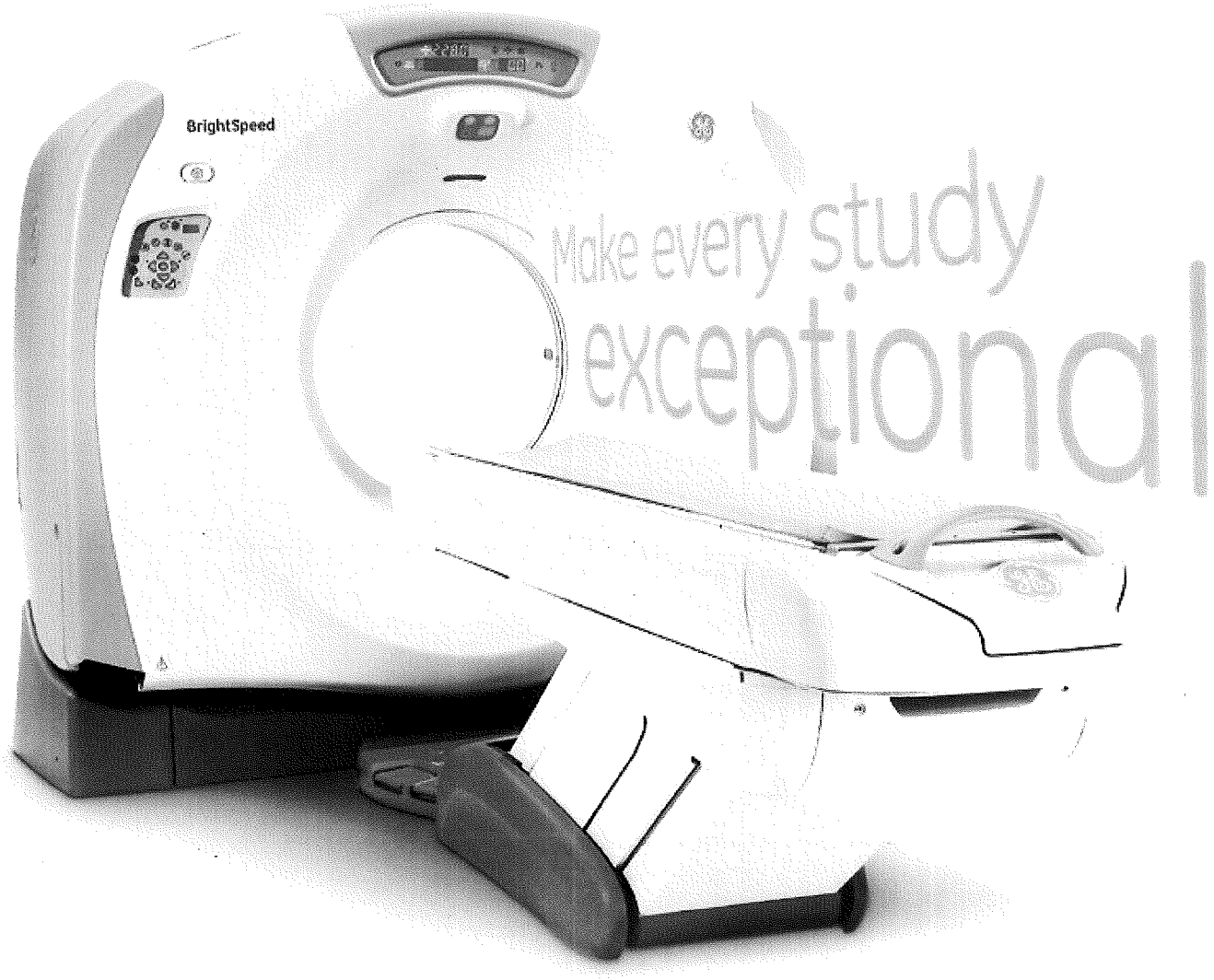
"Imagination at work" is the inspiration that drives us – an open license to think outside the box and dream of a better world for tomorrow. A world that is as pain and stress free as possible for patients, while enabling physicians to get to an answer accurately, quickly and reliably.
Now, the innovative technology of LightSpeed® VCT makes this world possible, opening the door to new and advanced procedure possibilities in non-invasive diagnostic imaging.

Dare to dream



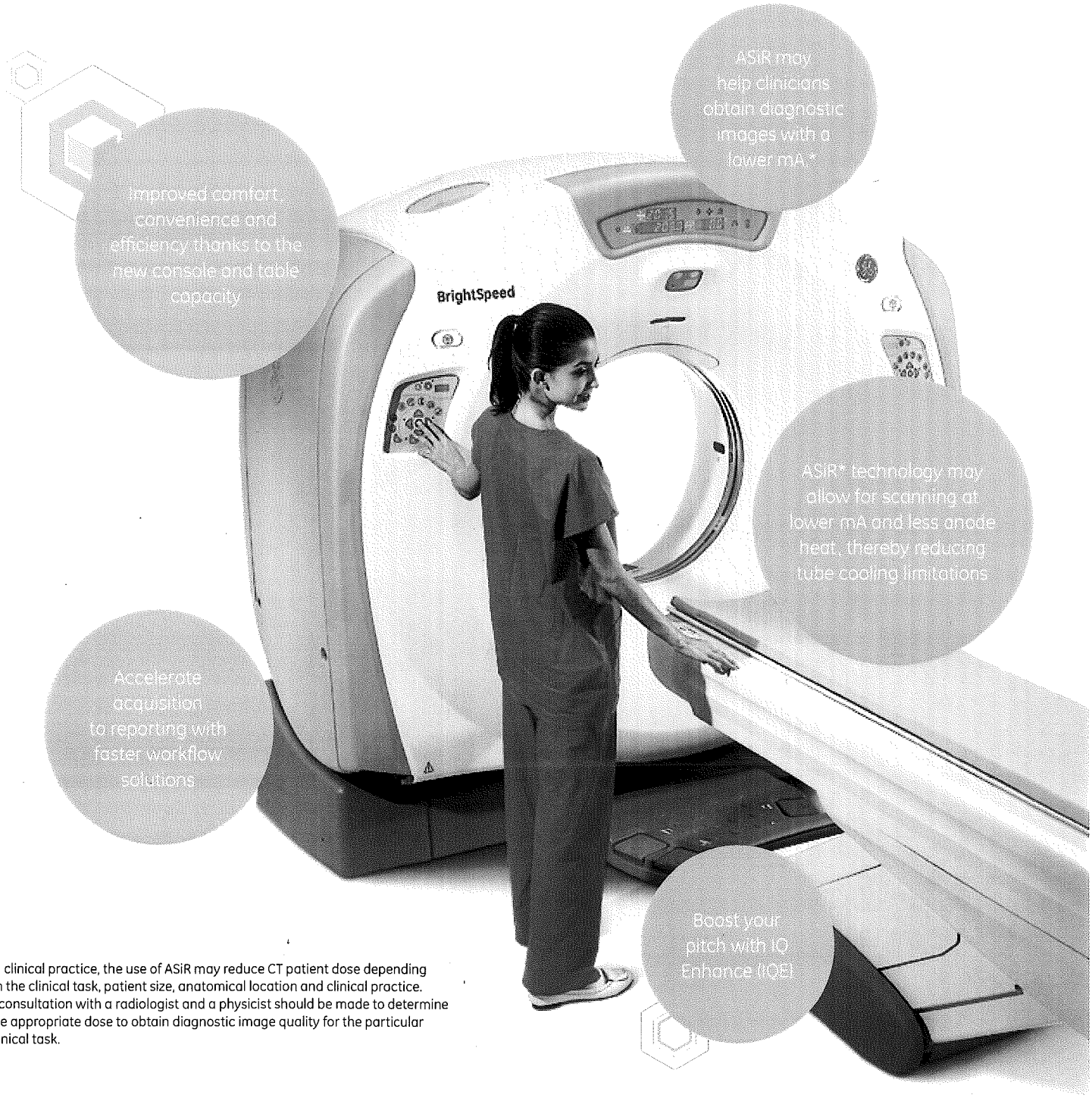
GE Healthcare

BrightSpeed* Elite



A new standard in CT

GE Healthcare continues its commitment to delivering high quality images and the introduction of ASiR on BrightSpeed™ Elite. ASiR dose reduction technology, may allow for reduced mA in the acquisition of diagnostic images, thereby reducing the dose required.** With ASiR, the BrightSpeed Elite may deliver image pixel standard deviation equivalent to an acquisition with higher generator power. BrightSpeed Elite offers efficiency improvements, an enhanced operator console and table design to improve workflow capabilities.



*In clinical practice, the use of ASiR may reduce CT patient dose depending on the clinical task, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.

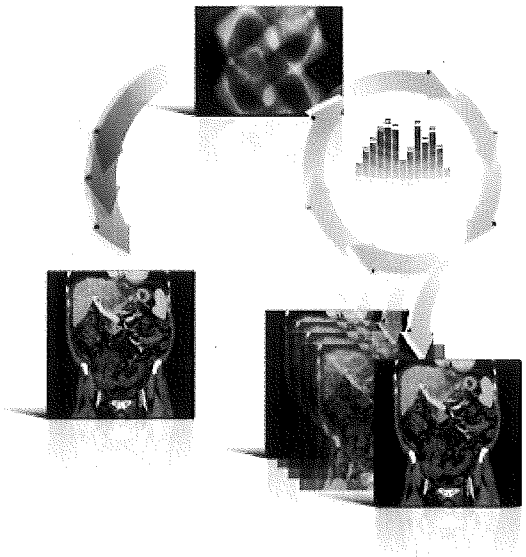
ASiR

GE Healthcare is working continuously to provide dose reduction and image quality improvements.

Leading the way with image reconstruction, GE has developed a unique algorithm — ASiR (Adaptive Statistical Iterative Reconstruction). In the past, when a clinician wanted to reduce radiation in a CT exam, kV and mA were reduced, resulting in an increase in image noise and artifact.

ASiR is a game-changing algorithm. It is different than conventional filtering techniques. Our image reconstruction technology may enable reduction in pixel noise standard deviation, thereby reducing mA in the acquisition of diagnostic images and reducing the dose required.[†] An additional benefit of reducing mA is production of less anode heat, thereby reducing tube cooling delays.[†]

The ASiR technique can also enable reduction in image noise for improved image quality and low contrast detectability (LCD).[†]



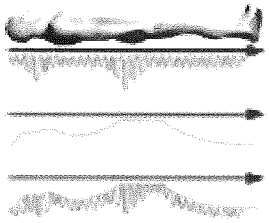
[†] In clinical practice, the use of ASiR may reduce CT patient dose depending on the clinical task, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriatedose to obtain diagnostic image quality for the particular clinical task.

Please contact your local sales representative for option availability.

Low Dose
Exceptional Diagnostic Images

3D dose modulation

BrightSpeed Elite uses 3D modulation to adjust the mA as you scan along x-y-z axes.



An Optimized Beam

BrightSpeed Elite reduces the dose without post-patient collimation. The beam narrows before entering the patient, reducing the dose and optimizing the beam for image generation.

Bowtie Beam Shaping Filter

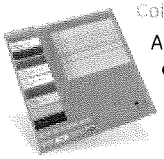
The bowtie filter automatically attenuates off-axis rays to maintain a more uniform X-ray field at the detectors. This minimizes dose and reduces X-ray scattering effects.

Conventional CT Scanner:

Some of beam never reaches detector. Results in wasted dose.

GE BrightSpeed Elite Scanner:

Minimizes patient dose. All of the beam used to create image.



Color-Coded Pediatric protocols

An intuitive interface for pediatric exams uses color codes to offer the user a selection of protocols tuned in advance to suit the weight of the child.

Dose Report and Prospective Dose Display

BrightSpeed Elite provides an easy-to-archive DICOM-structured dose report. It provides a clear summary of the CTDIvol and DLP parameters, so you can compute the dose received during the scan series.

New Dose Check

A tool helps the user to estimate and check the dose delivered in clinical practice.

Dose Check includes the following functions:

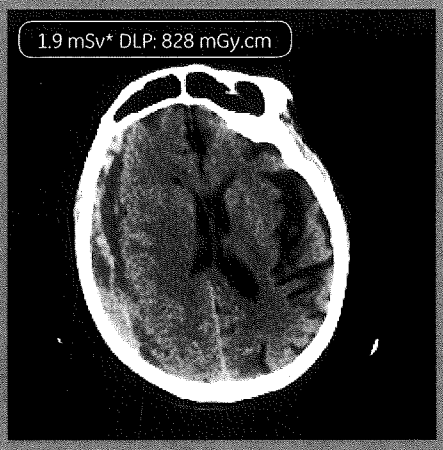
- **Notification Value:** The user will be notified if the estimated dose value of the scan is beyond the typical dose value.
- **Alert Value:** The user is alerted the estimated dose value of a scan is beyond the alert value and authorization to continue will be required.

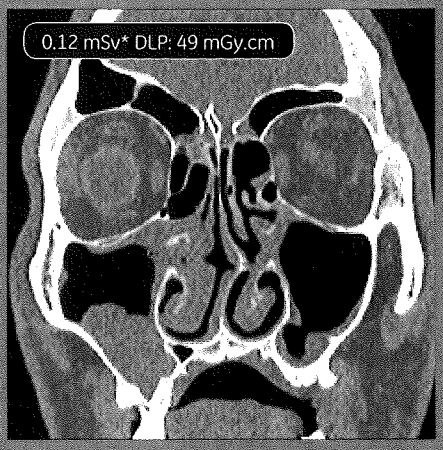
Also includes:

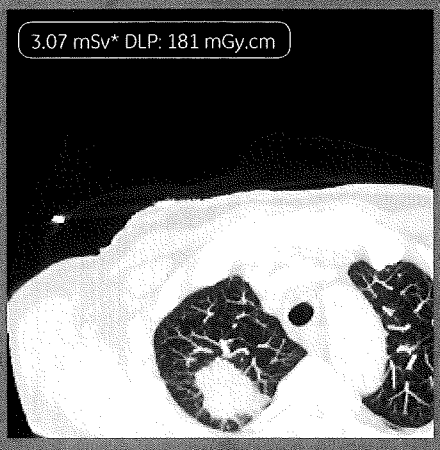
- Defining Alert Values for Adult and Pediatric with age threshold
- Audit logging and review
- Protocol Change Control

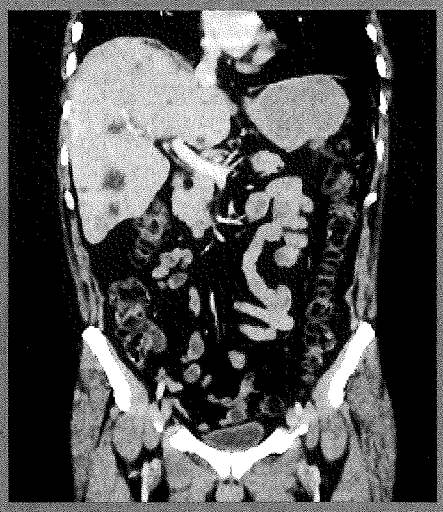
ASiR

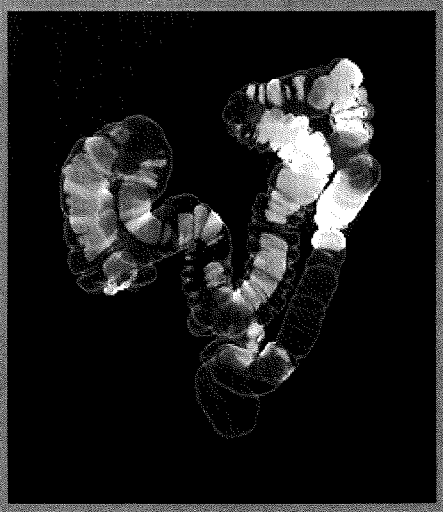
*Obtained by EUR – 16262 EN, using following factors:
Head: 0.0023* DLP
Abdomen: 0.015* DLP
Pelvis: 0.019* DLP

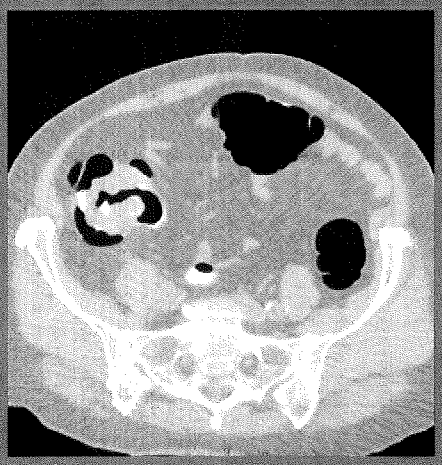


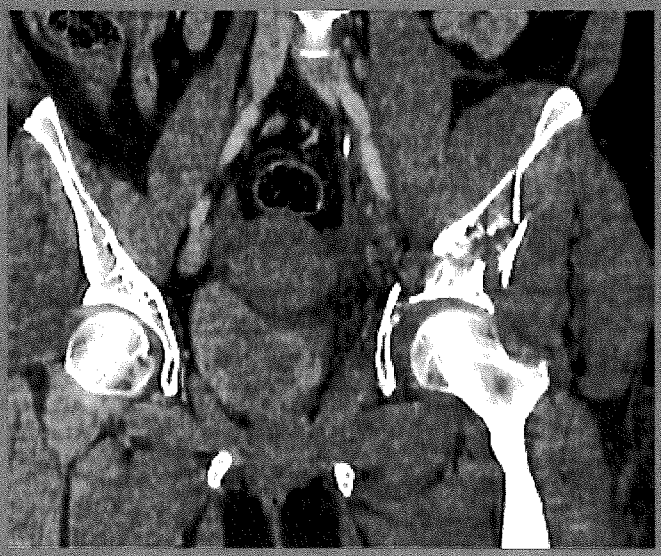


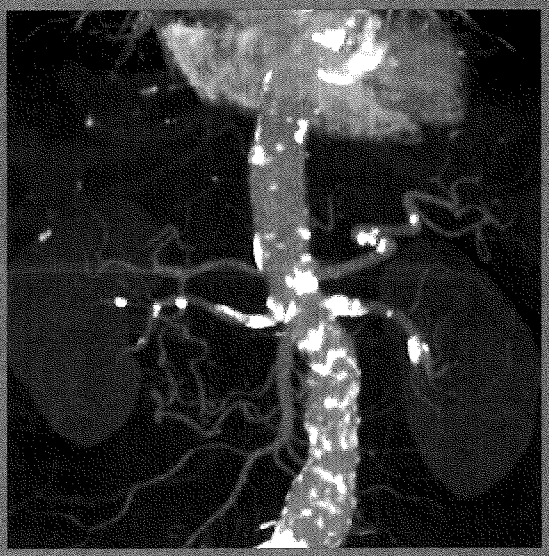












Increased power

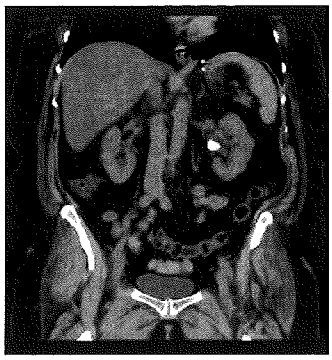
When imaging the same object, the BrightSpeed Elite system with ASiR may deliver pixel noise standard deviation equivalent to a higher mA acquisition such as that delivered by a higher power generator.[1]

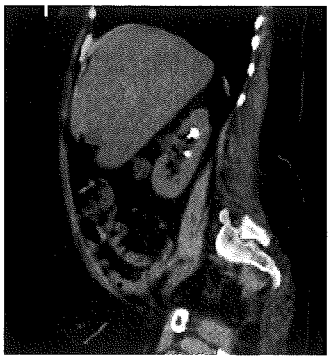
Maximize throughput

The ASiR reconstruction algorithm may allow for reduced mA in the acquisition of diagnostic images, thereby reducing the dose required. The use of ASiR may allow for scanning at lower mA and less anode heat input, which reduces the likelihood of encountering tube cooling delays.[1].

Effectively manage larger patients

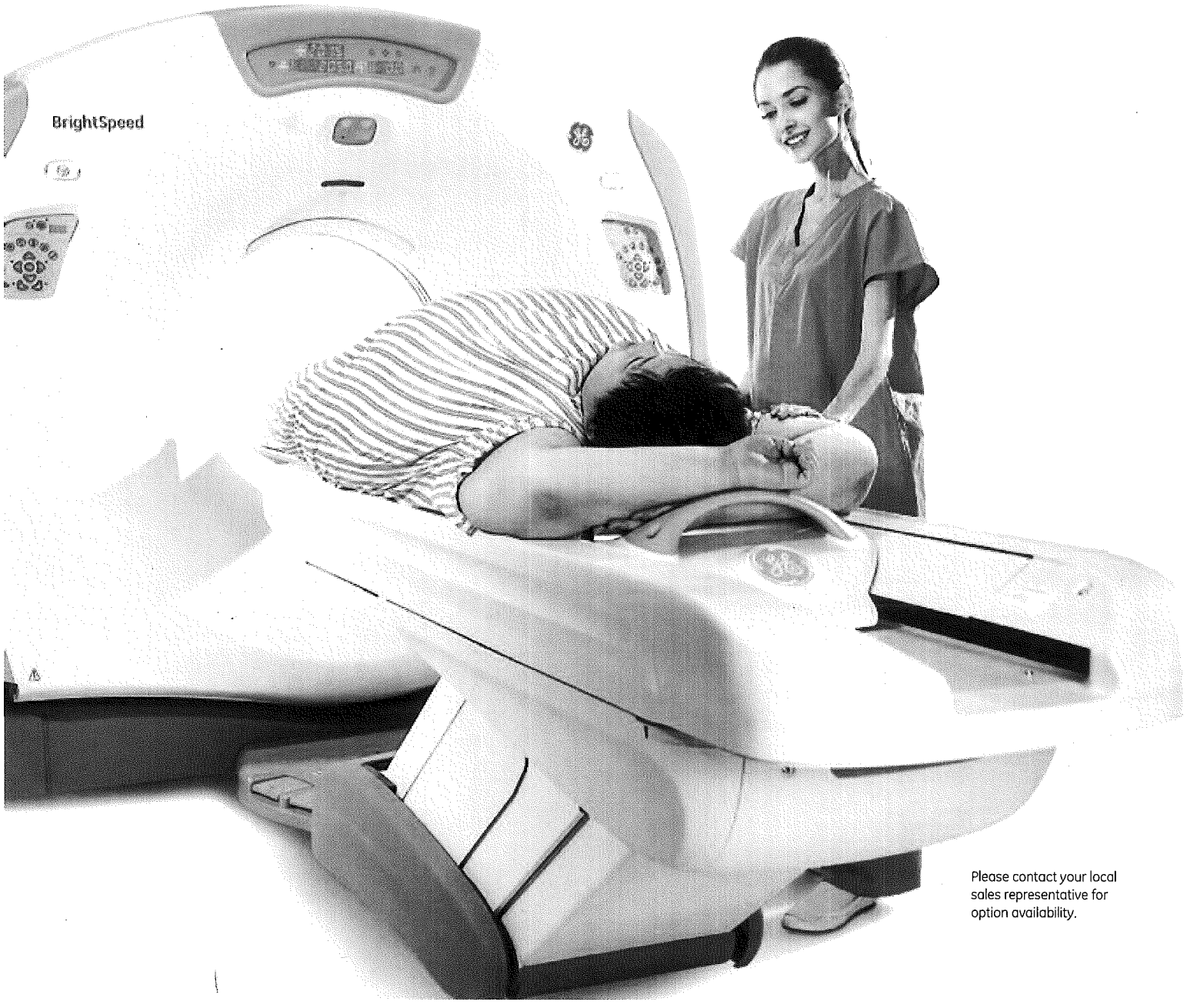
With ASiR, you can combine excellent diagnostic image quality and lower mA on heavier and larger size patients.





Patient: 56 year old female, BMI 53
Abdomen/Pelvis exam
DLP = 947.37
mSv = 14.21

[1] In clinical practice, the use of ASiR may reduce CT patient dose depending on the clinicaltask, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.



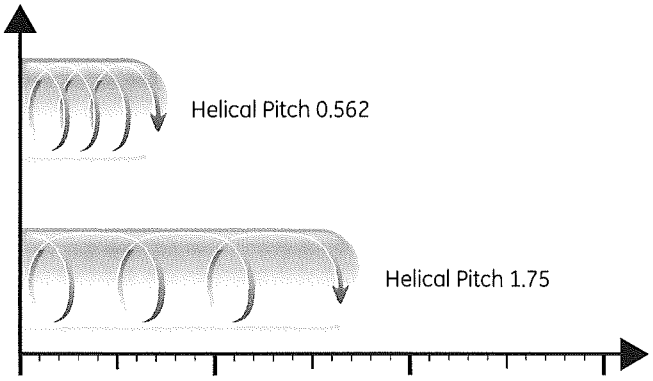
Please contact your local sales representative for option availability.

Versatile

50 slice equivalent with IQ Enhance

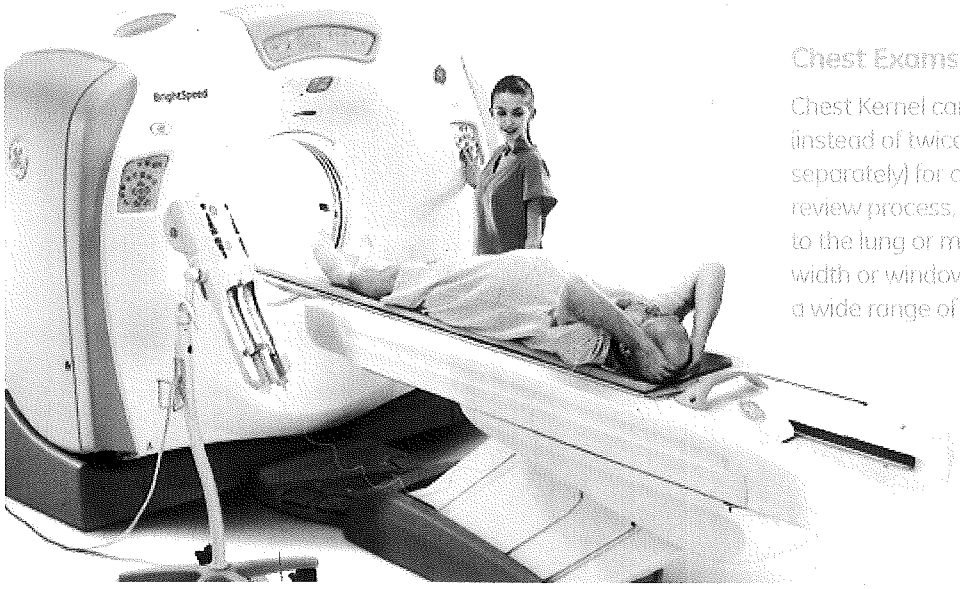
With the BrightSpeed Elite, IQ Enhance (IQE) enables faster anatomical coverage using faster pitch helical scanning at similar Artifact Index level compared to slower helical scanning without IQE. This coverage speed is equivalent to that of wider detectors (50 slice equivalent) at same table speed.[2]

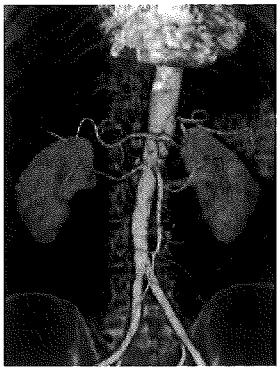
IQE also reduces helical Artifact Index in thin slice helical scanning. This reduction in artifacts makes it possible to scan at faster helical pitches.[2]

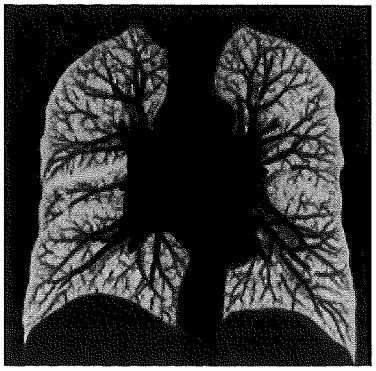


IQE enables accelerated helical pitch, up to 70% (e.g. 0.562 to 1.75, @16slice) at the same Artifact Index level.

[2] Helical Artifact Index is defined as: ((SD value at ROI1)2 - (SD value at ROI2)2)1/2. Two helical data sets were acquired to compute a Helical Artifact Index. Both helical acquisitions were acquired using kV:120, Gantry Rotation: 0.8S, Slice Thickness: 1.25mm, SFOV: Large, DFOV: 32cm, Start/End: S200-I370 and reconstructed using 512 matrix. One data set was acquired at 1.75:1 pitch with table speed of 37.5 mm per rotation with IQ Enhance ON at 260mA and the other using 0.562:1 pitch with table speed of 11.25mm per rotation with IQ Enhance OFF at 160mA.







Angiography

With the BrightSpeed Elite, you can routinely perform minimally invasive, fast angiography for your patients. Spatial and low contrast resolution allows a detailed study of arterial vascular disease, including calcified plaque and occluded or lumen reduction. The 50-slice CT equivalent coverage speed allows you to catch the arterial phase while maintaining high spatial resolution. Outstanding 3D images, automated bone removal and one click vessel tracking simplify processing and facilitate communication with referral doctors or vascular surgeons.

Abdominal Exams

The BrightSpeed Elite has the power, speed and resolution to help you diagnose abdominal disease. This system can also aid in the detection of small lesions or provide a detailed evaluation of tumor extension. It can also provide information to help clinicians characterize lesions through a comparison of arterial, portal and delayed phases.

Neuro Exams

Neuro 3D Filter provides the user the capability to filterhead acquisition data using specially designed and optimized 3D filter. The result is no compromise on resolution for an efficient diagnosis.

Chest Exams

Chest Kernel can let the user perform only one reconstruction (instead of twice—using lung kernel and standard kernel separately) for chest exams, which can speed up the image review process. Filter sharpness is automatically adapted to the lung or mediastinum when the user adjusts window width or window level. That means optimal imaging across a wide range of studies.

Faster Workflow

To handle the magnitude of today's datasets, BrightSpeed Elite is supported by workflow solutions that accelerate image acquisition, processing and transfer. Workflow is optimized at every step, from acquisition to reporting.

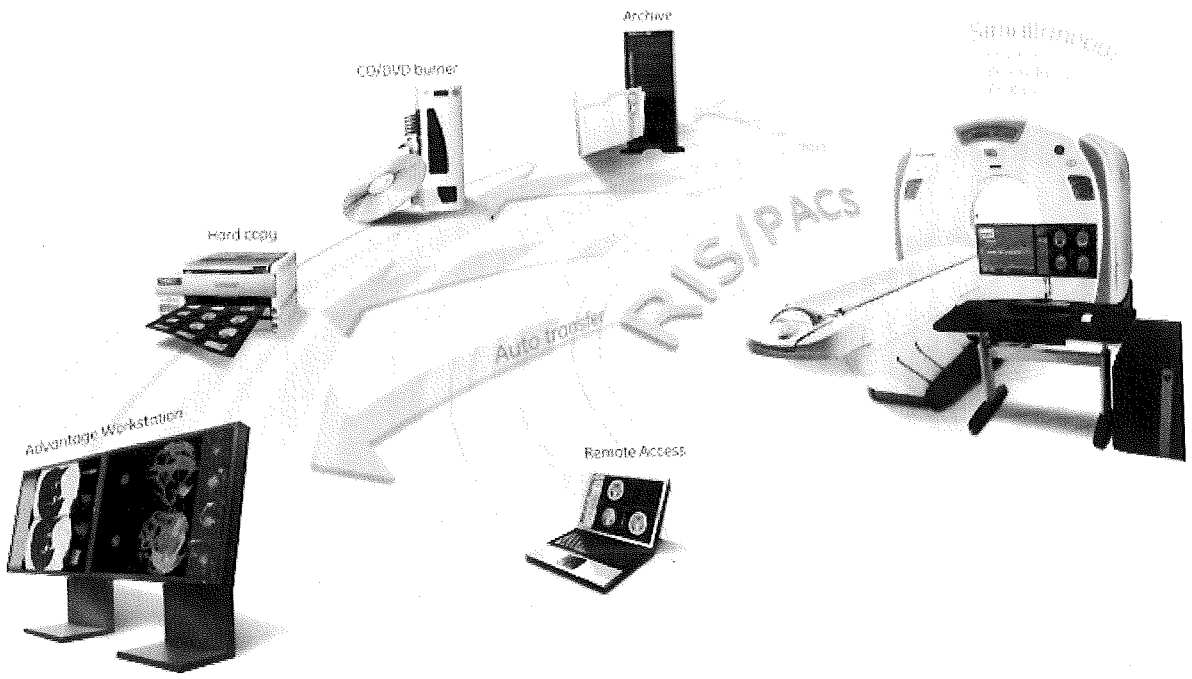
Faster Case Management

The console of BrightSpeed Elite is equipped with innovative computer technology, including Intel's® Quad-Core CPU. This technology helps to make managing large, thick-slice datasets easy. The user-friendly operating console puts automated processing at your fingertips, shortening the overall process. It also features double the storage space of many systems. Thin-slice datasets are also more manageable with Quad-Core CPU. You can manage thin-slice sets simultaneously while performing acquisition, reconstruction and image distribution throughout your facility.

Faster Review

The Advantage Workstation* gives you access to one of the industry's largest selection of customized applications. It equips you with optimized tools at each stage of patient care: diagnosis, pre-therapy planning and follow-up. The Advantage Workstation fulfills your clinical needs of today and tomorrow in vascular, oncology and neurology. It also comes with specific protocols to handle emergency cases efficiently. In addition, you have the option to use these applications from virtually anywhere. RemoteAccess* or AW Server solutions transform many PCs or laptops into a portable image review solution by allowing concurrent sessions from many locations.

* oncology
* Vascular
* Neurology



Please contact your local sales representative for option availability

BrightSpeed Elite is designed for convenient workflow that accelerates image acquisition, processing and transfer. Its ease of use streamlines every step from acquisition to reporting.

Ease of use

Comfort & flexibility

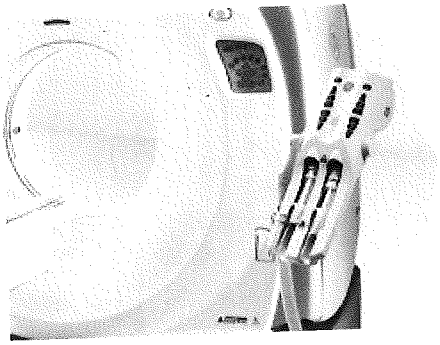
Whether the technician chooses to sit or stand, the BrightSpeed Elite Freedom Workspace offers outstanding flexibility and comfort. The location of the operator console hardware can help decrease noise and heat to enhance the working environment and reduce stress and fatigue.

Convenience

The single, powerful operating console has the same familiar interface as our LightSpeed VCT systems. This interface puts automated processing features at the technician's fingertips. The console also features SmartPrep, Autovoice and easy to create and select protocols.

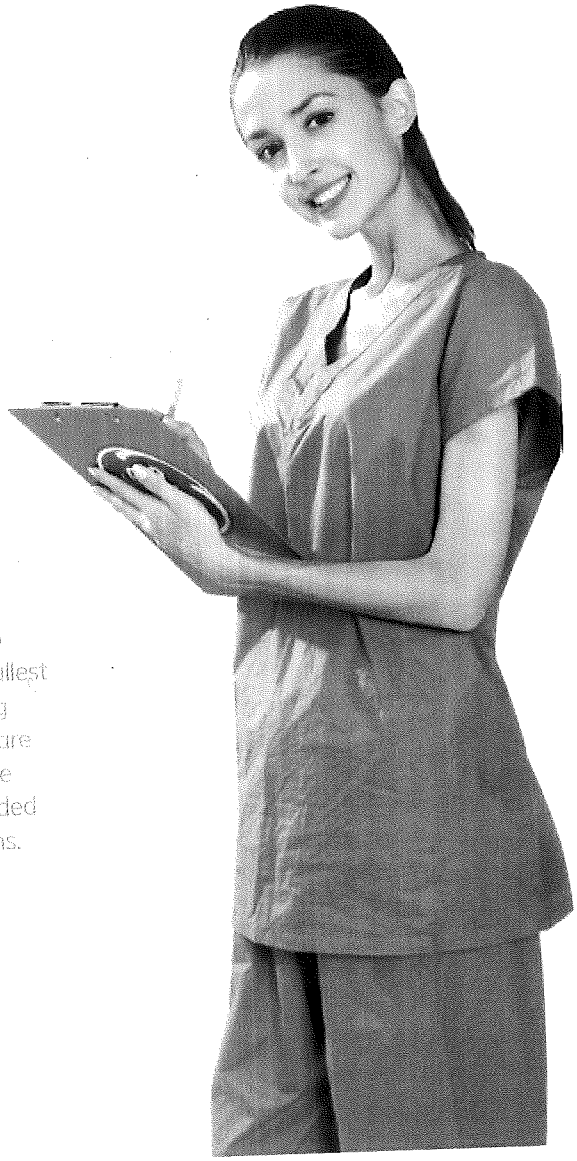
Flexible positioning

The system also offers improved patient positioning with 227 kg (500 lbs.) higher capacity, lower minimum height and an enhanced cradle in/out speed.



Compact

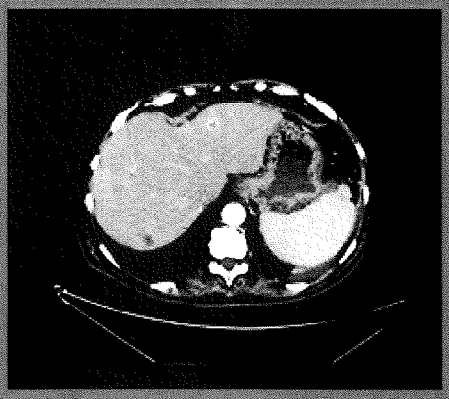
BrightSpeed Elite was designed to be compact; it has one of the smallest footprints in the market. Requiring a minimum room size of 18.4 square meters, BrightSpeed optimizes the speed, power and resolution needed for all types of routine applications.

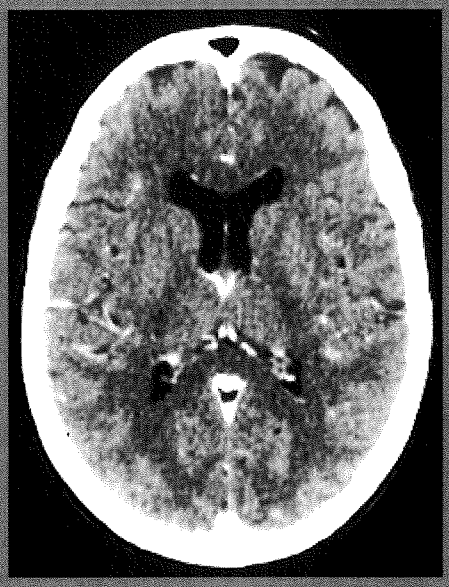


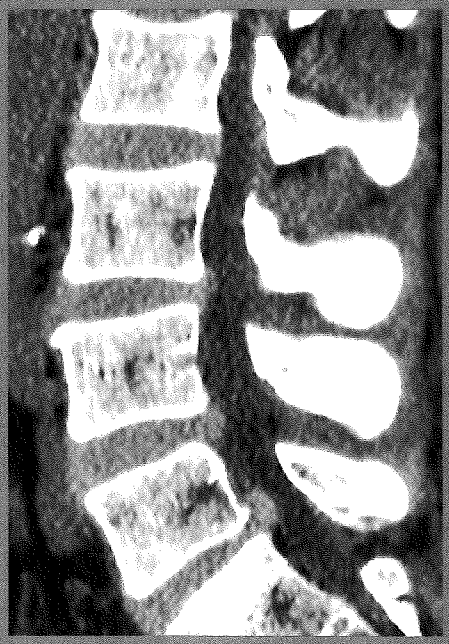
Please contact your local sales representative for option availability

Contrast resolution

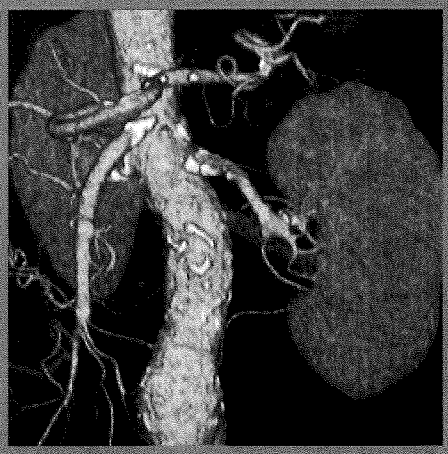
Cross-section focused on calcification and sthenosis.

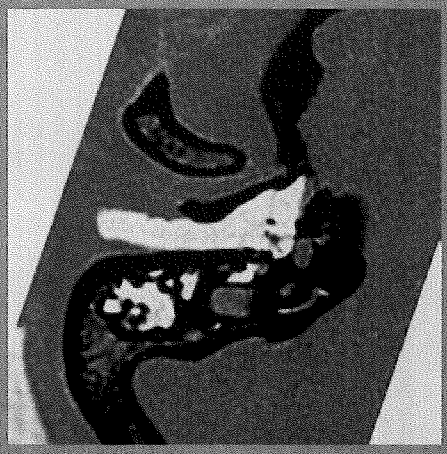


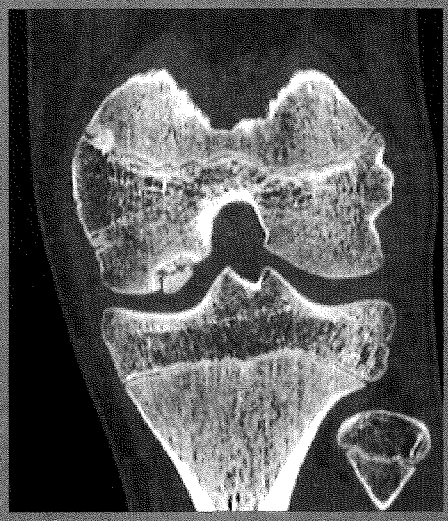


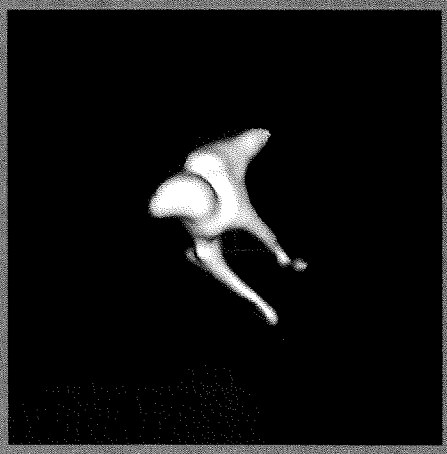


Spatial resolution

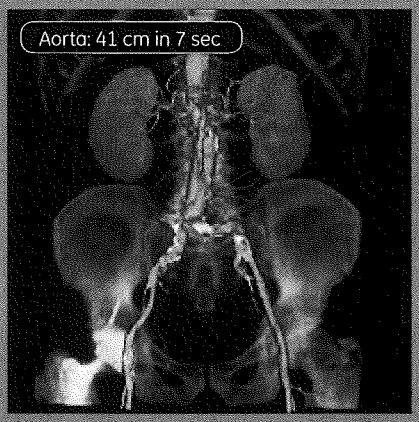


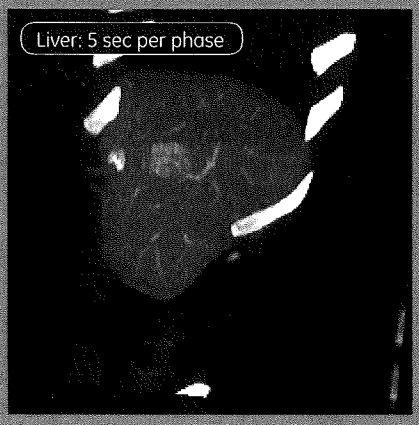


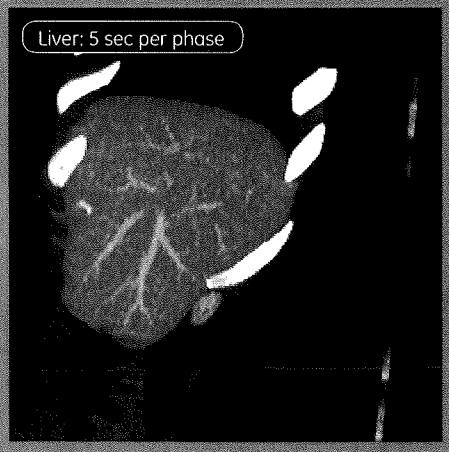




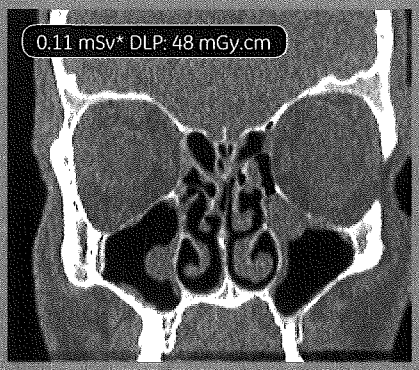
Acquisition speed

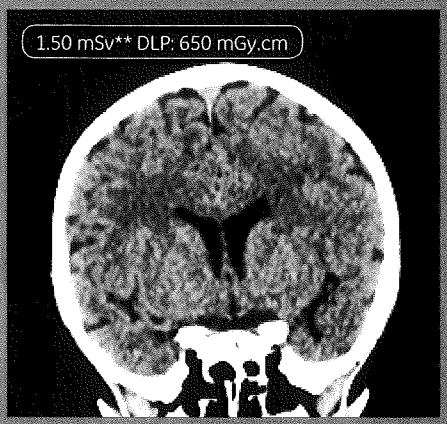


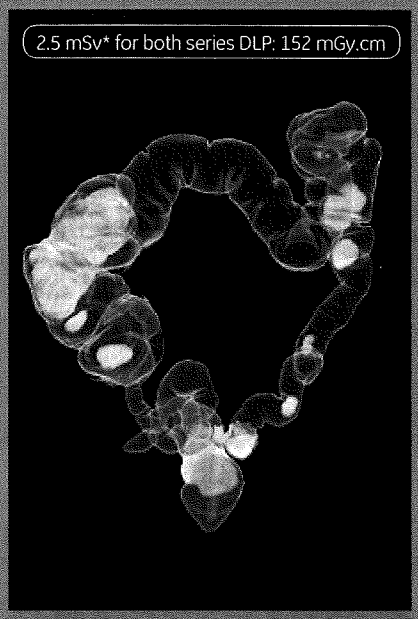


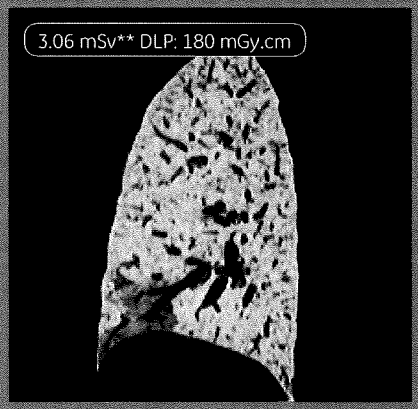


Dose optimization



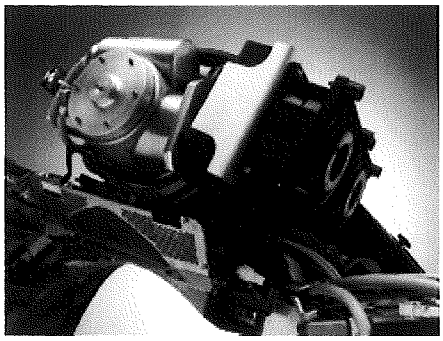




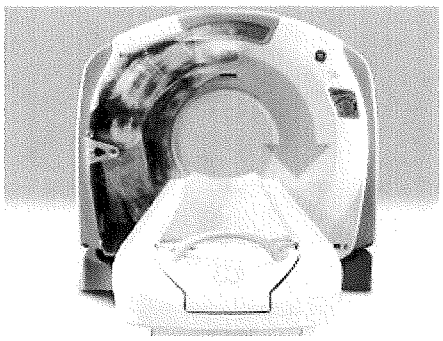


* Obtained by EUR - 16262 EN, using following factors:
Head: 0.0023 * DLP
Abdomen: 0.015 * DLP
Pelvis: 0.019 * DLP

** Obtained by IRCP, using following factors:
5-year old head factor: 0.0040 * DLP
5-year old chest factor: 0.018 * DLP

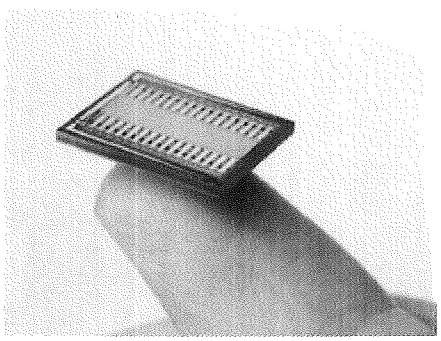


Performix Ultra X-ray tube



0.5 sec rotation speed

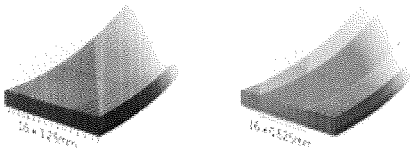
Table convenience kit



Volara* Digital DAS

Built for today and tomorrow

Known for reliability, you can depend on BrightSpeed Elite day after day. The system helps deliver the information you need in just a few minutes with reduced dose, making a new world of clinical applications possible.



High Resolution Detector

BrightSpeed Elite collects cubic datasets of the smallest practical volume, delivering remarkable quality of images through 3D and multi-planar reformatting (MPR) — true 20 mm coverage with 0.625 mm isotropic cells, for resolution as small as 0.35 mm in all directions throughout the body. It can therefore be reproduced at any time and in all planes.

Please contact your local sales representative for option availability

Making every study exceptional with proven performance

GE Healthcare Services

Our network of field service engineers and remote capabilities will ensure that you get the best out of your BrightSpeed Elite.

Maximizing uptime

- **Digital services:** Digital services multiply the power of our service engineers, provide our service teams with more time to address your most critical operating issues and help reduce unproductive work. That means you have more time to provide high quality patient care.
- **Remote maintenance:** On our systems connected to the GE technical centers, our on-line engineers can perform a variety of maintenance operations, like analyze hardware malfunctions, repair software errors, conduct proactive monitoring of the overall system — without sending an engineer on site.
- **Diagnose and fix your system fast:** Self check systems built into the system are directly connected to our technical centers. On-line services let us resolve most of the issues and provide you with a status of your system. Within a short time, your call is transferred to an on-line engineer. Faulty parts identified pro actively and ordered through remote services.

Simplify your access to service

- iLinq* is your direct connection to GE Healthcare support. GE iLinq services help save you precious time. At the touch of an on-screen button you can request technical or application support and obtain quick assistance. iLinq can be activated through a key on your Brightspeed as part of your GE service contract.
- To help ensure maximum scanner efficiency and productivity, GE also provides SiteWatch asset management tool for accurate reporting and analysis of your activity.
- AppsLinq*, a live clinical application support and training solution, delivered remotely. This solution provides a customized, cost efficient way to provide supplemental education to imaging operators. You will benefit from a wide spectrum of solutions to fit your needs like:
  - A live expert to increase confidence and introduce excellence in complex exams
  - Customized training session to best fit the day's busy schedule
  - Immediate support to avoid flow disruptions

Please contact your local sales representative for option availability

More from your network

A wide range of tools provides additional learning opportunities for your imaging professionals on the advanced imaging capabilities of the BrightSpeed Elite.

Physician and Technologist Instructed CT

Masters series A comprehensive range of courses, in Advanced CT Applications, taught by experts in the latest technologies.

On-site training

To help ensure maximum scanner efficiency and productivity, GE also provides iCenter* asset management tools for accurate reporting and analysis.

TiP* Virtual Assistant

For application support, the TiP Virtual Assistant provides your staff with interactive real-time training and support right on the console from a dedicated and experienced team of application specialists.

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About GE Healthcare

GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

Our "healthymagination" vision for the future invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access and improving quality around the world. Headquartered in the United Kingdom,GE Healthcare is a unit of General Electric Company (NYSE: GE). Worldwide, GE Healthcare employees are committed to serving healthcare professionals and their patients in more than 100 countries. For more information about GE Healthcare, visit our website at www.gehealthcare.com.

GE Healthcare
Chalfont St.Giles,
Buckinghamshire,
UK

imagination at work

CT-0498-12.11-EN-US
DOC1015176

BrightSpeed Elite

16 slice Edition

Product Data Sheet – Rev.3 2010. Feb.

GE Healthcare

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

Ideal Convenience and Improved Comfort

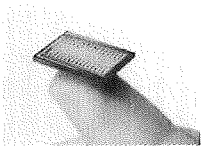
Ultra compact form: BrightSpeed maintains the optimal speed, power and resolution needed for all kinds of CT applications. Yet it fits in the same space as a single slice for an easier installation.

Freedom Workspace: Innovative hardware and software creates a unique 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

0.625mm FWHM at Helical:

GE's exclusive helical reconstruction technologies, crossbeam correction, conjugate ray interpolation and hyper plane helical reconstruction with alpha smoothing method, allow "Scan Thin 0.625mm, and Recon Thin 0.625mm".



Volara™ Digital DAS:

Data Acquisition System, with an increased sampling rate of up to 20% and noise reduction up to 33%, results in outstanding image quality in signal starved areas (shoulder, hip, large patient, metal).

Neuro 3D Filter

With the Neuro 3D Filter feature, the scanner has up to 20% IQ improvement by noise reduction at the same Dose level, or can reach the same image quality (noise) with up to 36% dose reduction.

New IQE 50 Slice Equivalent speed: IQ Enhance is special algorithm to reduce helical artifact in thin-slice helical scanning. The BrightSpeed Elite scanner with this feature can accelerate its helical pitch up to 70% (e.g. 0.562 to 1.75, @16slice) when acquiring the same helical artifact level compared with the same scanner with IQ Enhance disabled.

Use of IQ enhance (IQE) allows faster pitch scanning covering more anatomy at same image quality. The coverage speed is equivalent to it on the scanner with wider detectors (50 slice equivalent) at same table speed in helical scanning.

Chest Kernel: Allows the operator to recon once (instead of twice – lung kernel and std kernel separately), and may help the physician diagnose the Lung or Mediastinum area by adjusting the WW/WL. The new Chest Kernel provides up to 2-times productivity and 50% HDD space saving for Chest exams.

Extended OptiDose suite, including

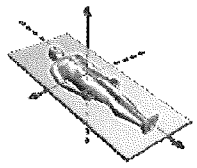
Unique "Color Coding for Kids" protocols,

Providing pediatric scan protocols based on the Broselow-Luten™ Pediatric System, designed to facilitate pediatric emergency care and reduce medical errors.

* Option

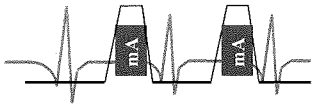
imagination at work

3D mA 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 average of 40% dose reduction.



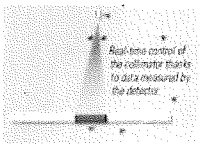
ECG Modulation.

For cardiac applications*, prospective ECG dose modulation automatically adjusts the mA to minimize the patient's exposure to X-rays – reducing dose during systolic phases.



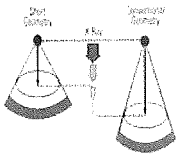
Unique Beam Tracking

Techniques, providing real-time X-ray follow-up, guarantying that the highest 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, ensuring the clinicians can always reach ALARA dose, and keep track of it.

Short gantry geometry offering high x-ray efficiency, in conjunction with hyper generator and the Performix Ultra X-Ray Tube affords to **get up to 440mA and a seamless throughput.**



Innovation in Workflow

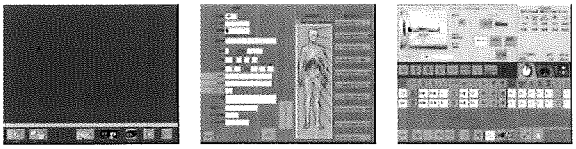
Xtream FX suite workflow management, including:

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.

Minimum 3-click scan start workflow

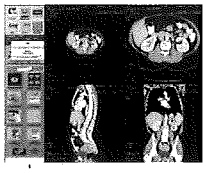
The pre-programmable protocol setting functions enable a minimum of 3 clicks to start a scan as minimum.

First click | Second click | Third click



Unique Up to **16fps* 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.



Unique Up to **10 fps transfer speed** of images, real-time during acquisition, to up to 4 different destinations.

DVD interchange capability, for archiving of up to 7168 uncompressed 512^2 images.

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

Grayscale 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.

Direct Connect allows remote Advantage Workstation (AW) access to the Xtream FX console's thin-slice data,

* Option

eliminating unnecessary network traffic and storage duplication. (AW4.3* and later)

Xtream Injector: Xtream Injector is a powerful integrated injection option which starts the Injection process in synchronization with "Start Scan" on CT system to simplify the enhancement exam workflow. The enhanced Xtream Injector supports injector parameters to be entered on CT console.

Graphic Retro: Graphic Retro allows users to prescribe retro recon graphically on appropriate prospective image by mouse. Visual adjustment parameters such as DFOV, AP/RL center improves retro recon productivity.

Enhancement SmartPrep: Enhancement SmartPrep can automatically play the prerecorded messages after the operator triggered the scan phase. With Auto Minimum Delay function enabled, the diagnostic delay time is set automatically to the minimum time.

Flip/Rotate provides image orientation flips and rotates prospectively for auto-filmed images and retrospectively through Exam Rx Display and the Image Works viewer. These image orientation operations do not produce images installed in the image database but rather create modified image films or screen saves.

Copy PMR & Series: Series Copy forward and Copy Patient. Orientation and Position. The following parameters are selectable to copy forward, Start Location, End Location, Interval, DFOV, A-P Center, and R-L Center.

WW/WL Preset for Scout: Window width/window level (WW/WL) Preset for Scout supports presetting WW/WL values in protocol management tool or during scans prescription. Users does not need to modify WW/WL in showlocalizer.

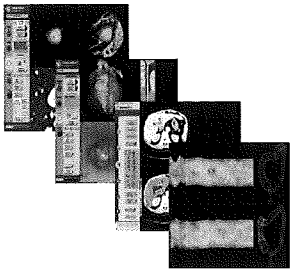
Preset Exam Description: Preset Exam Description allows user to select Exam Description from the drop down menu, which makes patient information input easier.

DICOM Structured Dose Report: Dicom Structured Dose Report creates a machine-readable record to be saved with each CT exam. This allows a hospital's radiation tracking system/RIS/HIS to retrieve the Dose information for a given CT study.

Series number for Retro Recon: The system will automatically specify the series number for Retro Recon series. The number assigned is 100 plus the series number. A new series number can be specified by selecting New Series. The system will specify a series number in the 300 ranges.

584GB Disk (system, images, scan disks) stores up to 250,000 512^2 images and 9,600 scan rotations at 16slice mode or up to 1,500 scan data files.

Largest available portfolio of **Advanced Clinical Applications*** Advanced Lung Analysis, Advanced Vessel Analysis with **unique** AutoBone, Neuro, Liver and **unique** Body Tumor Perfusion, CT Colonography with **unique** Virtual Dissection and auto-segmentation capability, CardIQ suites for cardiac acquisition providing **temporal resolution down to 65 ms.**

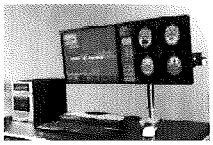


Unmatched ease-of-use and quality

Guarantied evolution, with the exclusive **GE Continuum*** contract.

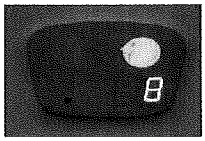
Compact system design Minimum installation in only 23.01 m^2 for exam room, recommended space is 25.2 m^2 5.1 m^2 for control room.

2xLCD monitor 19"inch, standard, for maximum comfort in images review.



1730 mm scannable range for full body scans.

Productivity features designed for the CT Technologist: **Unique** In- Room Start, Remote Gantry Tilt, **Unique** Breathing Lights with countdown timer, Gantry Controls mounted on all four corners of the Gantry, Integrated IV Pole* and Table Tray* at the foot of the table.



* Option

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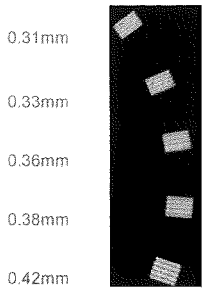
Unique

0.35mm isotropic microVoxel™ image resolution



Unique recon algorithms, **Hyperplane**™ and **Crossbeam**™, providing artifact-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 Elite, users can routinely use a 0.5 second scan speed in conjunction with high pitch helical up to 1.75:1,affording, for the same image quality, to reduce breath-hold, to reduce contrast media, 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	0.5 sec
Mode	16 x 0.625 mm
Pitch	1.75:1
MA	420
mAs	210
Speed	35 mm/s
Scan Time	17.8 seconds

Peripheral Run-Off

Coverage	1,400 mm
Rotation	0.5 sec
Mode	16 x 1.25 mm
Pitch	1.75:1
mA	380
mAs	190
Speed	70 mm/s
Scan Time	20.5 seconds

High Resolution Chest

Coverage	200 mm
Rotation	0.5 sec
Mode	16 x 0.625 mm
Pitch	1.75:1
mA	440
mAs	220
Speed	35 mm/s
Scan Time	6.3 seconds

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 16 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;

* Option

Minimum scan-to-scan cycle time of only 1.5 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.

Preset WW/WL for scout

Helical Scans

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

Helical Multi-slice Prescription

Simplified scan prescriptions and easy-to-use default protocols make the BrightSpeed Elite fast and efficient in patient set up.

Multi-slice acquisitions and short intergroup delays significantly reduce potential mis-registration between scans by increasing the number of scans possible in a patient breath hold. Contrast agents may be better utilized as well due to significantly faster scan acquisition.

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 with up to 90% overlap, 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 8 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. For sixteen-slice acquisition: 0.5625:1; 0.9375:1; 1.375:1 and 1.75:1. These clinically derived multi-slice scan modes offer a wide range of selections that carefully balance acquisition speed, image thickness, artifact level 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 16 slice helical acquisition modes provide table speeds from 5.625 mm/rotation up to 35 mm per rotation, enabling scan speeds that are up to 12 times faster than 4-slice helical scanners.

8-SLICE HELICAL MODES				
Table Speed (mm/rotation)				
Slice Thickness (mm)	Pitch 0.625:1	0.875:1	1.35:1	1.675:1
1.25	6.25	8.75	13.5	16.75
2.5	6.25 12.5	8.75 17.5	13.5 27.0	16.75 33.5
3.75	6.25 12.5	8.75 17.5	13.5 27.0	16.75 33.5
5	6.25 12.5	8.75 17.5	13.5 27.0	16.75 33.5
7.5	6.25 12.5	8.75 17.5	13.5 27.0	16.75 33.5
10	6.25 12.5	8.75 17.5	13.5 27.0	16.75 33.5

16-SLICE HELICAL MODES				
Table Speed (mm/rotation)				
Slice Thickness (mm)	Pitch 0.562:1	0.938:1	1.375:1	1.75:1
0.625	5.625	9.375	13.75	17.5
1.25	5.625 11.25	9.375 18.75	13.75 27.5	17.5 35
2.5	5.625 11.25	9.375 18.75	13.75 27.5	17.5 35
3.75	5.625 11.25	9.375 18.75	13.75 27.5	17.5 35
5	5.625 11.25	9.375 18.75	13.75 27.5	17.5 35
7.5	11.25	18.75	27.5	35
10	11.25	18.75	27.5	35

* Option

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.

Helical Scan Parameters

Scan Speed:

Full 360° rotational scans in 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0.

Scan Technique:

kVp: 80, 100, 120, 140 kVp

mA: 10 to 440mA, 5 mA increments

Power: 0.8 to 53.2 kW

Focal Spot Selection:

- Small spot for up to 24 kW

- Larger spot for greater than 24 kW

Single Acquisition Max. Scan Time: 120 sec

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 2000 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

35 cm for cardiac (small SFOV)

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: < 16 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 in 17 user-defined messages automatically deliver patient breathing instructions with a programmable delay; especially useful for multiple helical scanning and SmartPrep.

Preset massages are supported in 9 different languages: Chinese, English (Male/Female), French, German, Italian, Japanese, Korean, Spanish, and Mexican Spanish.

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, Standard, Detail, Bone, Bone Plus, Lung , Edge and Chest.

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

Helical Reconstruction Times:

Typical 6 frames per second reconstruction time. 0.167 sec image-to-image recon

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

* Option

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 0.1 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.

The operator also can prescribe retro recon graphically on appropriate prospective image by mouse. Visual adjustment parameters such as DFOV, AP/RL center improves retro recon productivity.

Helical Scan Protocols

All protocols assume 120 kVp scans under typical clinical conditions.

Single Helical Scans

Scan Time (sec)	Maximum mA
10	440
20	390-440
30	330-385
40	290-350
50	260-330
60	230-310
70	210-300
80	180-280
90	170-270
100	160-260
110	150-250
120	140-230

Multiple Helical Scans

(contiguous helical coverage with 5-second IGD):

Scan Time	IGD	No. Scans	Max. mA
10 sec	5 sec	3	340-420
		4	300-400
		5	270-390
		6	240-360
20 sec	5 sec	2	300-360
		3	240-330
		4	180-310
30 sec	5 sec	2	230-315
		3	180-285
		4	140-240
40 sec	5 sec	2	190-290
		3	140-240
		4	110-190
50 sec	5 sec	2	170-270
		3	120-200
		4	90-160
60 sec	5 sec	2	140-240
		3	100-170

Contiguous Helical Coverage

* Option

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).

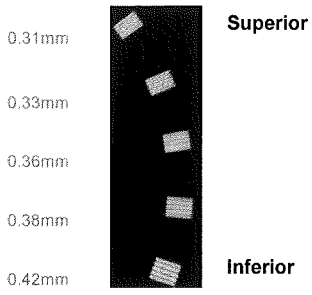
(The following chart assumes 120-sec helicals with 5-sec IGD)

Total Scan Time (sec)	Total Elapsed Time (sec)	Max mA
150	155	100-200
200	205	95-160
450	465	55-85

Helical Scan Image Quality

Volumetric Helical Scan Image Quality

With BrightSpeed Elite being a sub-millimeter isotropic CT scanner, it is now possible to specify coronal and sagittal image quality. Reformatted resolution is **visually** demonstrated on the Catphan High Contrast High Contrast Resolution Insert Module CTP528.



0.35 +/- 0.05mm voxel size is clearly seen in the reformatted plane.

High-Contrast Spatial Resolution

In-plane MTF is demonstrated on a 0.05mm tungsten wire.

Z-plane MTF is demonstrated on a 0.1mm aluminum disc.

Standard Algorithm - typical

	X/Y – lp/cm	Z – lp/cm
50%	4.3	7.5
10%	6.8	14.2
0%	8.5	19.6

Hi-Res Algorithm (Edge) - typical

	X/Y – lp/cm	Z – lp/cm
50%	10.2	7.9
10%	13.9	15.1
0%	15.4	19.6

* Option

Low-Contrast Detectability

On 8 inch (20 cm) CATPHAN phantom:

5mm @0.32%, 8.90mGy when ASiR is disabled (CTDI with CTDI body phantom)

5mm @0.30%, 13.3mGy when ASiR is disabled (Surface dose on CATPHAN)

Noise

On either an AAPM water phantom or GE Quality Assurance phantom:

=< 0.35% at 28.5 mGy (2.85 Rad)

CTDI

On CTDI Head and Body Dose Reference Phantoms: (Calculated from Axial data and adjusted for 0.9375:1 pitch and 240mAs)

$CTDI_w$ expressed in mGy/100 mAs for IEC pitch 1: (normalized to a pitch of 1).

Head 19.6 mGy/100 mAs
Body 9.9 mGy/100 mAs

Axial Scans

Multi-slice acquisitions and short interscan delays significantly reduce potential misregistration between scans by increasing the number of scans possible in a patient breath hold. Contrast agents may be better utilized as well due to significantly faster scans.

Axial Multi-slice Prescription

Simplified scan prescriptions and easy-to-use default protocols make the BrightSpeed Elite 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 Elite CT Scanner System acquires axial scans in sets of 8 or 16 contiguous images in one 360° rotation.

For each rotation of the gantry, the BrightSpeed Elite collects 16 rows of scan data. There are five reconstruction modes available for creating images from the multi-slice scan data (1i, 2i, 4i, 8i, and 16i). 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: 0.625, 2.5, 5, 7.5, 10 mm

(2.5mm Thickness in 2i Mode is available RETRO recon only)

4i Mode:

Produces 4 images per rotation

Nominal Thickness: 2.5, 3.75, 5 mm

8i Mode:

Produces 8 images per rotation

Nominal Thickness: 1.25, 2.5 mm

16i Mode:

Produces 16 images per rotation

Nominal Thickness: 0.625, 1.25 mm

Axial Scan Parameters

Scan Time:

0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 2.0, 3.0 and 4.0 sec full scans (360° acquisition)

Scan Technique:

kVp: 80, 100, 120, 140 kVp

mA: 10 to 440 mA, 5 mA increments

Power: 0.8 to 53.2 kW

Focal Spot Selection:

- Small spot for up to 24 kW

- Larger spot for greater than 24 kW

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

User-selectable.

Intergroup Delay (IGD):

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

Scan-to-Scan Cycle:

Minimum scan-to-scan cycle of 1.5 sec possible for 0.5 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, and Edge and Chest.

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:

Typical 6 frames per second reconstruction time. 0.167 sec image-to-image recon

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

* Option

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.

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 1/16 the original acquisition image thickness for images acquired in the 1i scan mode, down to 1/8 the original thickness for 2i mode, and down to 1/4 the original thickness for 4i mode.

Similarly, additional reconstruction supports partial-volume artifact reduction by reconstructing images with 4, 8, or 16 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 operator also can prescribe retro recon graphically on appropriate prospective image by mouse. Visual adjustment parameters such as DFOV, AP/RL center improves retro recon productivity.

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

Scan Mode	Slice Thickness	Recon Slice Thickness
16 row	0.625	16i – 0.625mm 8i – 1.25mm 4i – 2.5mm 2i – 5mm
16 row	1.25	16i – 1.25mm 8i – 2.5mm 4i – 5mm 2i – 10mm
8 row	1.25	8i – 1.25mm 4i – 2.5mm 2i – 5mm 1i – 10mm
8 row	2.5	8i – 2.5mm 4i – 5mm 2i – 10mm

* Option

Axial Scan Protocols:

All protocols assume 120 kV scans under typical clinical conditions.

Standard Scans:

Scan Time	ISD	MA	Scans	Acquisition Time
1 sec	1 sec	440	18-45	0:35-1:29
1	1	400	24-55	0:47-1:49
1	1	360	32-68	1:03-2:15
1	1	340	37-76	1:13-2:31
1	1	320	43-86	1:25-2:49
1	1	300	50-97	1:37-3:11
1	1	280	58-110	1:45-3:37
1	1	260	66-122	1:55-3:59
1	1	240	74-135	2:07-4:21
1	1	220	84-152	2:21-4:49
1	1	200	94-168	2:37-5:21
2	1	200	37-77	1:13-2:33
2	1	180	42-86	1:23-2:51

Cluster Scans (All cluster protocols assume 9-s clusters of five 1-s scans with 1-s ISDs and 7-s between clusters

mA	# Scans (Clusters)	Acquisition Time
440	15-45 (3-11)	0:41-2:49
400	25-55 (5-13)	1:13-3:21
340	35-75 (7-18)	1:45-4:41
320	45-85 (9-20)	2:17-5:13
300	50-95 (10-22)	2:33-5:45
280	60-110 (12-25)	3:05-6:33
260	75-125 (13-28)	3:21-7:21
240	85-145 (14-31)	3:37-8:09
220	100-170 (16-34)	4:09-8:57
200	115-185 (18-38)	4:41-10:01
180	135-250 (22-43)	5:45-11:21

Axial Scan Image Quality

High Contrast Spatial Resolution

On GE Performance phantom:

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

Line pair values decrease with larger focal spot (by 5% with Standard and by 7% with Hi-Res); limiting resolution is unaffected.

Low-Contrast Detectability

On 8 inch (20 cm) CATPHAN phantom:

5mm @0.32%, 8.90mGy when ASiR is disabled (CTDI with CTDI body phantom)

5mm @0.30%, 13.3mGy when ASiR is disabled (Surface dose on CATPHAN)

Noise

On either an AAPM water phantom or GE Quality Assurance phantom:

=< 0.35%at 29.3 mGy (2.93 Rad)

CTDI

On CTDI Head and Body Dose Reference Phantoms:

CTDI expressed in mGy/100 mAs:

Head	17.0 mGy/100 mAs	center
	16.8 mGy/100 mAs	surface
Body	5.5 mGy/100 mAs	center
	10.0 mGy/100 mAs	surface

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 gantry angles are also available on a single Scout.

Scout Scan Parameters

Aperture: 1.25 mm x 4 aperture

Table speed: 100 mm/sec.

Scan Technique:

kVp: 80, 100, 120, 140 kVp

mA: 10 to 440mA, 5 mA increments

Power: 0.8 to 53.2 kW

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

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

Scouts longer than 500 mm are auto minified to fit the display.

Preset WW/WL for scout.

SmartView™ Fluoro*

Offers real-time 12 frames per second CT fluoroscopy with image latency of less than 170ms. Detailed targeting is supported by multiple acquisition modes, up to and including high-resolution acquisition at 1.25mm (16x0.625 mode only). Highest possible 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 during acquisition. Features ceiling-mounded in-room LCD monitor and full-featured handheld / cradle-mounted controller.

User Interface

The BrightSpeed Elite 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

* Option

Scan control keyboard assembly with intercom speaker, microphone and volume controls

Three button mouse with mouse pad

BrightBox (trackball assembly) *option

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 Elite 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.

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 Elite CT Scanner System to department productivity is its simplified exam set-up.

Exam parameter set-up has been greatly simplified 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 with 90 protocols for each region

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.

As many as 8,460 protocols can be stored on the Operator Console.

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 in 9 user selectable languages and 17 user-defined messages automatically deliver patient breathing instructions ; especially useful for multiple helical scans and SmartPrep.

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.

Cardiac Image Filters* provides users the capability to reconstruct filtered images using three steps of noise reduction for cardiac imaging, allowing reduced dose while maintaining an acceptable level of image noise.

Dose Computation & Display

Volume CTDIw, DLP (Dose Length Product), and Dose Efficiency computation and display during scan prescription provides patient dose information to the operator.

Volume CTDIw is a dose index defined by IEC60601-2-44. This index is computed automatically by the BrightSpeed Elite 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 divided 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

* Option

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.

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 16.

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

* Option

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

Three ways are provided to adjust window/ level of images in focus in order to meet a variety of clinical work environments and user preferences:

Six 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

* Option

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. As for that format over 30 , the function does not support at the auto film format.

Film formats supported are 1:1, 2:1, 4:1, 6:1, 8:1, 9:1, 12:1, 15:1, 16:1, 20:1, 24:1 25:1, 30:1, 35:1, 42:1.

Important note: The BrightSpeed Elite 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 Elite CT Scanner's computer and image processor. This desktop environment includes image management and networking.

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 *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.

Autobone*

Autobone is an exclusive image analysis software package that facilitates segmentation of bony structures from abdominal and extremity CT Angiography data in One-click.

CT Colonography Pro*

CT Colonography Plus analyses the colon and surrounding structures utilizing helical CT data, by synchronized, indexed review of 2D, 3D and dissection views.

Dentascan*

DentaScan is a fast simple non-invasive software package, which provides a panoramic dental view enabling accurate measurements to be taken. DentaScan facilitates dental prosthetic implants and other dental surgical procedures by providing highly detailed information of the teeth and the surrounding bone structure.

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 1.25mm (16x0.625 mode only). 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 during acquisition. Features ceiling-mounded in-room LCD monitor and full-featured handheld / cradle-mounted controller.

* Option

Smart Step*

SmartStep enables a step and shoot-imaging mode for performing biopsies and other interventional procedures. A Highly Functional Image Display presents a set of 3 interventional images in 3 viewports.

CT Perfusion Multi-organ*

CT Multi-Organ Perfusion allows the user to process dynamic image data of organs and tumors, and generates information with regard to changes in image intensity over time.

CT Perfusion Neuro*

CT Perfusion Neuro allows the user to process dynamic image data of the brain & generate information with regard to changes in image intensity over time.

SmartScore *

SmartScore provides prospective/retrospective software designed for computing Coronary Artery Calcification scores from a single scan.

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 16 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 Elite 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 LightSpeed, BrightSpeed, HiSpeed CT/i, X/i, NX/i, QX/i, MR Signa LX, and Advantage Workstation 3.x or later.

Image transfer time using DICOM 3.0 protocols is approximately 0.1 second per 512 image on a 100baseT Network.

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

Computer Based Training

The BrightSpeed Elite 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 Elite 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.

* Option

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

DICOM Structured Dose Report

HIPAA

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.

Focus to Detector: 95 cm

Focus to Isocenter: 54 cm

Maximum SFOV: 50 cm

Rotational Speeds: 360° in 0.5, 0.6, 0.7 0.8, 0.9, 1.0, 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.

Biopsy and interventional studies have been facilitated through a more streamlined gantry shroud, and bilateral table/gantry controls and gantry display that 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: 49.0cm to 99.1 cm

Vertical Scannable Range: 79.1 cm to 99.1 cm

Horizontal Range: Up to 170 cm

Horizontal Scannable Range: Up to 173 cm metal-free (Axial), 163cm metal-free (Helical), and 160 cm metal-free (Scout)

Horizontal Speed: Up to 125 (150*) mm/sec

Table automatically re-centers on scan plane with changes in vertical position (after setting internal landmark with alignment lights on)

*: During ISD

Table Load Capacity:

227 kg (500 lb) with +/- 0.25 mm of position repeatability

Controls on gantry for table up/down and cradle in/out. Foot pedals on both sides of table for fast elevation. Cradle position controlled from OC for prescribed scans.

IV Pole* integrated at the foot-end of the table prevents IV lines from becoming crossed and tangled, and ensures that the lines stay securely in place on the patient.

X-Ray Tube

* Option

Performix Ultra

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

Heat Storage Capacity: 6.3 MHU

Heat Dissipation:

Anode (max) 840 KHU/min

Casing (cont) 300 KHU/min

Tube Unit: 6.9 kW continuous for 10 minutes

Dual Focal Spots:

Small Focal Spot:

0.8 mm (W) x 0.7 mm (L) nominal value
(IEC 336/2005)

0.7 mm (W) x 0.6 mm (L) nominal value
(IEC 336/93)

0.9 mm (W) x 0.7 mm (L) traditional methodology

Large Focal Spot:

1.1 mm (W) x 1.0 mm (L) nominal value
(IEC 336/2005)

0.9 mm (W) x 0.9 mm (L) nominal value
(IEC 336/93)

1.2 mm (W) x 1.2 mm (L)
traditional methodology

Maximum Power: 53.2 kW

Beam collimated to 56° fan angle.

Average time to replace tube: ≤ 10 hours

High Voltage Generation

High-frequency on-board generator. Continuous operation during scans.

53.2 kW output power.

kVp: 80, 100, 120, 140

mA: 10 to 440 mA, 5 mA increments

Maximum mA for each kVp selection:

KVp	Max mA
80	400
100	420
120	440
140	380

* Option

HiLight Matrix Detector

21,888 individual elements composed by: 8 rows of 1.25 mm thickness and 16 rows of 0.625 mm thickness, each containing 888 active patient elements; 24 reference elements.

1.0-mm detector element spacing.

4 modes of data output:

8 x 1.25 mm (uses center 16 rows)

8 x 2.5 mm (uses all 24 rows)

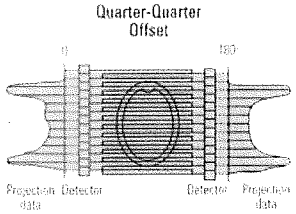
16 x 1.25 mm (uses all 24 rows)

16 x 0.625 mm (uses center 16 rows)

98 % absorption efficiency

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 New 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.

1,968 Hz maximum sample rate.

Effective analog to digital conversion range greater than two million to one.

Broadband contact-less data transfer between gantry rotor

and stator, 833Mb/sec fiber optic channel bit rate

Scan/Control Unit

Located in base of Operator Console.

Host Computer

- Dual 2.33GHz Quad Core Xeon Processors with 12MB shared L2 cache&1333MHz Dual FSB
- 8GB DDR-2 667 ECC memory, dual-channel architecture.

Image Processor

- Nvidia QuadroFX 1700 with 256MB GDDR3
- Graphics Memory Bandwidth 12.8GB/sec
- PCI express interface

Image Reconstruction Engine

- Special Nvidia QuadroFX 4800 with 1.5GB GDDR3
- Graphics Memory Bandwidth 76.8GB/sec
- PCI express interface

* Standard configuration (6fps) is using Host recon.

Software Architecture

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

Peripherals

Total of 584 GB system:

• Main system (host) disk drive
- High Performance Drive
- 146 GB, 3.5-inch form factor
- 15,000 RPM
- SAS interface
- Assigned to applications software and image files

• System disk drives (Image Disk)
- High Performance Drive
- 146 GB, 3.5-inch form factor.
- 15,000 RPM
- SAS interface
- Assigned to image files only
- 250,000 uncompressed 512 images

• 2scan data disk drives

- High Performance Drive
- 146 GB, 3.5-inch form factors each.
- 15,000 RPM
- SAS interface

Scan data up to 9,600 scan rotations at 16slice mode or up to 1,500 scan data files.

MOD drive *:

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 7168/1200 uncompressed images.

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.

3-Button **Mouse**

3-Button **Trackball (*Option)**

Image Networking

Standard auto-configuring 1000BaseT/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.

- English Keyboard
- French Keyboard
- German Keyboard

* Option

- Asian Keyboard
- Danish Keyboard
- Dutch Keyboard
- Italian Keyboard
- Norwegian Keyboard
- Spanish Keyboard
- Swedish Keyboard
- Portuguese, Keyboard

- Euro Misc Keyboard
- Chinese Keyboard
- French UIF
- German UIF
- Italian UIF
- Portuguese UIF
- Spanish UIF
- Simplified Chinese UIF
- Japanese UIF
- English UIF
- Danish UIF
- Netherlands Dutch UIF
- Finnish UIF
- Norwegian UIF

- Swedish UIF
- Standard length Cable

- Long Cables

- Freedom Workspace (Std)

- Freedom Workspace (Wide)

- Table Convenience Kit (IV Pole, Table Tray)

- Coronal Head Holder

- Low profile Head holder

- Gantry Rear Raceway

- FX Exam Split

- Snapshot Imaging Package

- SmartScore Pro Complete

- Standard Cardiac Package

- Advanced Cardiac Package

- 3D Neuro filter

- Xtream injector/Enhanced Xtream Injector

- ConnectPro HIS/RIS Interface with Performed Procedure Step (PPS)

- Recon Enhancement

- Volume Viewer (including Virtual Endoscopy, 3D, Volume Rendering)

- DentaScan

- Cardiac Imaging

- 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

- CTC Pro

- CardIQ Plus

- Advantage 4D

- Flat Table Top

- Trackball

- ECG Trace on OC

- Dicom MOD drive

- Barcode Reader

- Advantage Workstation

Siting Requirements

Recommended Suite Size

Exam Room:

Minimum Size with short footprint mode and without PDU in exam room:

3.4m x 5.4m = 18.4M²

Minimum Size with short footprint mode (PDU in exam room):

3.7m x 5.4m = 20.0M²

Minimum Size without short footprint mode:

3.9m x 5.9m = 23.0m²

Recommended Size:

4.0m x 6.3m = 25.2m²

Please consult with local General Electric Project Manager of Installation (GE PMI) for appropriate room specifications before installation

* Option

Control Room:

3.0m x 1.7m

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.

Temperature and Humidity

Exam and Control Rooms: 64°-79°F (18°-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 a 380 to 480 V nominal, 3 phase Delta or Wye, 50/60 Hz, 90 kVA 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 Elite 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.

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	5,440	18,600**
Table	300	1023
PDU	1,000	3,400
Operator Console	2,165	7,400
Optional Laser Camera	800	2,730

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

** Recommended Allowance: 7,150/24,400

Growth Allowance: 9,200/31,400

System Components Dimensions

	Width +/-10%	Depth +/-10%	Height +/-10%	Weight +/-10%
Gantry	2040 mm	1018 mm	1930 mm	1770 kg
Table	650 mm	2370-5000mm	533-1094 mm	480 kg
Power Distribution Unit	700 mm	550 mm	1062 mm	350 kg
TIO Console	470mm	740m	640mm	87kg
FWS (Std)	1300mm	620mm	683-912mm	44kg
FWS(Wide)	1350mm	741mm	683-912mm	49kg
LCD Monitor	402mm	247mm	411-561mm	9KG
The standard configuration has 2 above LCD Monitors.				

Warranty

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

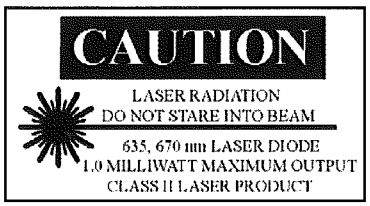
All specifications are subject to change.

* 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.



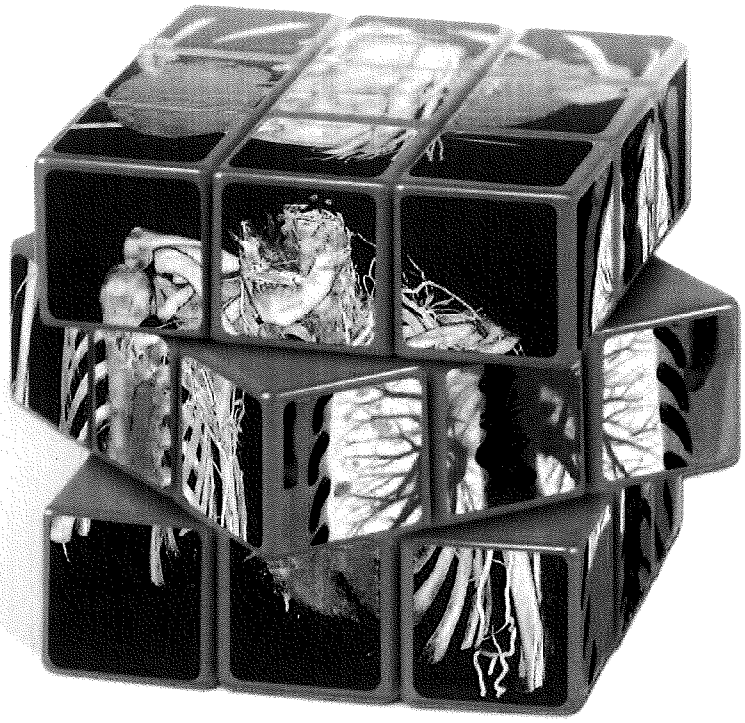
This product is a CE-compliant device which satisfies regulations regarding Electro-Magnetic Compatibility (EMC) and Electro-Magnetic Interference (EMI), pursuant to IEC-60601-1-2.

* Option

GE Healthcare

Enter the volume

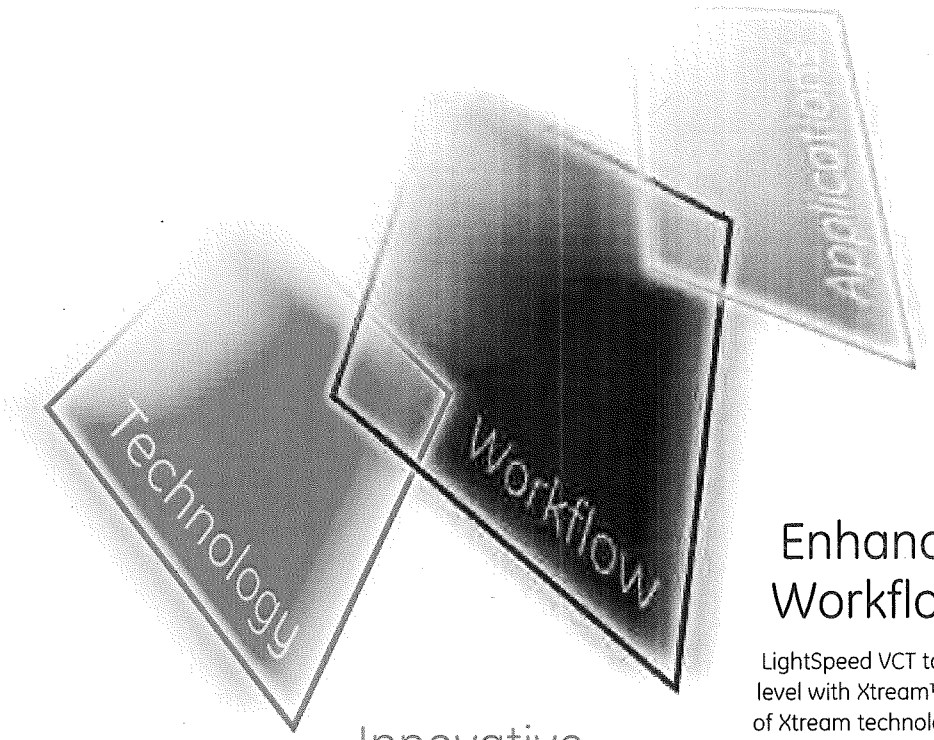
LightSpeed VCT: the first Volume CT




LightSpeed
VCT

Volume CT achieves this technological leap forward through a radical platform design that enables the clinician, for the first time, to utilize volume coverage and thin slice imaging concurrently rather than alternately.
LightSpeed VCT delivers 40mm of coverage per rotation while providing 0.35mm microVoxel™ resolution.
This unprecedented marriage of high volume and high resolution has three major clinical rewards: dramatically reduced acquisition times, improved image quality and new clinical applications.

Volume CT generation



New Clinical Applications

LightSpeed VCT takes a leap forward in expanding the role of CT imaging

Enhanced Workflow Platform

LightSpeed VCT takes workflow to the next level with Xtream™ FX, the second generation of Xtream technology platform

Innovative Technology

A balanced system design to deliver technology without compromise

Why LightSpee

Image quality

5-Beat Cardiac™, Triple RuleOut™, Stroke WorkUp - breakthrough clinical applications

V-Res™ **true 64 channel** detector with 40mm coverage

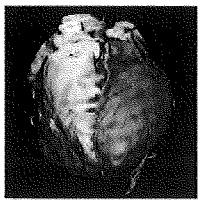
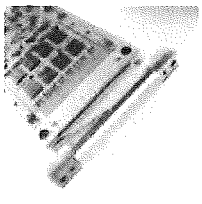
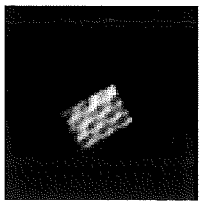
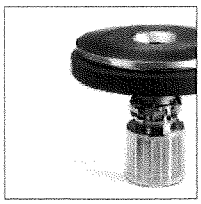
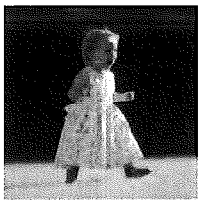
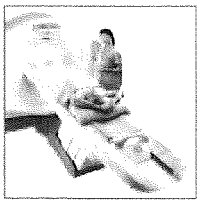
Isotropic 0.35mm resolution with isotropic detector size and conjugate ray recon

Performix™ Pro tube, 100kW, 800mA, for cardiac and large patients

Patient friendly

Fast rotation, down to 0.35sec, for short breath hold, reduced sedation, improved compliance

VT Patient Table, 227kg capacity, 2m scannable range, 43cm minimum height

ed VCT?

Reduced dose

Optidose™, 3D and ECG dose modulation, 3 dose reduction bowtie filters, to ensure lowest dose to patient, always

Volara™ DAS - 30% lower electronic noise to give better IQ and lower dose

Throughput

Xtream™ FX reconstruction and transfer at **16 images per sec**

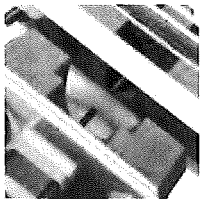
DirectMPR and Direct Connect, protocol driven and automated 3D workflow

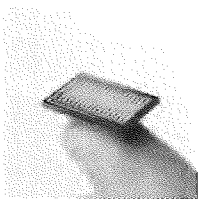
Uptime

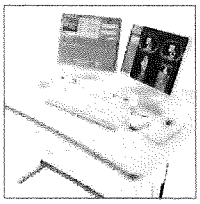
Fault tolerant design and high reliability – redundant recon processors, disk arrays

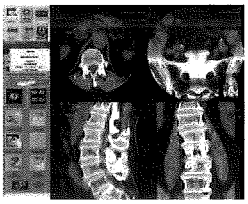
Future

Open platform for evolution, in acquisition and clinical applications









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GE imagination at work

LightSpeed VCT
Volume CT Scanner
With Xtream FX

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Tokyo, Japan - Fax: 81 425 85 5490
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* Option

Introduction

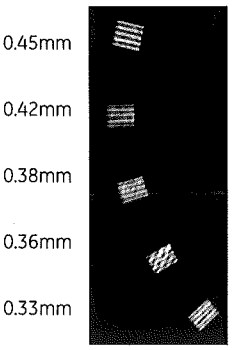
LightSpeed VCT ushers in the next generation of Volume CT technology, bringing a distinct set of new capabilities beyond those offered by conventional multi-slice helical scanners, opening the doors to new and advanced procedure possibilities in non-invasive diagnostic imaging. LightSpeed VCT achieves this technological leap forward through a radical design that enables the clinician, for the first time, to utilize volume coverage and thin slice imaging *concurrently* rather than alternately.

Built on the award-winning LightSpeed platform, and using Design for Six Sigma (DFSS™) methodology, LightSpeed VCT is a breakthrough in CT scanner coverage, speed, resolution, dose management, and clinical performance. And combined with **Xtream™ FX** workflow technology, LightSpeed VCT enables volumetric scanning, processing, and review.

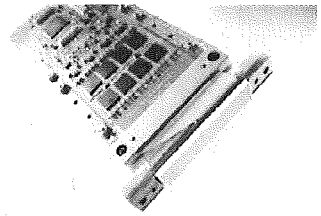
Primary Benefits

- **Dramatically reduced acquisition times**: Static organs can be imaged in one second, the lung in two seconds, and a whole body scan can be completed in less than ~10 seconds. That's one-quarter to one-half the time of multi-slice – freezing anatomical motion such as cardiac, respiratory, and circulatory.

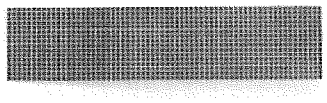
Unmatched isotropic **Volume Image Quality** with **Z-axis resolution up to 0.35mm**, as demonstrated by reformatted Catphan images:



- **5-Beat Cardiac™**: With 40mm of high resolution coverage and 44 msec* temporal resolution, the coronary arteries can be imaged in as little as 5 seconds, for exceptional image quality that is repeatable across a wider range of heart rates.
- **Triple RuleOut™**: Complete an ECG-gated study of the chest in a single breathhold, in order to assist physician diagnosis of coronary artery disease, aortic dissection, and pulmonary embolism.
- **Stroke WorkUp**: 40mm coverage in a single rotation for evaluation of cerebral perfusion defects.
- **Breakthrough clinical applications** in cardiovascular, perfusion, lung, trauma, and pediatric studies.
- The **V-Res™ Detector** enables Volume CT with a true 64-channel design with 40mm coverage. Ultimately the performance of every CT scanner begins with the detector design, and V-Res™ sets a new standard for excellence with key technology breakthroughs:



- GE Proprietary **HiLight™** scintillator that provides fast, repeatable light output enabling 0.35 (*) second rotation speed with 99% detection efficiency (@ 120 kVp).



- **Backlit Diode** technology that breaks the barrier of conventional multi-slice CT detectors, enabling true 64-channel detector that is scaleable to the volume coverage and higher resolution needs of future.

- **High Density Interconnect:** The FET-less (Field Effect Transistor) architecture has 58,368 individual elements, each with its own acquisition pipeline. All data is acquired at the thinnest 0.625mm slices, providing the finest resolution possible as input to Volume Reconstruction and Multi-Planar

LightSpeed VCT
Volume CT Scanner
With Xtream FX

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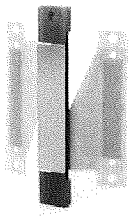
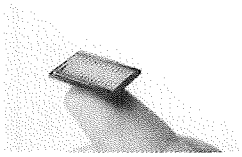
Reformat (MPR), for the highest image quality.

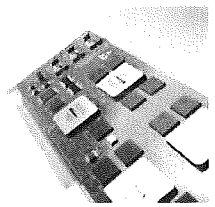


- **Volara™ Digital Data Acquisition System (DAS)**: Volara™ enables true 64-slice acquisition with an 8-to-1 miniaturization of conventional multi-slice technology, and a dramatic reduction in electronic noise for improved image quality at low dose.

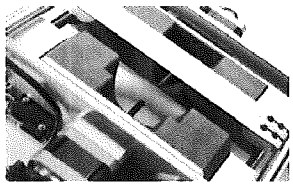


- **The Power to Perform:** The **100 kW, 800mA Performix™ Pro 100 X-Ray Tube** demonstrates the highest reliability and delivers the highest power you need for image quality at fast rotation speeds and for large patients.
- **New Xtream™ FX technology** breaks through existing limits on speed, image quality and flexibility to provide an optimized volumetric workflow solution from acquisition to final report. At the core of Xtream FX is a new operator's console that delivers up to 16 frames per second reconstruction at full resolution, even with GE's volumetric reconstruction algorithm on, that is matched to the industry's highest 16 frames per second transfer rate. Xtream FX is a field-upgradeable, inherently scalable platform designed with the future in mind.
  - **Direct MPR** enables automated protocol-driven axial, sagittal, and coronal reformats. Reformatted images may be routed to multiple network destinations, eliminating the need to transfer and store all thin-slice data.
  - **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.
  - **Direct Connect** allows remote Advantage Workstation (AW) access to the Xtream FX console's thin-slice data, eliminating unnecessary network traffic and storage duplication. Images are transferred using Direct Connect at 40 images per second, 2 to 3 times faster than previously possible. (AW4.3* and later)
  - **ECG Waveform on the Console*** will allow users to visualize the ECG waveform directly on the CT scanner console during the scan. The waveform data can be viewed to determine where prospectively created images are located with respect to the heart cycle to better understand and avoid motion artifacts like blurring or mis-registration.
  - **Data Export** is a stand-alone tool to convert clinical images into PC-friendly formats like .jpeg, .mpeg, and .avi from the image browser, creating more flexible report creation for both referring physicians and patients. Images can then be saved using Data Export tool to any PC industry standard removable media, including CD-ROM and DVD.
  - **803 GB disk** (system, image, scan disks) stores up to 250,000 512^2 images and 3,369 scan rotation data files.
- **Fully 3D Volumetric Reconstruction.** True cone beam reconstruction combined with true 64x0.625mm acquisition reduces artifacts from z-interpolation. All scan modes can take advantage of the image quality benefits from cone beam reconstruction.

  3D Volumetric Reconstruction is implemented through the scaleable Xtream™ FX platform, along with GE's Proprietary Volume Reconstruction Accelerator Card (VRAC).



- **44 msec* cardiac temporal resolution** with 0.35* sec rotation, variable speed, and SnapShot scan algorithm. LightSpeed VCT not only offers faster acquisition speed, it builds on GE's exclusive variable speed technology that has now been expanded for cardiovascular imaging to include .35*, .37*, .40, .42*, .45*, .47* and .50 second scans – so you have the power to customize rotation speed to your patients' heart rates.
- GE's **OptiDose™** philosophy is extended with LightSpeed VCT to provide additional dose reduction capabilities:
  - 40mm Volume CT coverage reduces overbeaming percentage by a factor of four compared to 16-slice systems.
  - New bowtie filter for medium sized patients for head and body imaging.



  - V-Res™ **Backlit Diode** technology has 100% active area, and **Volara™** reduces electronic noise for improved low dose performance.
  - Cardiac image processing filters provide substantial dose reduction while maintaining image quality and spatial resolution.
- **New 64-slice data acquisition system** that supports 0.35* sec gantry rotation at 0.625mm slice thickness, including 5 Gbaud Slip Ring and redundant data acquisition disk array.
- **New VT Patient Positioning System** sets the standard for comfort, function and form. With its award winning Industrial Design, the VT (Volume CT Table) is designed for the needs of today and tomorrow:

  Unmatched **500lb (227kg) patient weight capacity**, with full cradle extension
  - Two configurations, with **up to 2000mm scannable range** (or 1700mm), for longer runoff studies, flexible patient positioning, and easy room siting
  - Faster motion (**up to 137.5 mm/sec**) with smooth acceleration and deceleration as demanded by next generation Volume CT scanners
  - True vertical motion, without translation in z, improves patient positioning and productivity for biopsies
- Two standard 19-inch LCD color monitors for operator console

* Option

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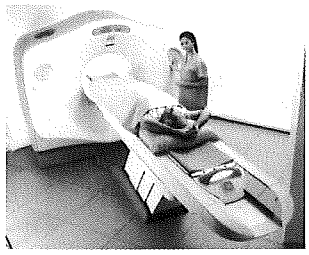
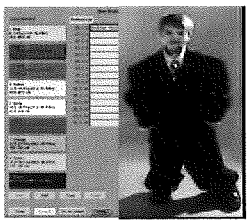


The LightSpeed VCT delivers this level of performance through a balanced design that focuses on image quality, dose optimization, coverage, spatial resolution, temporal resolution, and scan speed.

LightSpeed® Family Main Features

LightSpeed VCT introduces Volume CT capabilities while extending the following features of today's LightSpeed series scanners.

- **Exceptional Vascular & Cardiac Image Quality:** Small lesion and small vessel assessment – pancreas, liver or circle of willis, renal arteries, coronary arteries and peripheral vascular arteries.
- **0.35mm microVoxel™ imaging** improves 3D and reformatted 2D resolution through the optimum choice of sub-millimeter slice thickness and reconstructed voxel size.
- Routine use of **sub-millimeter slices** without image noise or coverage compromise.
- GE's **OptiDose™** philosophy provides the following built-in dose reduction capabilities:
  - **3D Dose Modulation utilizing SmartmA™ and AutomA.** Having this kind of volumetric knowledge *before* you scan allows you to easily personalize dose protocols and minimize dose for every patient – large and small. During the scan, real-time, 3D dose modulation helps deliver consistent image quality because it automatically accounts for the changing dimensions of your patient's anatomy. And with less off-focal radiation from the Performix Pro tube, the LightSpeed VCT reduces dose and enhances clarity even more.
  - **ECG Dose Modulation**: For cardiac applications, prospective ECG dose modulation automatically adjusts the mA to minimize the patient's exposure to X-rays – reducing dose during systolic phases of the cardiac cycle. This provides the clearest images and allows you to reduce dose primarily in the systolic phases of the cardiac cycle – yet gives you enough power to obtain quality images for functional analysis.
  - **Color Coding for Kids,** winner of a National Heroes Award from the Emergency Medical Services for Children, provides pediatric scan protocols based on the Broselow-Luten™ Pediatric System. This Color Coding system is incorporated into the protocol selection on the operator's console and is designed to facilitate pediatric emergency care and reduce medical errors.



  - **SmartTrack™** advanced hardware and software for X-ray beam tracking minimizes patient dose.
  - **SmartBeam™** hardware and software optimizes X-ray beam filtration independently for body, head, and cardiac applications.
  - **$CTDI_{vol}$, DLP** (Dose Length Product), **and Dose Efficiency** display during scan prescription provides patient dose information to the operator.
- **Dose Reporting** provides access to the $CTDI_{vol}$ and DLP with the patient record prior, during and post exam. **Productivity features** designed for the CT Technologist: In-Room Start, Remote Gantry Tilt, Breathing Lights with countdown timer, Gantry Controls mounted on all four corners of the gantry and an Integrated IV Pole at the foot of the table plus table tray.
- **Direct3D™,** makes 3D routine and instant by building the 3D model during axial image reconstruction, reducing the need for user interaction.
- **Standard set of clinically- proven protocols** derived from leading luminary sites around the world. Up to 8,460 protocols can be edited, modified and stored on the system.
- **Remote Gantry Tilt** from the Operator's Console to increase exam speed, including built-in safety features to prevent accidental contact of the gantry with the patient.
- Built-in **patient breathing lights** and digital counter provides a goal-oriented approach to coach the patients in holding their breath during an exam.
- **SmartStart™** gantry-mounted start scan button and countdown display, facilitates single-technologist operation by allowing start of scan at the gantry, with a visual reminder of time until X-ray initiation.
- **SmartHelical™** GE proprietary, non-linear interpolation algorithms, balance slice profile, helical pitch, image noise and required technique.
- **HiRes Chest™** software provides a single-slice, high-resolution scan mode that minimizes dose for this critical application.
- **SmartPrep™,** standard on LightSpeed VCT, provides software for real-time monitoring of contrast enhancement.
- **SmartScorePro Complete*** provides ECG-gated hardware for both prospective and retrospective gating along with software on the Advantage Workstation for coronary artery calcium scoring.
- **Cardiac* acquisition with Segment, Burst and Burst Plus** enables you to scan patients with heart rates from 30 to 200 BPM and provide for **temporal resolution up to 44 msec.**
- **CardiacSnapShot*** provides software and hardware to perform retrospective ECG-gated reconstructions of the heart with three SnapShot imaging modes.
  - **SnapShot Segment** is a single sector protocol using information from one heart cycle to generate an image with temporal resolution of 175msec*.
  - **SnapShot Burst** is a multi-sector protocol using up to two sectors from two different heart cycles to produce an image with temporal resolution of 88msec*.
  - **SnapShot Burst Plus** is a multi-sector protocol using up to four sectors of data from four different heart cycles to produce images with temporal resolution to 44msec*.
- **Cardiac Image Filters*** provides users the capability to reconstruct filtered images using three steps of noise reduction for cardiac imaging, allowing reduced dose while maintaining an acceptable level of image noise.

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- **ECG Waveform on the Console*** will allow users to visualize the ECG waveform directly on the CT scanner console during the scan. The waveform data can be viewed to determine where prospectively-created images are located with respect to the heart cycle to better understand and avoid motion artifacts like blurring or mis-registration.
- **Compact system design** of the LightSpeed VCT allows for installation in only 24.3m² (261 square feet).
- Large breadth of **Advanced Software Applications** (AW or Xtream FX)*: Advanced Lung Analysis, CT Colonography, Advanced Vessel Analysis, Brain and Body Perfusion, Cardiac Analysis, Cardiac Function, Cardiac Electrophysiology, Coronary Calcium Scoring, AutoBone, DentaScan, Advantage 4D CT, Bone Mineral Densitometry, and Advantage Sim.

LightSpeed® Interactive CT Technology

The LightSpeed VCT scanner supplies exceptional computer and image processing power that significantly enhances clinical productivity, building upon the strength of the LightSpeed family - true interactive CT technology.

Interactive CT embodies a variety of design choices all striving to enhance operator and department productivity. A truly interactive CT system will:

- Provide a user interface beyond "**intuitive**" to become purely "natural" - from the screens to the console hardware itself;
- Allow two users to **review cases side-by-side**, with minimal interference;
- Supply a **truly multi-tasking** environment where even advanced image processing can take place quickly and simultaneously with other processes underway;
- Operate with a very high degree of **automation**, yet allow patient-specific changes to be easily made, with virtually no restrictions;
- Be as self-teaching as possible, and have **on-line access to tutorials** as needed.

One key element of this design is to combine some of the best features from several product families into one state-of-the art CT system. For example, the LightSpeed VCT Scanner combines:

- **SmartTools** productivity software to automate every step of the examination, critical for ensuring the highest productivity and throughput possible with the LightSpeed VCT Scanner;
- **Large screen interface** for controlling scan acquisition easily, with virtually everything at a single glance;
- Excellent simultaneity and **multi-tasking** performance;
- Completely **protocol-driven** scan control with a dramatic reduction in number of screens;
- Highly flexible editing tools that allow easy tailoring of the exam to the patient;
- Large, 1024 color display;
- Leading edge, **real-time image processing** (MPR, MPVR, Volume Viewer Plus*).

In summary, **primary benefits** of Interactive CT on the LightSpeed VCT Scanner:

- A natural scan control user interface
  - Dramatic reduction in the number of screens; only 2 screens to set up first scan and 1 screen for real-time monitoring while scanning;
  - Easier and more **flexible** protocols
  - Much more flexible and **intuitive graphic prescription** process with a 1024 Localizer;
  - **View/Edit Wizard™** intuitively adjusts dependent parameters automatically in response to operator-initiated changes and highlights them for quick review; also alerts the operator to incompatible dependencies requiring operator intervention;
  - **DynaPlan Plus™** full screen display illustrates scan status pictorially, with real-time feedback.
- Large color screen
  - Extensive use of picture icons and color cues enhance ease of use;
  - Large on-screen controls and attractive color palette provide comfortable viewing over extended periods.
- Enhanced **multi-tasking** allows operators to review more than one exam simultaneously, independently - even with AutoView and AutoFilm on
  - **BrightBox™** dedicated controls for image next, prior, manual paging and trackball W/L helps make two person image review practical;
  - Up to four 512x512 images from four different exams can be viewed on a large 1024 color display.
- **SmartmA™** User Interface - automatically optimizes mA to maintain constant image noise when collimation/detector configuration, scan mode, scan rotation speed, table speed, or image thickness changes. It takes the guesswork out of setting scan technique when changing parameters (note: user must select initial Noise Index as well as maximum mA setting). Noise index enable 100% Image Quality reproducibility from one patient to another and from one user to another.
- **Protocol Pro™** protocol manager - provides operator control of automated features (like AutoFilm, AutoStore, and AutoTransfer) on per exam, series or image basis.
- Patient demographics and exam protocols can be preprogrammed in advance of patient arrival through the Schedule Patient feature. Common inputs for new patient include: physician, radiologist, technologist and contrast type (oral and IV).
- A preprogrammed selection of AutoView and Image Review Layouts allow simple customization of the image presentation to match the anatomical area of interest - without the complexity of free-form "windows".
- **ImageWorks™** provides instant access to advanced image processing features such as MIP, MPR, MPVR, Volume Viewer Plus*, Advanced Vessel Analysis*, CT Perfusion 3*, DentaScan*, CardIQ Pro*, Advantage CTC*, CardEP*, CT Perfusion 3*, AutoBone*.
- Background filming allows use of the full screen for AutoView and image review/processing without interruption when auto or batch filming. Special "one touch" controls provide on-screen viewing of camera progress during **AutoFilm** without disrupting other image processes in progress.
- **ProView™** visualization algorithms available to enhance anatomical structures without additional image reconstruction time.
- Operator console convenient to locate in suite.
  - Computer, image processor and image reconstruction hardware completely integrated in base of console - no separate computer cabinet to site;
  - Split console table top allows unrestricted patient viewing while still supporting 2 large color LCD monitors;

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- Front and back work surfaces can be set during installation within a range of vertical heights that help accommodate a variety of siting requirements - especially surrounding the height of the console relative to the window into the scanning suite.

- **Direct network connection** means a multi-suite Ethernet card is not required for a gateway out of the suite - saving costs and simplifying installation.
- **Learning Solutions** provides an on-line Operator manual detailing system operation via a multi-media CD-ROM player integrated into the media tower. Learning Solutions can also be accessed on a stand alone PC providing flexibility and productivity for on demand learning of system operation.

Scan Modes

The LightSpeed VCT system can perform virtually any clinical application due to its wide variety of scan modes. With the LightSpeed VCT, CT studies are easier to perform and more productive than ever before.

Helical:

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

Axial:

- Up to 64 contiguous axial slices 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 1.0 sec with table moves of ≤ 10 mm (any scan time).

Cine:

- Up to 64 contiguous axial slices acquired simultaneously with each 360° rotation.
- Minimum scan-to-scan cycle time of only 1.0 sec with table moves of ≤ 10 mm.
- Half scan imaging and segmented reconstruction is supported with acquisitions times of 0.65 times that of the scan speed.

* Option

Scout™:

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

Some typical scan protocols are as follows (with VT2000 Table):

Chest / Abdomen / Pelvis

Coverage	600 mm
Rotation	0.4 sec.
Mode	64 x 0.625 mm
Pitch	1.375:1
mA	525
mAs	210
Speed	137.5 mm/s
Scan Time	4.36 seconds

Peripheral Run-Off

Coverage	1,700 mm
Rotation	0.4 sec.
Mode	64 x 0.625 mm
Pitch	1.375:1
mA	700
mAs	280
Speed	110 mm/s
Scan Time	12.8 seconds

High Resolution Chest

Coverage	200 mm
Rotation	0.4 sec.
Mode	64 x 0.625 mm
Pitch	1.375:1
mA	550
mAs	220
Speed	137.5 mm/s
Scan Time	1.45 seconds

ECG-Gated Cardiac *

Coverage	120 mm
Rotation	0.35 sec *
Mode	64 x 0.625 mm
Pitch	0.22:1
mA	571
mAs	200
Speed	25.1 mm/s
Scan Time	4.8 seconds

The net result is that in many cases, helical scans on the LightSpeed VCT are up to 4 times faster than 16-slice CT systems. With the LightSpeed VCT, users can routinely use a 0.40 second, or 0.35 second* scan speed for cardiac, and nominal 0.5:1, 0.9:1, and 1.375:1 helical pitches. This added performance, at the same image quality, may allow you to: reduce contrast media, perform better thin-slice CT angiography exams, use thinner slices for most exams, and perform longer helical exams without tube cooling delays.

Helical Scans

Slip ring technology has advanced axial scanning by enabling scans with zero interscan delay and simultaneous table movement.

Helical Multi-Slice Modes

Simplified scan prescriptions and easy-to-use default protocols make the LightSpeed VCT fast and efficient in patient set up.

Multi-slice acquisitions and short intergroup delays significantly reduce potential mis-registration between scans by increasing the number of scans possible in a patient breath hold. Contrast agents may be better utilized as well due to significantly faster scan acquisition.

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 with up to 90% overlap, and retrospectively, at any arbitrary table location in 0.1 mm increments.

Prospective Multiple-Thickness Reconstruction

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

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the defined nominal slice 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.

64-SLICE HELICAL MODES Table Speed (mm/rotation)			
Slice Thickness (mm)	**Nominal Pitch 0.5:1**	**1.0:1**	**1.375:1**
0.625 1.25 2.5 3.75 5	20 mm/ rot	40 mm/ rot	55 mm/ rot

Helical Scan Parameters

Scan Speeds: Full 360° rotational scans in 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 seconds, Cardiac* application (0.35, 0.37, 0.40, 0.42 ,0.45, 0.47, 0.50).

Helical Pitch (nominal): 0.5:1, 0.9:1, 1.375:1

Cardiac Pitch : 0.16:1 to 0.24:1 for 0.35 sec (*) gantry speed. Up to 0.325:1 for slower gantry speeds.

Scan Technique:

- kVp: 80, 100, 120, 140
- mA: 10 to 800 in 5 mA increments
- Power: 0.8 to 100 kW
- Focal Spot Selection @140 kVp:
  - Small spot for up to 46.9 kW
  - Larger spot for greater than 46.9 kW

Single Acquisition: 60 second scan maximum.

Multiple Acquisition Maximum Scan Time: Multiple scans may be acquired in one series to produce up to 3,000 contiguous helical images. Up to 3,000 rotations helical coverage is possible in multiple series.

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

Maximum Scan Fields of View:

- 32cm for pediatric head
- 32cm for pediatric body
- 32cm for small head
- 32cm for head
- 32cm for small body
- 50cm for medium body
- 50cm for large body

- 32cm for cardiac-small
- 36cm for cardiac-medium
- 50cm for cardiac-large

* Option

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

Anatomical Programmer: a ten-region anatomical selector allows quick and easy access to 90 user-programmable protocols per region. Separate selector for adult and pediatric exams. There are four selection tabs to select: GE, User, Service and Most Recent Patient. Copy/Paste is supported for easy modification and copying of protocols.

Ten user-defined regions. Each region has one default protocol displayed with the anatomical selector for very fast access to most commonly used protocols

Protocols include preset scan time, kVp, mA, scan mode, slice thickness and spacing, table speed, scan FOV, display FOV and center, recon algorithm and special image acquisition and processing options

Any scan parameters may be edited for each scan or all scans - either before or during an exam. The number of scans may also be easily changed.

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

AutoVoice™: 3 presetand 17 user-defined messages automatically deliver patient breathing instructions with a programmable delay; especially useful for multiple helical scanning.

Preset messages are supported in 9 different languages: Chinese, English (Male/Female), French, German, Italian, Japanese, Korean, Spanish and Mexican Spanish.

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

Advanced Artifact Reduction (AAR) Filter significantly reduces streaking artifacts when highly absorbent objects are in the field of view – ie: large shoulders, screws.

Helical Image Reconstruction

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

High-resolution cardiac reconstruction algorithm for stent visualization provides 2x improvement of in-plane resolution.

Reconstruction Matrix: 512

Display Matrix: 1024.

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

CT Number Scale: -31,743 to 31,743 HU

Helical Reconstruction Times:

- Reconstruction time as fast as 16 images per second
- Typical 0.067 sec. image-to-image recon in normal 64 slice recon mode.
- Maximum image-to-image cycle time is ± 10% for prospective and retrospective image-to-image display. This applies for 512 matrix; any display FOV; in AutoView (all layouts); with concurrent filming and image archival for all scan modes.
- Iterative bone processing increases time by 150 milliseconds. 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: 0.1875 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-

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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. 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 0.1 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	Maximum mA
5 sec	745-800
10	675-790
20	600-670
30	555-595
40	525-540
50	465-500
60	305-470

Multiple Helical Scans:

Scan Time	IGD	No. Scans	Max mA
5 sec	5 sec	2	685-800
		3	645-775
		4	620-750
		5	600-730
		6	580-705
10 sec	5 sec	2	605-690
		3	585-625
		4	540-575
		5	515-540
		6	490-515
20 sec	5 sec	2	525-550
		3	310-485
		4	295-450
30 sec	5 sec	2	305-480
		3	285-425
		4	270-395

Helical Scan Image Quality

With LightSpeed VCT being a sub-millimeter isotropic CT scanner, it is now possible to specify coronal and sagittal image quality.

A new optimized x-ray source (focal spot shape & dynamics as well as reduced off focal radiation) allows for improved measurement methods to fully characterize the limiting resolution of the LightSpeed' VCT system design. In conjunction with the additional power of LightSpeed VCT, this has been shown in clinical images to realize more vascular and anatomical detail.

For details of scan techniques and tolerances, please refer to the Technical Reference Manual.

1. Visual Measurement:

Reformatted resolution is demonstrated on the Catphan High Contrast High Contrast Resolution Insert Module CTP528.

0.35 +/- 0.05mm voxel size is seen in the reformatted plane.

2. 3D MTF:

In-plane MTF is demonstrated on a 0.05mm tungsten wire. Z-plane MTF is demonstrated on a 0.1mm aluminum disc.

	Standard Algorithm	Hi-Res Algorithm (Edge)	
	X/Y - lp/cm	X/Y - lp/cm	Z - lp/cm
50%	4.2	10.1	8.5
10%	6.8	13.7	13.9
0%	8.5	15.4	16.0

3. Low-Contrast Detectability:

On 8 inch (20cm) CATPHAN phantom, 10mm (calculated) slice thickness:

5 mm @ .3% at 7.5 mGy CTDIvol
3 mm @ .3% at 21.5 mGy CTDIvol

New Body Low Contrast Detectability - Statistical

On 8 inch (20cm) CATPHAN phantom surrounded by a 36cm tissue equivalent ring, 10mm (calculated) slice thickness:

5mm @ 1.3% at 18.2 mGy CTDIvol

4. Noise:

On either an AAPM water phantom or GE Quality Assurance phantom with 10mm slice thickness equivalent (calculated):

0.32% +/- 0.03% at 18.3 mGy CTDIvol

5. CTDI:

On CTDI Head and Body Dose Reference Phantoms:

$CTDI_{vol}$ expressed in mGy/100 mAs:

Head	16.9 mGy/100 mAs
Body	8.5 mGy/100 mAs

Axial Scans

Multi-slice acquisitions and short interscan delays significantly reduce potential missed registration between scans by increasing the number of scans possible in a patient breath hold. Contrast agents may be better utilized as well due to significantly faster scans.

Axial Multi-Slice Prescription

Simplified scan prescriptions and easy-to-use default protocols make the LightSpeed VCT Scanner fast and efficient in patient set-up.

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Axial protocols are nearly identical to helical scan protocols.

Axial Multi-Slice Modes

The LightSpeed VCT acquires axial scans in sets of 2 through 64 contiguous images in one 360° rotation.

For each rotation of the gantry, the LightSpeed VCT collects 64 rows of scan data. There are seven reconstruction modes available for creating images from the multi-slice scan data (1i, 2i, 4i, 8i, 16i, and 32i). By using 2i, 4i, 8i, 16i, and 32i 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.

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

Axial Scan Parameters

Scan Speeds:

- 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, and 2.0 second full scans (360° acquisition)

Scan Technique:

- kVp: 80, 100, 120, 140
- mA: 10 to 800, in 5 mA increments
- Power: 0.8 to 100 kW
- Focal Spot Selection @140 kVp:
  - Small spot for up to 46.9 kW
  - Larger spot for greater than 46.9 kW

Scan Plane Geometry:

- +/- 30° 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 movements of 0 - 10 mm: 1.0 sec.
- Minimum ISD with table movements of more than 10 mm and up to 20 mm: 1.3 sec
- Minimum ISD with table movements of more than 20 mm and up to 40 mm: 1.7 sec
- User-selectable.

Inter Group Delay (IGD):

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

Scan-to-Scan Cycle:

- Minimum scan-to-scan cycle of 1.5 seconds possible for 0.5 sec. scan speed with minimum ISD's.

Maximum Scan Fields of View:

- 32cm for pediatric head
- 32cm for pediatric body
- 32cm for small head
- 32cm for head
- 32cm for small body
- 50cm for medium body
- 50cm for large body

- 32cm for cardiac-small
- 36cm for cardiac-medium
- 50cm for cardiac-large

Scan with no table incrementation, contiguous image location, or skipped image location are possible. Overlapped axial scans are not possible.

Axial Image Reconstruction

Reconstruction Algorithms: Standard, Soft Tissue, Detail, Chest, 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: -31743 to 31743 HU

Axial Reconstruction Times:

- Maximum image-to-image cycle time is ± 10% for prospective and retrospective image-to-image display. This applies for 512 matrix; any display FOV; in AutoView (all layouts); with concurrent filming and image archival for all scan modes.
- Iterative bone processing increases time by 150 milliseconds. 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. 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 for 10mm or 20mm beam collimation.

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

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

Scan Mode	Slice Thickness	Recon Slice Thicknesses
64 slices 40mm	0.625	16i – 2.5mm 8i – 5mm
32 slices 20mm	0.625	32i – 0.625mm 16i – 1.25mm 8i – 2.5mm 4i – 5mm
16 slices 10mm	0.625	16i – 0.625mm 8i – 1.25mm 4i – 2.5mm 2i – 5mm
8 slices 5mm	0.625	8i – 0.625mm 4i – 1.25mm 2i – 2.5mm 1i – 2.5mm
4 slices 2.5mm	0.625	2i – 1.25mm
2 slices 1.25mm	0.625	1i - 0.125

Axial Scan Protocols

All protocols assume 120 kVp scans under typical clinical conditions.

Standard Scans:

Scan Time	ISD	mA	Scans	Acquisition Time
1 s	1 s	800	4-16	7-31s
1	1	750	7-29	13-57s
1	1	700	12-45	23-89s
1	1	650	21-65	41-129s
1	1	600	35-91	69-181s
1	1	550	58-126	115-251s
1	1	500	85-166	169-331s
1	1	450	106-198	211-395s
1	1	400	132-243	263-485s

* Option

Axial Scan Image Quality

For details of scan techniques and tolerances, please refer to the Technical Reference Manual.

1. High Contrast Spatial Resolution:

In-plane MTF is demonstrated on a 0.05mm tungsten wire.

Standard Algorithm

	X/Y – lp/cm
50%	4.2
10%	6.8
0%	8.5

Hi-Res Algorithm (Edge)

	X/Y – lp/cm
50%	10.1
10%	13.7
0%	15.4

2. Low-Contrast Detectability

On 8 inch (20cm) CATPHAN phantom, 10mm (calculated) slice thickness:

5 mm @ .3% at 7.6 mGy CTDIvol
3 mm @ .3% at 22.2 mGy CTDIvol

New Body Low Contrast Detectability – Statistical

On 8 inch (20cm) CATPHAN phantom surrounded by a 36cm tissue equivalent ring, 10mm (calculated) slice thickness:

5mm @ 1.3% at 18.2 mGy CTDIvol

3. Noise:

On either an AAPM water phantom or GE Quality Assurance phantom with 10mm slice thickness equivalent (calculated):

0.32% +/- 0.03% at 18.8 mGy CTDIvol

4. CTDI:

On CTDI Head and Body Dose Reference Phantoms:

$CTDI_w$ expressed in mGy/100 mAs:

Head 16.9 mGy/100 mAs
Body 8.5 mGy/100 mAs

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 gantry angles are also available on a single Scout.

Scout Scan Parameters

Aperture: 8 x 0.625 mm effective aperture

Table speed: 100 mm/sec.

Scan Technique:

- kVp: 80, 100, 120, 140
- mA: 10 to 800 in 5 mA increments
- Power: 0.8 to 100 kW

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

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

Scouts longer than 1,000 mm are auto minified to fit the display.

User Interface

The LightSpeed VCT 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

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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 LCD monitors. Each work surface can be adjusted at installation to help accommodate a variety of siting requirements.

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 FX** 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 LightSpeed VCT 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 Plus*, CT Perfusion 3* 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.

Learning Solutions:

The LightSpeed VCT provides an on-screen, on-line operator manual via a multi-media CD-ROM/DVD player integrated into the front of 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. Common inputs for new patient include: physician, radiologist, technologist and contrast type (oral and IV).

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 LightSpeed VCT Scanner System to department productivity is its simplified exam set-up.

- Exam parameter set-up has been greatly simplified 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
- Two Anatomical Programmers - one for adults and one for pediatrics - provide quick and easy access to 8,460 user-programmable protocols (total). Each programmer has ten anatomical regions with 90 protocols for each region
- 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 exam, series or image basis.
- Protocol Pro also provides preselection of two different window/level settings per image 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

* Option

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- 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.
- As many as 8,460 protocols can be stored on the Operator Console.

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: Preset (English) 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.

Dose Computation, Display & Reporting

$CTDI_{vol}$ (CTDI volume), DLP (Dose Length Product), and Dose Efficiency computation and display during scan prescription provides patient dose information to the operator.

$CTDI_{vol}$ is a dose index defined by IEC 60601-2-44. This index is computed automatically by the LightSpeed VCT. System and reported on the Exam Rx screen. $CTDI_{vol}$ is a single number consisting of 2/3 of the $CTDI_{100}$ peripheral dose plus 1/3 of the $CTDI_{100}$ central dose that is divided by the helical or axial pitch factor.

$CTDI_{100}$ 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. 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.

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 16.
- 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:

* Option

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- 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

- Three ways are provided to adjust window/level of images in focus in order to meet a variety of clinical work environments and user preferences:
  - Six 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
  - Large font for patient name, patient ID, and accession number

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).

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.

* Option

Manual Image Filming

- On-screen filming is available for any analog or 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 0.9:1, 2:1, 4:1, 6:1, 8:1, 9:1, 12:1, 15:1, 16:1, 20:1, 24:1 and 35-mm slide

Important note: The LightSpeed VCT 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 LightSpeed VCT scanner's computer and image processor. This desktop environment includes image management and networking.

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:
  - MIP - 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;
- **Direct MPR** allows customer to move from routine 2D review to prospective 3D image review of axial, sagittal, coronal, and oblique planes while enabling automated protocol-driven batch reformats to be created and networked to their desired reading location, reducing total exam time and increasing technologist and radiologist productivity.
- **Exam Split** provides customers with the capability to "split" a series of patient images into separate groups. These new smaller image groups can then be networked to desired reading stations for multiple "reads" and multiple billings on select patient exams. Virtual mode provides ability to send window level values, flip & rotate images, and compatibility with MPPS.
- **Data Export** provides CT scanner customers with a stand-alone tool to convert clinical images into PC-friendly formats like .jpeg, .mpeg, and .avi, creating more flexible report creation for both referring physicians and patients. Images can then be saved using Data Export tool to any PC industry standard removable media, including CD-ROM and DVD.

Volume Viewer Plus (*)

Volume Viewer Plus is an innovative and powerful suite of productivity enhancers (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

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- 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 16 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

* Option

- 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.

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 retrieval time is approximately 30 images 512 per second.

Direct MPR

- **Direct MPR** enables automated protocol-driven axial, sagittal, and coronal reformats. Reformatted images may be routed to multiple network destinations, eliminating the need to transfer and store all thin-slice data.
- Direct MPR provides an interactive axial review mode that can change the slice thickness reconstruction instantaneously.
- The user selects the volume to be specifically analyzed and chooses the slice thickness to be displayed as axial, sagittal, coronal and oblique images. The user can then save a number of recon images sets, viewing a large number of slices for pure axial or multi-planar review and filming.
- Batch film can typically enable you to reduce filming images by 50%, thickening the slab from 0.625 to 1.25mm or 1.25 to 2.5mm with no information loss.

Image Networking

Exams can be selected and moved between the LightSpeed VCT Scanner System and any imaging system supporting the DICOM 3.0 protocol for network send, receive and pull/query. NOTE: Because the LightSpeed VCT creates images in pure DICOM format, exams *can not* be moved from the LightSpeed VCT Scanner System to MR Signa Advantage, CT HiSpeed Advantage or the Advantage Independent Console systems.

DICOM Interchange allows the saving of any image from the database, along with PC viewer, to a CD or DVD without marking the exam/series or image as archived for exam transfer between stations that are not networked or pass along to referring physicians or patients.

Image transfer time using DICOM 3.0 protocols is approximately 0.1 second per 512x512 image on a 1000baseT network.

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
- DICOM 3.0 Modality Performed Procedure Step
- DICOM 3.0 Print

Filming Protocol

- 3M-952 Standard

Computer Based Training

This innovative feature provides on-screen, on-line support of Exam Rx and ImageWorks functions via a multi-media CDROM player, integrated into a tower on operator console for easy access. The on-line training uses rich graphics and text to provide truly useful system help.

A well-indexed table of contents helps speed access to information. The CD can be viewed on the scanner or on a PC.

Industry Standards

The LightSpeed VCT 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.

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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.
- Focus to Detector: 95 cm
- Focus to Isocenter: 54 cm
- Maximum SFOV: 50 cm
- Rotational Speeds: 360° in 0.35*, 0.37*, 0.4, 0.42*, 0.45*, 0.47*, 0.5, 0.6, 0.7 0.8, 0.9, 1.0, and 2.0 sec.
- Remote Tilt from Operator's Console.
- Integrated breathing lights and countdown timer.
- Integrated start scan button with countdown to X-ray on.
- Scan plane toward front of gantry for improved positioning access.

Biopsy and interventional studies have been facilitated through a more streamlined gantry shroud, and bilateral table/gantry controls and gantry display that maximize maneuverability while working next to the gantry.

Laser Alignment Lights:

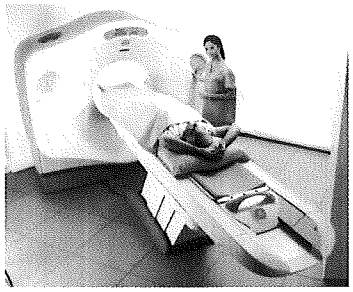
- Define both internal and external scan planes to ± 1 mm accuracy.
- Operate over full range of gantry tilt; activated any time during exam (with tube stationary).
- Coronal light remains perpendicular to axial light as gantry tilts.

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: 43 cm to 99.1 cm
- Vertical Scannable Range: 78.5 cm to 99.1 cm
- Elevation Speeds: 15 mm/sec and 30 mm/sec



- Horizontal Range: 203 cm
- Horizontal Scannable Range varies according to one of two table configurations:
  - 200 cm metal-free (axial) and 190 cm metal-free (helical & scout), or
  - 170 cm metal-free (axial) and 160 cm metal-free (helical & scout)
- Horizontal Speed: **Up to 175 mm/sec**
- Table Load Capacity:
  - **227 kg (500 lb)** maximum allowed with +/- 0.25 mm positional accuracy
- Controls on gantry for elevation and cradle incrementation. Foot pedals on both sides of table for fast elevation. Cradle position controlled from OC for prescribed scans.
- IV Pole integrated at the foot-end of the table prevents IV lines from becoming crossed and tangled, and ensures that the lines stay securely in place on the patient.

X-Ray Tube

Performix Pro Anode Grounded Metal-Ceramic Tube Unit. Design optimized for exams requiring a large number of scans without tube cooling.

- Maximum Power: **100 kW @140 kVp**
- Dual Focal Spots:
  - Small Focal Spot (nominal values):
    0.7mm (W) x 0.6mm (L) – IEC 336/93
    0.8mm (W) x 0.7mm (L) – IEC 336/2005
  - Large Focal Spot (nominal value):
    0.9mm (W) x 0.9mm (L) - IEC 336/93
    1.1mm (W) x 1.0mm (L) - IEC 336/2005

Maximum mA for each kVp selection:

kVp	Small Spot Max mA	Large Spot Max mA
80	300	675
100	310	770
120	335	800
140	335	715

- Heat Storage Capacity: 8 MHU
- Heat Dissipation:
  - Anode (max) **>2100** KHU/min
  - Casing (cont) **648** KHU/min
- Beam collimated to 56° fan angle.
- Average time to replace tube: ≤ 10 hours

High Voltage Generation

- High-frequency on-board generator. Continuous operation during scan.
- **100 kW** output power.
- kVp: 80, 100, 120, 140 kVp.
- mA: 10 to **800 mA**, 5 mA increments

V-Res™Detector

58,368 individual elements composed by 64 rows of 0.625 mm thickness at isocenter, each containing 888 active patient elements; 24 reference elements. All data is acquired as **64 x 0.625mm**, with the option of thicker slices from image reconstruction or processing.

98% absorption efficiency.

Data Acquisition System

58,368 available input channels.

2,460 Hz maximum sample rate.

Effective analog to digital conversion range greater than two million to one.

Scan/Control Unit

Located in base of Operator Console.

Host Computer

- Dual 3.2 GHz Intel Xeon processors with 1MB L2 cache.
- Intel Hyper-threading technology.
- 4GB DDR2-400 Dual Channel Memory with a throughput of 6.4GB/s

* Option

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Image Processor

- Nvidia Quadro FX1400 PCI Express Graphics Card with 128MB Memory and Dual 400MHz RAMDAC
- Graphics memory bandwidth 19.2 GB/s

Image Reconstruction Engine

- Custom-designed special purpose CT Image Generator
- Custom CT back projection hardware accelerates 2D & 3D back projection.
- Intel Hyper-threading Technology.
- 32-bit floating point data format
- 6GB DDR266 ECC Dual Channel Memory Standard (4.2 GB/sec).

Software Architecture

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

Peripherals

Total of **803 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
  - **146 GB** total on 73 GB, 3.5 inch form factor each
  - 15,000 RPM
  - Ultra320 SCSI interface
  - Assigned to image files only
  - 250,000 uncompressed 512x512 images
- 8 Scan data disk drives:
  - High Performance Drive
  - **584 GB** total on 73 GB, 3.5 inch form factor each
  - Ultra320 SCSI interface
- Standard **MOD** drive:
  - 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 512x512 image files per side
  - Off-line retrieval of image. Images may be viewed as soon as they are restored from MOD
- DVD-R/ CD-R (DVD Interchange):
  - **9.4 GB total.** 4.7 GB per side, 5.25" half height form factor
  - **Up to 7168 image storage**
  - Transfer rate 2.7MB/sec
  - Assigned to scan data file and protocol file storage/retrieval.
- **Color LCD monitors (2 standard):**
  - 19 inch diagonal width
  - 1280 x 1024 dot resolution
  - Horizontal viewing angle: 176 degrees
  - Vertical viewing angle: 176 degrees
  - Horizontal synchronization range: 31.5 - 81.1 kHz
  - Vertical synchronization range: 50 - 85 kHz
- Scan control **keyboard** (English language) assembly with intercom speaker, microphone and volume controls.
- Optional **modem** for backup to standard broadband InSite connectivity
- 3-Button **Mouse**
- 3-Button **Trackball**

Image Networking

- Exam Transfer 16 frames per second on dedicated 1 Gbit connection.
- Standard auto-configuring 1000BaseT/100BaseTX/10BaseT Ethernet (UTP connection)
- 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;

Standard, Selectable Items

- VT Patient Positioning System
- Keyboard: English, French, German, Italian or Scandinavian
- Cable Set
- ConnectPro HIS/RIS Interface with Performed Procedure Step)
- Table Tray

Compatible Options

The following options are available on the LightSpeed VCT and Xtream FX console. See Advantage Workstation (AW) product data sheet for list of available AW options.

- Bar Code Reader
- Volume Viewer Plus
- DentaScan
- SmartScorePro
- CardIQ Snapshot
- ECG Gating HW and SW
- Advantage 4D CT
- CT Perfusion 3 Multi-Organ, Neuro
- SmartStep with or without in-room monitor
- Advanced Vessel Analysis
- AutoBone
- Advantage CTC
- CardIQ
- CardEP
- Uninterruptible Power Supply
- Color Printer
- Digital DASM
- ECG Monitor
- Table Tray
- Customer Marketing Kit

Siting Requirements

For siting requirements, see "LightSpeed 7.x Pre-Installation Manual", Direction 5116410-100.

Warranty

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

GE Medical Systems, a General Electric company, going to market as GE HealthCare.

General Electric Company reserves the right to make changes in specifications and features shown herein, or discontinue the product described at any time without notice or obligation.

* Option

LightSpeed VCT
Volume CT Scanner
With Xtream FX

GE Healthcare
Milwaukee, USA - Fax: 1 262 544 3384
Tokyo, Japan - Fax: 81 425 85 5490
Paris, France - Fax: 33 1 30 70 94 35

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 that satisfies regulations regarding Electro-Magnetic Compatibility (EMC) and Electro-Magnetic Interference (EMI), pursuant to IEC-60601.

* Option