



GE Healthcare

**Technical
Publications**

**Direction 2414305-100
Rev. 3**

***Ventri*
Site Preparation Manual
Nuclear Medicine Imaging System**

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All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibration and testing shall be performed by qualified Medical personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineer. All of Vendor's electrical work on these products will comply with the requirements of the applicable electrical codes.

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CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS. SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE. NE PAS TENTER D'INTERVENTION SUR LES EQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ETE CONSULTE ET COMPRIS. LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPERATEUR OU LE PATIENT DES BLESSURES DUES A DES DANGERS ELECTRIQUES, MECANIKES OU AUTRES.

WARNUNG

DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.
FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

ATENÇÃO

ESTE MANUAL DE SERVIÇO SÓ É DISPONÍVEL EM INGLÊS. CASO O PROVEDOR DE SERVIÇOS DO USUÁRIO NECESSITE DE UMA TRADUÇÃO, ESTA É DE RESPONSABILIDADE DO CLIENTE.
NÃO TENTE UTILIZAR O EQUIPAMENTO ANTES DE CONSULTAR E COMPREENDER O MANUAL DE SERVIÇO.
A NÃO OBSERVÂNCIA DESTA PODE ACARRETAR LESÕES AO PROVEDOR DE SERVIÇOS, OPERADOR OU PACIENTE CAUSADAS POR CHOQUE ELÉTRICO, MECÂNICO OU DE OUTRA NATUREZA.

AVVERTENZA

IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLO IN LINGUA INGLESE.
SPETTA ALL'UTENTE PROCURARSI UNA VERSIONE TRADOTTA NEL CASO IN CUI L'ADDETTO ALLA MANUTENZIONE DOVESSE RICHIEDERLA.
NON TENTARE DI METTERE IN FUNZIONE L'APPARECCHIATURA PRIMA DI AVER CONSULTATO IL MANUALE DI MANUTENZIONE ED AVERNE COMPRESO PIENAMENTE IL CONTENUTO.
LA MANCATA OSSERVANZA DI QUESTA AVVERTENZA PUÒ PROVOCARE LESIONI AL PERSONALE DI MANUTENZIONE, ALL'OPERATORE O AL PAZIENTE, DERIVANTI DA SCOSSE ELETTRICHE, URTI O RISCHI DI ALTRA NATURA.

AVISO

ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.
SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.
NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.
LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.

Revision History

PCN	REV	DATE	DESCRIPTION	CHAPTERS/PAGES	APPR.
2017661	1	Feb.2006	Initial Release	All	A. Sherman
2031920	2	Aug.2006	Changes, Additions and Updates	All	Noam Zilbershtain
2035455	3	Nov 2006	Changes, Additions and Updates	Chapter 3	E. Edelvize

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Chapter 1 – Introduction to Site Preparation

1.1 Overview

Important

Good site preparation is essential for a smooth and efficient installation. Poor site planning may compromise usability and/or patient comfort.

The purpose of this manual is to simplify the site preparation process and to provide the purchaser (or the purchaser's contractor) with the information necessary to prepare the site for the installation of a Ventri system

The following information is also essential to the architects, construction engineers, electrical contractors, and all other personnel involved in the site preparation process:

- Planning the site
- Ensuring adequate accessibility to the site
- Physical layout
- Providing construction, mechanical, electrical and environmental specifications
- Cables routing
- Connectivity
- Time Schedule
- Site Safety

It is important that the information contained herein is used in conjunction with the drawings prepared specifically for each site.

1.2 Prerequisites

Verify all aspects of site configuration **before** construction is started. Once building operations have been completed, it may be difficult and/or costly to make changes.

It is advisable to use workers experienced in medical suite installations. Personnel with only general construction experience may not have the expertise to complete the required tasks within the designated time frame.

Important

Since this equipment involves the use of radioactive isotopes, compliance with Nuclear Regulatory Commission regulations, or similar regulatory requirements (depending on the country), must be adhered to.

In most situations, this must be done prior to acquiring any source materials. This includes calibration sources which may have fairly long delivery lead times. These calibration sources may also have a short half life, and it may not be advisable to store them over long periods of time.

Regulatory compliance should be arranged early in the site planning process.

1.3 Project Coordination

To insure a successful installation, it is preferable to have one person (a project coordinator) manage the entire project. The project coordinator should be involved in every phase of the installation, from conceptual planning through to system start up.

Ideally, the project coordinator should be thoroughly familiar with construction procedures and have a background in medical suite construction. If such a person is not available from existing staff, it is recommended that the services of a local Site Planner or Construction Manager be secured.

This person will be the primary contact and liaison between the purchaser and GE Healthcare.

Note

The purchaser is responsible for assigning this post and providing GE with the relevant contact information.

The project coordinator should keep in close contact with all of the contractors, sub-contractors, GE Healthcare, and administrative personnel, as well as the planners and architects. Keeping a schedule (and adjusting that schedule if necessary) is part of the project coordinators responsibility.

GE can provide a site planing service to assist the purchaser / project coordinator with the site planning. Please contact your local GE representative should any such assistance be required. GE personnel are willing and well qualified to help ensure that your installation is a successful one.

1.4 Purchaser's Responsibility

The purchaser is responsible for all site preparation, unless a special agreement has been entered into with GE Medical Systems.

Such preparation may include, but is not limited to the following tasks:

- Cost analysis, construction, renovation or alterations and modifications when not specifically provided for in the contract.
- Procurement of all the material required to carry out the work.
- Safe storage of the system and equipment prior to and during installation.
- Installation of lighting.
- Air-conditioning and ventilation, suitable for the Ventri System.
- Fitting of adequate thermal protection devices.
- Installation of electrical conduit, junction boxes, ducting and outlets as required.
- Facility input power supplies and wiring.
- Demolition, debris removal and cleaning of construction site.
- Fire control devices as may be required by local codes.
- Permits, inspections, radiation licensing etc.
- Installation of any required networking materials which are external to the system's internal sub-net.
- Removal of packing and shipping material.
- Floor tile removal and replacement in area of table and gantry.
- Floor Requirements
- Ensure that the scan room can be locked during the installation procedure, and that it will not be accessed by unauthorized people.
- Provide storage space with a minimum size of 3 x 3 meters for storing the system components, installation tools, and the removed system covers.

1.5 Regulatory Requirements

Every effort must be made to assure safe and efficient installation, and proper operation of the Ventri suite. Prepare the site, and install the equipment in close compliance with all local regulatory requirements.



CAUTION

Ventri uses radioisotopes which are regulated by various governing agencies. You will need to obtain all pertinent permits and licenses to comply with local regulations.

Stringent laws and standards apply to the installation and operation of any equipment that involves the use of radioactive isotopes. This section has been designed to alert the responsible personnel to the need for regulatory compliance. The purchaser is solely responsible for keeping the Ventri facility in compliance during preparation, installation and operation.

It is not practical to include all of the regulatory information that might apply in all situations. The purpose of this chapter is to serve as a guideline only, and is not intended to be used as a regulatory standard in any manner. Government agencies are charged with the responsibility of protecting the general public from hazardous materials. For radioactive sources in the United States of America, that agency is the Nuclear Regulatory Commission (NRC)

The NRC monitors the activity of all industries that are engaged in the use and handling of hazardous radioactive materials and licenses organizations to make use of such material. The installation of an NM imaging system falls into the category of a facility that must be regulated and monitored by this agency.

Some states have signed agreements with the NRC, allowing that state to regulate the use of radioactive material within the confines of their borders. The NRC can supply a list of the agreement states, with addresses. Installation of projects in those states which have not signed such an agreement, require an application to the NRC for licensing. Request for application should be made to:

United States Nuclear Regulatory Commission
Washington, D.C. 20555

1.6 Information to be Prepared Before Installation

All the information which must be obtained and recorded *prior* to start of installation can be found in the check list in [Section 1.7](#).

Failing to acquire the information beforehand may cause serious delays in completing the system installation.

- Site parameters - to be decided in consultation with the customer.
- Local Area Network (LAN) information - provided by the local network administrator.
- Broadband information - to be decided in consultation with the local network administrator as well as with the network administrators of the remote network.
- Telephone Availability - if possible a telephone should be installed in the scan room

1.7 Pre-Installation Checklist

The following checklist should be completed by both the customer and the Vendor's representative. Mark each **Yes** or **No** box, then sign the checklist.

Equipment Arrival Date: _____

Planned Installation Date: _____

1.7.1 Site Information Contact Persons

Table 1–1: Site Information Contact Persons

Site Name		IT System Administrator	
Department		Chief Technologist	
Street		Facilities Engineer	
City, State, Zip		Shipping/Receiving	
Country		Physician	
Telephone			

The questions to be answered are arranged according to four topics:

- Site preparation and required cables
- Unloading and conveyance to installation site
- Networking
- Radionuclides licenses

1.7.2 Site Checklist

Table 1–2: Site Checklist

Site Planning		Yes	No	Comment
Room Measurements	Does the camera room meet minimum size requirements?	<input type="checkbox"/>	<input type="checkbox"/>	
	Does room height meet the minimum height requirement?	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the room layout leave sufficient free space for servicing?	<input type="checkbox"/>	<input type="checkbox"/>	
Room Layout	Are final Site Layout drawings completed and approved by the customer?	<input type="checkbox"/>	<input type="checkbox"/>	
	Are final Site Layout drawings approved by the Vendor?	<input type="checkbox"/>	<input type="checkbox"/>	
Floor Preparation	Can the floor tolerate the specified loads?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is construction necessary?	<input type="checkbox"/>	<input type="checkbox"/>	
	If yes, what is the scheduled completion date?			
	Does floor leveling meet the requirements?	<input type="checkbox"/>	<input type="checkbox"/>	
	Does floor flatness meet the specified requirements?	<input type="checkbox"/>	<input type="checkbox"/>	
Emergency Button	Is the planned location of the emergency button easily accessible by the operator?	<input type="checkbox"/>	<input type="checkbox"/>	
Power Requirements	Does the single-phase wall outlet meet the specified requirements?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is the single-phase power line stabilized?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is a wall outlet available for installation tools?	<input type="checkbox"/>	<input type="checkbox"/>	
Environmental Conditions	Are the specified requirements met, considering the system's thermal loads?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is the magnetic field in the camera and workstation room less than 1 Gauss?	<input type="checkbox"/>	<input type="checkbox"/>	
Communication Requirements	Is there a telephone available in the scan area?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is there a network connection available near the system?	<input type="checkbox"/>	<input type="checkbox"/>	

Table 1–2: Site Checklist (Continued)

Unloading and Conveyance to Installation Site		Yes	No	Comments
Loading Dock	Does the institution have a truck-height (44") loading dock?	<input type="checkbox"/>	<input type="checkbox"/>	
	Can a full-size truck access the truck-height loading dock?	<input type="checkbox"/>	<input type="checkbox"/>	
	If not, will institution arrange for a short truck delivery?	<input type="checkbox"/>	<input type="checkbox"/>	
Unloading by fork lift:	Does institution have a fork lift with weight capacity to lift a fully crated Gantry?	<input type="checkbox"/>	<input type="checkbox"/>	
	If not, will institution arrange for an appropriate fork lift?	<input type="checkbox"/>	<input type="checkbox"/>	
Unloading by crane	Is an area for crane hoisting planned?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is closing off of this area for the required period of time approved by the authorities?	<input type="checkbox"/>	<input type="checkbox"/>	
	Please provide the following information: Name of rigging company: _____ Contact name: _____ Phone: _____			

Table 1–2: Site Checklist (Continued)

Halls, Elevators and Doors	Are <u>all</u> door openings/hallways from loading dock to the camera room large enough for passage of the Gantry and/or the patient table mounted on the moving kit/wheels?	<input type="checkbox"/>	<input type="checkbox"/>	
	Can all pathways tolerate the weight of the Gantry mounted on Moving Kit/Wheels?	<input type="checkbox"/>	<input type="checkbox"/>	
	If elevator passage is required, can the elevator tolerate the weight and size of the Gantry + Moving Kit/wheels and the length of the Table?	<input type="checkbox"/>	<input type="checkbox"/>	
	Will the Patient Table clear all 90° corners?	<input type="checkbox"/>	<input type="checkbox"/>	
	Will the Gantry assembled on Moving Kit/Wheels clear all corners?	<input type="checkbox"/>	<input type="checkbox"/>	
	<u>Inclines:</u> Are there any inclines on the route to the camera room?	<input type="checkbox"/>	<input type="checkbox"/>	
	If so, what is the angle of incline			
	<u>Carpet & Tile:</u> Will the camera be pushed across delicate carpets or tiles, requiring floor protection?	<input type="checkbox"/>	<input type="checkbox"/>	
Unloading and Conveyance to Installation Site (Continued)		Yes	No	Comments
Riggers	If camera can not pass through halls, elevators or doors, a rigging company must be employed. Will a rigging company be hired?	<input type="checkbox"/>	<input type="checkbox"/>	
	If so, please provide this information: Name of rigging company: _____ Contact name: _____ Phone: _____ Attach a copy of the riggers company insurance policy.			
Temporary Storage	Will institution store the crated camera in the department?	<input type="checkbox"/>	<input type="checkbox"/>	
	If not, will institution arrange for delivery on first install day?	<input type="checkbox"/>	<input type="checkbox"/>	

Table 1–2: Site Checklist (Continued)

[illegible]

Table 1–2: Site Checklist (Continued)

General Access	Is the route to the installation room clear, are corridor / elevator requirements met?	<input type="checkbox"/>	<input type="checkbox"/>	
Room Shielding	Was the room shielding, relating to the other rooms and corridors, checked according to the site preparation requirements in this chapter?	<input type="checkbox"/>	<input type="checkbox"/>	
Room Environments	The Thermal load of the Ventri is 1500W / 5130 BTU/H. Does the room meet GEHC environmental specifications temperature and humidity?	<input type="checkbox"/>	<input type="checkbox"/>	
Equipment Receiving	Is the receiving dock identified?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is a pallet truck available locally?	<input type="checkbox"/>	<input type="checkbox"/>	
	Does forwarder supply a pallet truck?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is the equipment delivery route defined / accepted by GEHC and the customer?	<input type="checkbox"/>	<input type="checkbox"/>	
	Is the storage of 3m X 3m area defined in the site?	<input type="checkbox"/>	<input type="checkbox"/>	
	Could the room be locked for the installation period?	<input type="checkbox"/>	<input type="checkbox"/>	
	Are all conveying means and architectural changes required facilitating equipment delivery done?	<input type="checkbox"/>	<input type="checkbox"/>	
Waste Packing	Are there any facilities for the disposal of empty wooden cases, foam blocks and large cardboard boxes?	<input type="checkbox"/>	<input type="checkbox"/>	
Networking	Is network established with site name, host name, Ethernet addresses, and IP address for the workstation?	<input type="checkbox"/>	<input type="checkbox"/>	
Completion Sign Off Pre-installation completed: _____ Date: _____ Customer: _____ Vendor's Representative: _____				

1.7.3 Network Readiness Table

Please fill in this table before equipment arrival.

Table 1–3: Network Readiness Table

Assigned by the Hospital Net Admin if connecting to the Hospital LAN. Otherwise assigned by local GE On-Line Center	Hostname	IP	AE Title	Dicom Port	Wired (Y/N)?
Acquisition Host					
Processing Host					
Hardcopy Host					
LAN Net Mask					
Gateway to other networks					
Other					
Insite phone line					
Hub or Switch					
Network Printer					
PACS system					

1.8 Time Schedule

1.8.1 Site Preparation

Time is a very important dimension for a project of this sort. If specific tasks are not completed in a timely manner, other tasks can be slowed, or even halted. It is important to allow the appropriate amount of time to accomplish each task. Before any work is started, it is advisable to secure commitments from contractors with respect to time requirements.

Check lists are provided in Appendix A to ensure that nothing is overlooked.

1.8.2 Job Progression

It is rarely advisable to have several trades working together at the same time. Generally speaking, the work should progress in the following manner:

1. Application to Regulatory Agencies for Site License.
2. Planning and preliminary design work.
3. Review of plans.
4. Revision of plans.
5. Drafting of final plans.
6. Application for construction permits.
7. Demolition (if required).
8. Structural revisions and framing.
9. Heating Ventilation and Air Conditioning (HVAC) rough-in.
10. Electrical rough-in.
11. Rough-in inspection.
12. Dry wall and wall covering.
13. Heating Ventilation and Air Conditioning (HVAC) trim.
14. Electrical trim.
15. Flooring, trim and painting.
16. Cleaning.
17. Final inspection.
18. Equipment installation.

1.9 Unloading Area

A suitable unloading area must be allocated. The unloading area must be large enough to accommodate the packed units, with additional space to allow for some of the system components to be unpacked.

The Weight and Dimensions of the shipped packages are given in Chapter 2 [Table A–1 to Table A–4](#)

From the unloading site, there must be a free path to wheel the units into the installation room or into a lift which will carry them to the installation site. The path specifications are given in [Section 3.3](#). Special facilities must be provided if the units are to be transferred from an unloading site outside the building.

1.10 System Installation

The optimal installation time of the basic system, assuming that *all* system parts arrived in proper working conditions, and assuming proper site preparation and acceptable site temperature, is two working days plus half an additional day for Xeleris installation.

Important

The presence of the Field Engineer is mandatory for the entire time period.

1.11 Manpower Requirements

All personnel participating in unpacking, conveying and installing the camera must be suitably qualified and approved. Specific manpower requirements for the various installation stages of the camera are shown in [Table 1–4](#) and [Table 1–5](#).

Table 1–4: Manpower Requirements - Unpacking, Conveying

Component	Task and Manpower
Gantry	Unpacking: 2 persons
	Conveying (with transport wheels) - 2 persons: <ul style="list-style-type: none"> • 1 persons (at least) to push the Gantry • 1 person in the front to steer the Gantry
Patient Table	Conveying with integral wheels - 2 persons
Collimators and Workstation	Unpacking: at least 1 person
	Conveying: at least 1 person

Table 1–5: Manpower Requirements - Installation

Procedure	Manpower
System Mechanical Installation	1 qualified Field Engineer and at least 1 assistant
System Calibration	1 qualified Field Engineer
Acceptance Test	1 qualified Field Engineer

1.12 Dust and Dirt Removal

The computer hardware is cooled with small cooling fans mounted in various locations in the equipment. The equipment is sensitive to dust and dirt that may be drawn into the electronics by the cooling fans. Therefore, special attention should be given to cleaning the room. All dust and residue should be removed as an ongoing activity, and as a last step in the preparation process before bringing any of the equipment into the suite area. All such debris must be removed as it accumulates. The best cleaning method for removing dust and dirt, particularly fine dust is to use of a vacuum cleaner, not sweeping.

Note

Just before the equipment is set in place is a good time to perform a thorough cleaning and sanitizing of the site. There may never again be an opportunity to execute such a detailed cleaning of these areas.

1.13 Site Safety

1.13.1 Site Management

- Continually gather up and remove debris to keep the work site orderly.
- Plan for the disposal of scrap, waste and surplus materials.
- Keep the work area and all equipment tidy. Designate areas for waste materials and provide suitable containers.
- Keep stairways, passageways and gangways free of material, supplies and obstructions.
- Remove or bend over nails protruding from lumber.
- Do not allow rubbish to fall freely from any level of the project. Use chutes or other approved devices to dispatch the materials.
- Do not throw tools or other materials.
- Do not raise or lower any tool or equipment by its own cable or supply hose.

1.13.2 Flammable Material Storage

- Store flammable or explosive materials such as gasoline, oil and cleaning agents apart from other materials.
- Keep flammable and explosive materials in proper containers with contents clearly marked.
- Post signs prohibiting smoking, open flames and other ignition sources in areas where flammable and explosive materials are stored.
- Ventilate all storage areas properly.
- Ensure that all electric fixtures and switches are explosion-proof where flammable materials are stored.

1.13.3 Head Protection

Head protection (hard hats) must be worn in areas where there is a possible danger of head injuries from impact, flying or falling objects.

1.13.4 Fire Protection

Fire fighting equipment and fire warning systems should be installed on the site, in accordance with local regulations.

Fire fighting equipment must be strategically located, clearly marked and readily accessible at all times. The fire extinguishers must be periodically inspected, and maintained in operating conditions.

Important**Never throw water on an electrical fire**

Water is an excellent conductor of electricity, and if water is thrown on an electrical fire, it will only spread the fire. For electrical fires a chemical fire extinguisher is recommended.

1.13.5 Electrical Protection

1.13.5.1 Power Tools

- Switch tools OFF before connecting them to a power supply.
- Disconnect power supply before making adjustments, fitting attachments or changing blades.
- Ensure tools are properly grounded or double-insulated. The grounded tool must have an approved 3-wire cord with a 3-prong plug and plugged into a properly grounded 3-pole outlet.
- Do not bypass the switch and operate the tools by connecting and disconnecting the power cord.
- Do not use electrical tools in wet conditions or damp locations unless tool is connected to a GFCI.
- Do not clean tools with flammable or toxic solvents.
- Do not operate tools in an area containing explosive vapors or gases.
- Keep power cords clear of tools during use.
- Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.
- Do not carry electrical tools by the power cord.
- Do not tie power cords in tight knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.
- Check the insulation around the power cord to make sure it is in good condition. You should not see any exposed wires or frayed ends. Power cords in poor condition should be replaced, never taped or spliced.

1.13.5.2 Outlets and Extension Cords

- Make sure all electrical outlets are three-hole, grounded outlets. If there is water in the area, there should be a GFI or Ground Fault Interrupter outlet.
- There should be ample electrical capacity to run equipment without tripping circuit breakers or blowing fuses.
- Minimize extension cord use. Never place them under rugs. Use extension cords sparingly and check them periodically

- Don't use extension cords in areas that receive a lot of traffic because not only will it cause someone to trip, but constant traffic will wear out the insulating rubber cover.

1.13.6 Eye and Face Protection

Eye and face protection must be provided when machines or operations present potential for hazardous eye or face injury.

Chapter 2 – System Specifications

2.1 Overview

The Ventri System is made up of five main components:

- Gantry (with Detectors).
- Integrated Power Supply (IPS).
- Patient Table.
- Acquisition Station.
- Storage Cabinet for Collimators.
- Console Cart

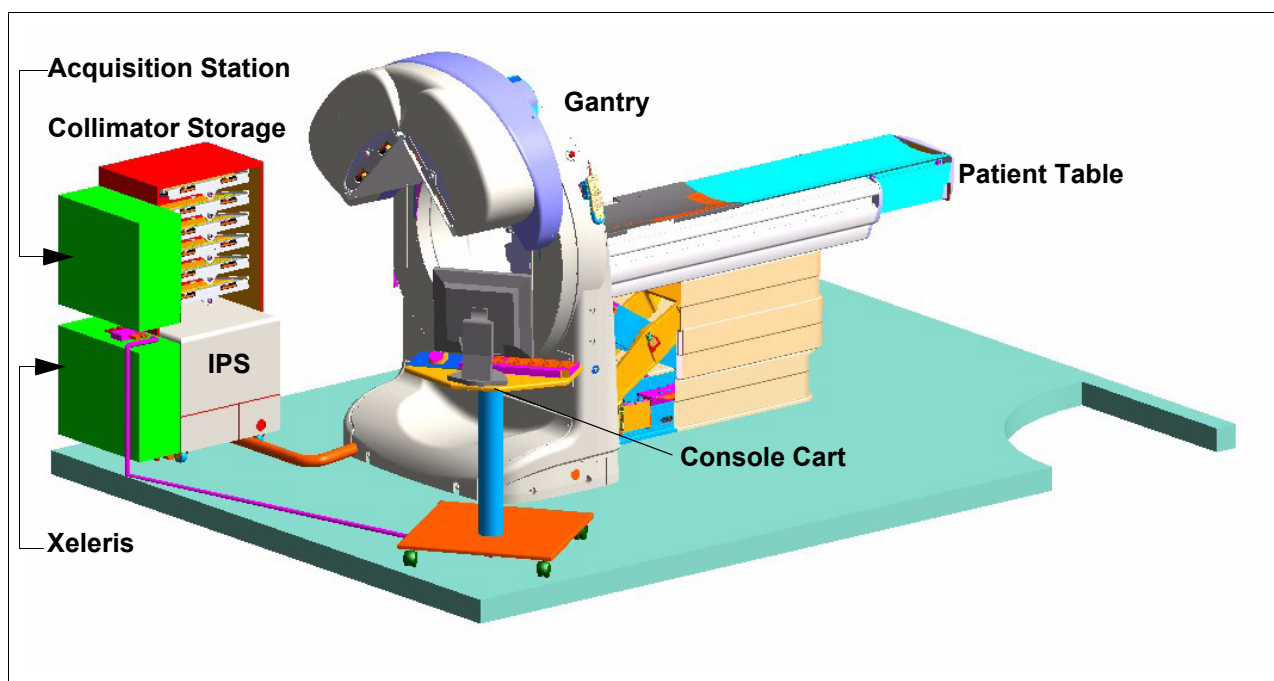


Figure 2-1 Ventri System Components

The Ventri system is normally supplied together with an Xeleris Workstation. In this configuration both computers use a common mouse, keyboard and monitor. Switching between computers is performed automatically via a KVM switching unit.

In cases where Xeleris is using the same keyboard and monitor as the acquisition station, the Xeleris workstation should be located on the bottom shelf (as illustrated)

If the Xeleris workstation is installed independantly, the acquisition computer can be located on the bottom shelf .

2.2 Weights and Dimensions of System Components

Weights and dimensions of the unpackaged system components are shown in [Table 2–1](#).

Table 2–1: System Component Weights & Measurements

Unit	Net Weight	Measurements / mm (in)		
	kg (lbs)	Height	Width	Depth
Gantry (without detectors)	590 (1300)	1550 (61.0)	1250 (49.2)	830 (32.7)
Gantry Full Configuration (with detectors)	650 (1433)	1550 (61.0)	1250 (49.2)	830 (32.7)
Collimator General	2 x 13 (2 x 29)	80 (3.2)	440 (17.3)	340 (13.4)
Collimator High Res	2 x 12 (2 x 27)	75 (3.0)	440 (17.3)	340 (13.4)
Table & Stretcher	260 (573)	550 (21.6)	550 (21.6)	1400/1950 ^a (55) (77)
IPS	78 (172)	545 (21.5)	520 (20.5)	565 (22.3)
Collimator Storage Cabinet	46 (101)	1208 (47.6)	630 (24.8)	514 (20.3)
Collimator Storage Cabinet with shelf and computer		1208 (47.6)	795 (31.3)	514 (20.3)
PC Cart	15 (33)	1800 (70.9)	759 (29.9)	802 (31.86)

a. 1400 (55) = Base size; 1950 (76.7) = Pallet size

Chapter 3 – Packing, Unloading, Access and Conveyance Information

3.1 Packing

3.1.1 Gantry

The gantry is shipped in a wooden container with the detectors already fitted. The container is designed to provide limited protection against mechanical impact during the shipments. The Gantry covers are shipped in a separate container.

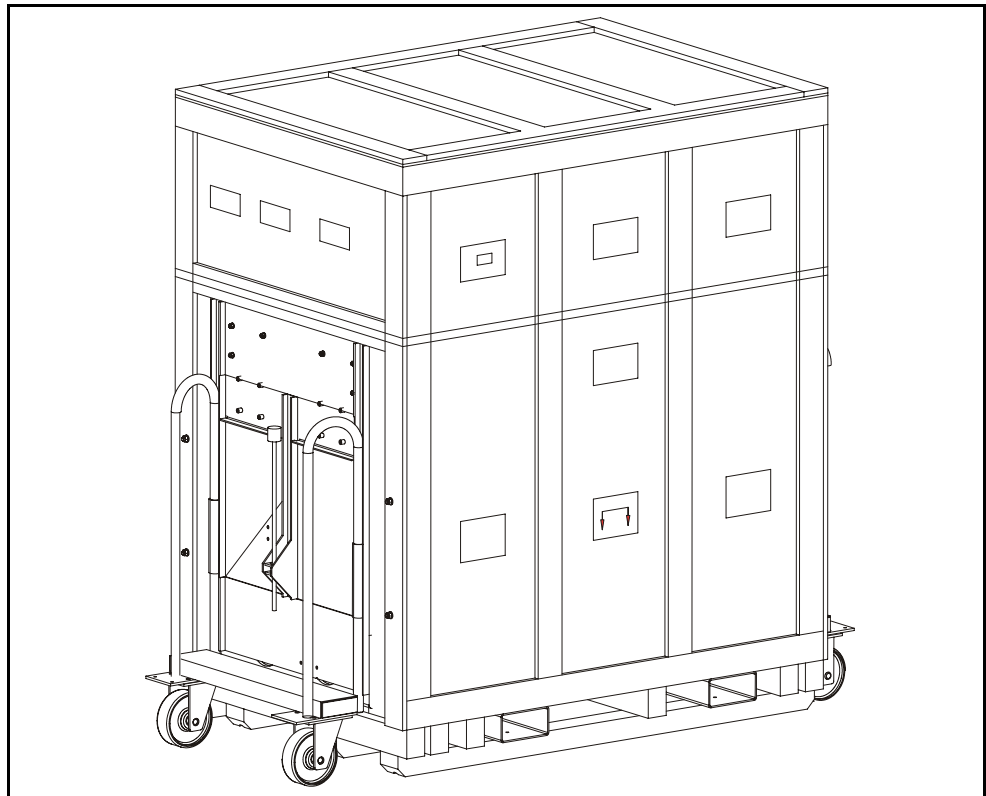


Figure 3-1 Gantry Shipping Container

The Gantry Weights and Measurements are listed in [Table 3-1](#)

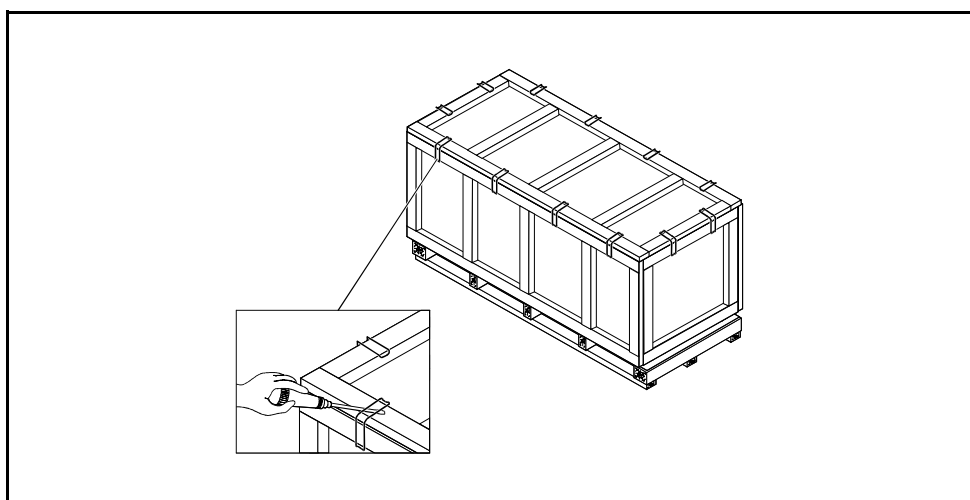
The weights and dimensions of the shipped packages (crated) are given in [Table 3-1](#), [Table 3-2](#) and [Table 3-3](#) or [Table A-1](#), [Table A-2](#) and [Table A-3](#).

Table 3–1: Gantry Crated Weights and Measurements

Unit	Weight	Dimensions / mm (in)		
	kg (lbs)	Height	Length	Width
Gantry & Detectors	800 (1764)	1800 (70.9)	1900 (74.8)	1000 (39.4)

3.1.2 Patient Table

The Patient Table is shipped in a wooden container designed to support the table and provide limited protection against mechanical impact.

**Figure 3-2** Patient Table Packing Container

The Weights and Measurements of the Patient Table are listed in [Table 3–2](#). Weights and dimensions of the unpacked system modules are shown in [Table 2–1](#)

Table 3–2: Patient Table Crated Weights and Measurements

Unit	Weight	Measurements / mm (in)		
	kg (lbs)	Height	Width	Depth
Table	500 (1120)	800 (31.5)	700 (27.6)	2100 (82.7)

3.1.3 System Components Shipping Container

Table 3–3 contains a list of the items shipped in the System Components shipping container.

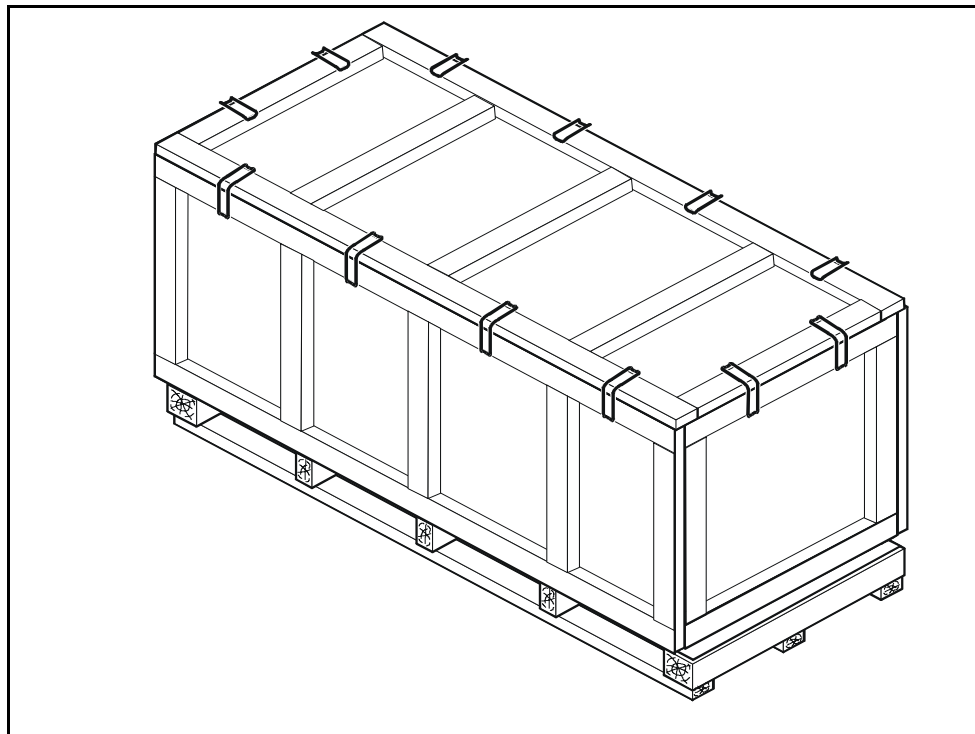


Figure 3-3 System Components Shipping Container

Table 3–3: System Components Container Crated Weights and Measurements

Unit	Weight	Dimensions / mm (in)		
	kg (lbs)	Height	Width	Depth
System Components	± 300 (660) depending on options	800 (31.5)	1900 (74.8)	1400 (55.1)

Table 3–4: Contents of Systems Components Container

Item	Mandatory/Optional
Two sets of collimators	Optional
Bar phantom	Optional
Decoy collimator	Standard Equipment
Two system cables	Standard Equipment
Acquisition accessories	Optional

Table 3–4: Contents of Systems Components Container

Item	Mandatory/Optional
Acquisition station and accessories	Standard Equipment
Collimator storage cabinet and accessories	Standard Equipment
ECG shelf	Optional
IV pole	Optional
ECG - Norav*	Standard Equipment
User Manuals and Service CD	Standard Equipment
IPS	Standard Equipment
Console Cart or wall unit	Optional
UGP500007 Video Position Set Ventri	Optional
UGP500010 KVM switch	Optional
Monitor 17" or 19"	Standard Equipment
Installation Kit UGP001592	Standard Equipment

* Other ECG Options may be available

The Weights and Measurements of the System Components shipping container are listed in [Table 3–3](#)

Weights and dimensions of the unpacked system modules are shown in [Table 2–1](#)

The weights and dimensions of the shipped packages (crated) are given in [Table 3–1](#), [Table 3–2](#) and [Table 3–3](#) or [Table A–1](#), [Table A–2](#) and [Table A–3](#).

3.2 Unloading Area

A suitable unloading area must be allocated. The unloading area must be large enough to accommodate the packed units, with additional space to allow for some of the system components to be unpacked.

The Weight and Dimensions of the shipped packages are given in [Section 3.1](#).

From the unloading site, there must be a free path to wheel the units into the installation room or into a lift which will carry them to the installation site. The path specifications are given in [Section 3.3](#). Special facilities must be provided if the units are to be transferred from an unloading site outside the building.

3.3 Access Path to Installation Area

From the unloading site, there must be a free path to wheel the components to the installation area, or into a lift which will carry them to the correct level. The size and weight specifications of the system components are given in [Table 3–5](#), and [Table 3–6](#).

It is important to verify that the route selected has sufficient clearance and load carrying capacity. Special facilities must be provided if the units are to be transferred from an unloading site outside the building

3.3.1 Access Specifications

3.3.1.1 Gantry

The Weights and Measurements listed below **include** the moving wheels.

Note

The access measurements mentioned in the manual are based on any position of the swiveled dolly wheels and a minimal gap from the wall of about 1.35". In some particular situations, the wheels may be swiveled to allow access through smaller doors and hallway dimensions. In the Site Preparation Manual we have to take into an account the most unfavorable position of wheels.

Table 3–5 shows the ratio between Doorway Size and Hall Width.

Figure 3-5 displays maneuvering the Gantry through a doorway vs. a hallway.

Table 3–5: Gantry - Measurements and Required Clearances

Minimum hall width allowing the Gantry to be wheeled around 90° corners	1,118 mm (43.9")
Minimum hall width to allow the Gantry to move through 914 mm (36") doorway	1,346 mm (53")
Minimum hall width to allow the Gantry to move through 1041 mm (41") doorway	1,186 mm (46.7")
Minimum hall width to allow the Gantry to move through 1113 mm (43.8") doorway	1,118 mm (44")
Minimum doorway allowing the Gantry to move through is 32" (813 mm)	1,555 mm (61.2") minimum hallway width

Important

The Moving Kit wheels have no braking mechanism.
Do NOT move or leave the Gantry on inclined surfaces.

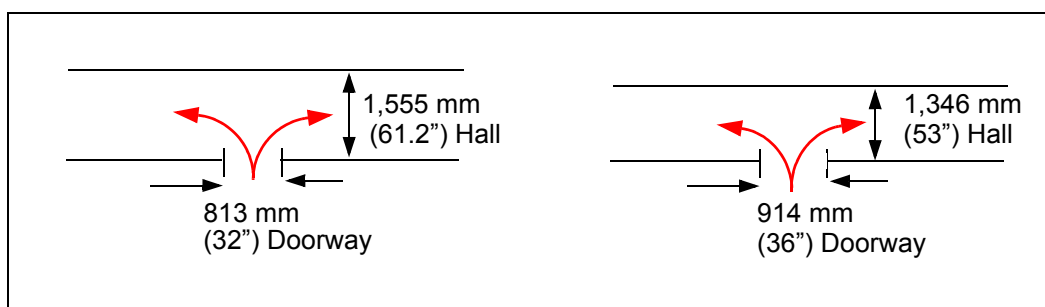


Figure 3-4 Doorway to Hall Width Ratios

Table 3–6: Patient Table - Weights, Measurements and Clearance

Path slope	< 4% (4 cm / 100 cm; 1.57" / 39.37")
Table length	1,800 mm (71")
Weight of Table mounted on moving wheels	320 kg (705.5 lb.)

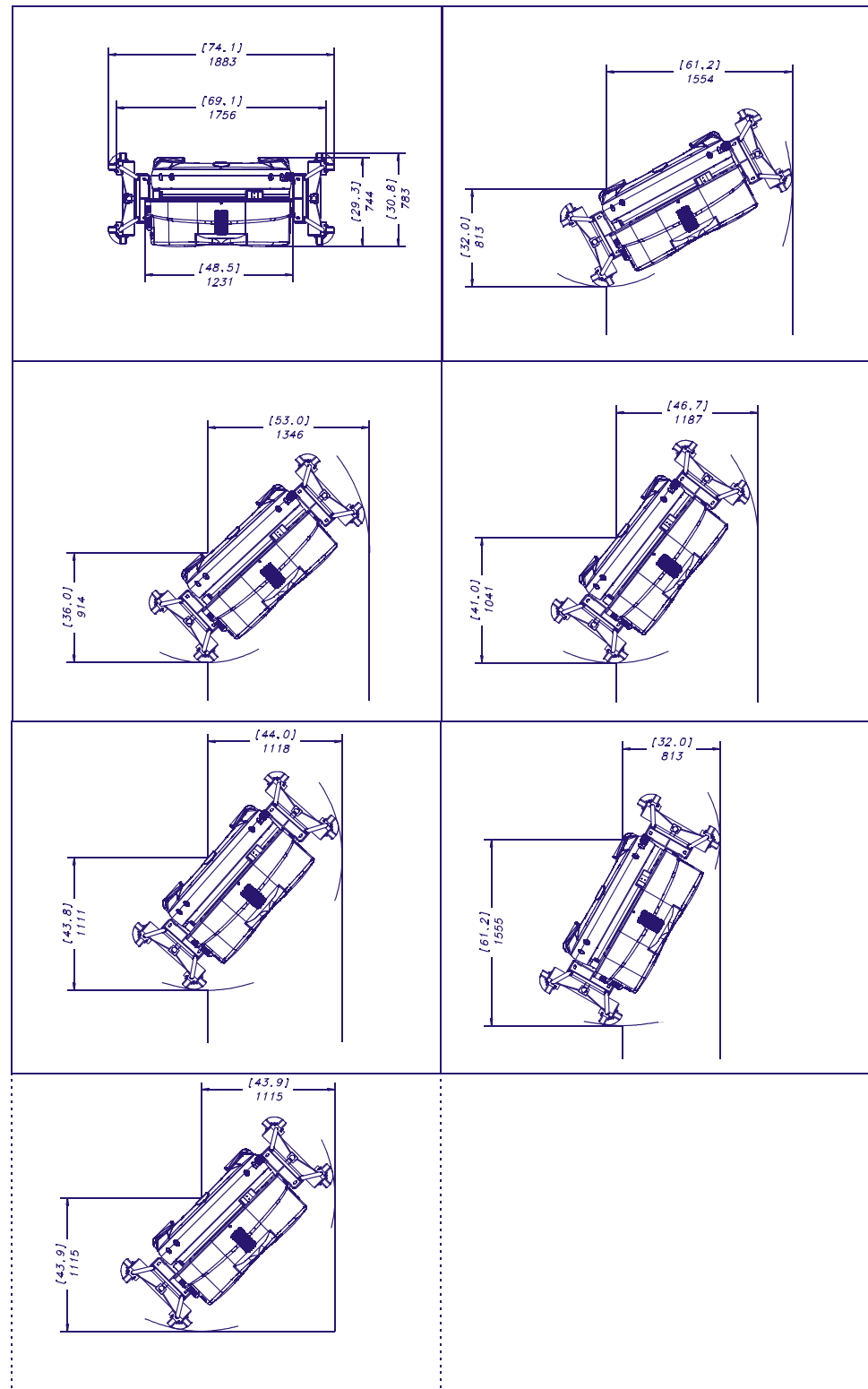


Figure 3-5 Maneuvering Gantry on Dolly: Doorway vs. Hallway

3.3.1.2 Table

Note

In some particular situations, the wheels may be swiveled to allow access through smaller doors and hallway dimensions. In the Site Preparation Manual we have to take into an account the most unfavorable position of wheels.

[Table 3–7](#) shows the ratio between Doorway Size and Hall Width.

[Figure 3-6](#) displays maneuvering the Gantry through a doorway vs. a hallway.

Important

The Table is shipped with the Stretcher fully retracted. Therefore the total length of the Table for maneuvering and installation is 60.5" (1537 mm).

Table 3–7: Table - Measurements and Required Clearances

Hall width to allow the Table to move through 813 mm (32") doorway	1,219 mm (48")
Hall width to allow the Table to move through 991 mm (39") doorway	991 mm (39")
Hall width to allow the Table to move through 1219 mm (48") doorway	813 mm (32")

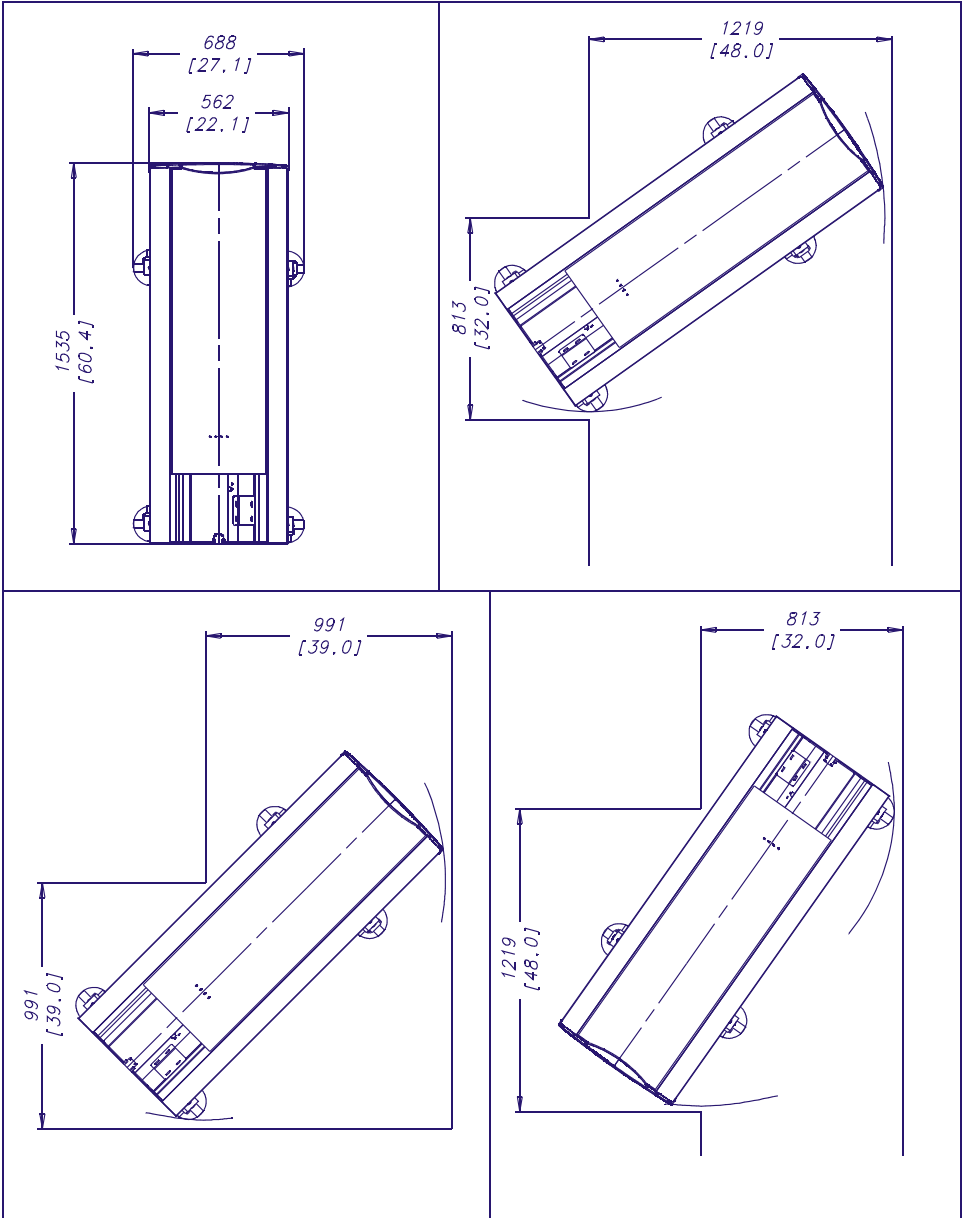


Figure 3-6 Maneuvering the Table: Hallway vs. Doorway

3.3.1.3 **Gantry Cart (Service Tool Part # 5169505)**

The Gantry Cart is designed for maneuvering in tight corridors.

Note

In some particular situations, the wheels may be swiveled to allow access through smaller doors and hallway dimensions. In the Site Preparation Manual we have to take into an account the most unfavorable position of wheels.

Table 3–8 shows the ratio between Doorway Size and Hall Width.

Figure 3-7 displays the Gantry mounted on the Gantry Cart.

Figure 3-8 and Figure 3-9 display the flow for unpacking and assembly of the Gantry Cart.

Table 3–8: Gantry Cart - Measurements and Required Clearances

Minimal doorway for Gantry Cart to move through 813 mm (32 ")	1245 mm (49") Minimum hallway
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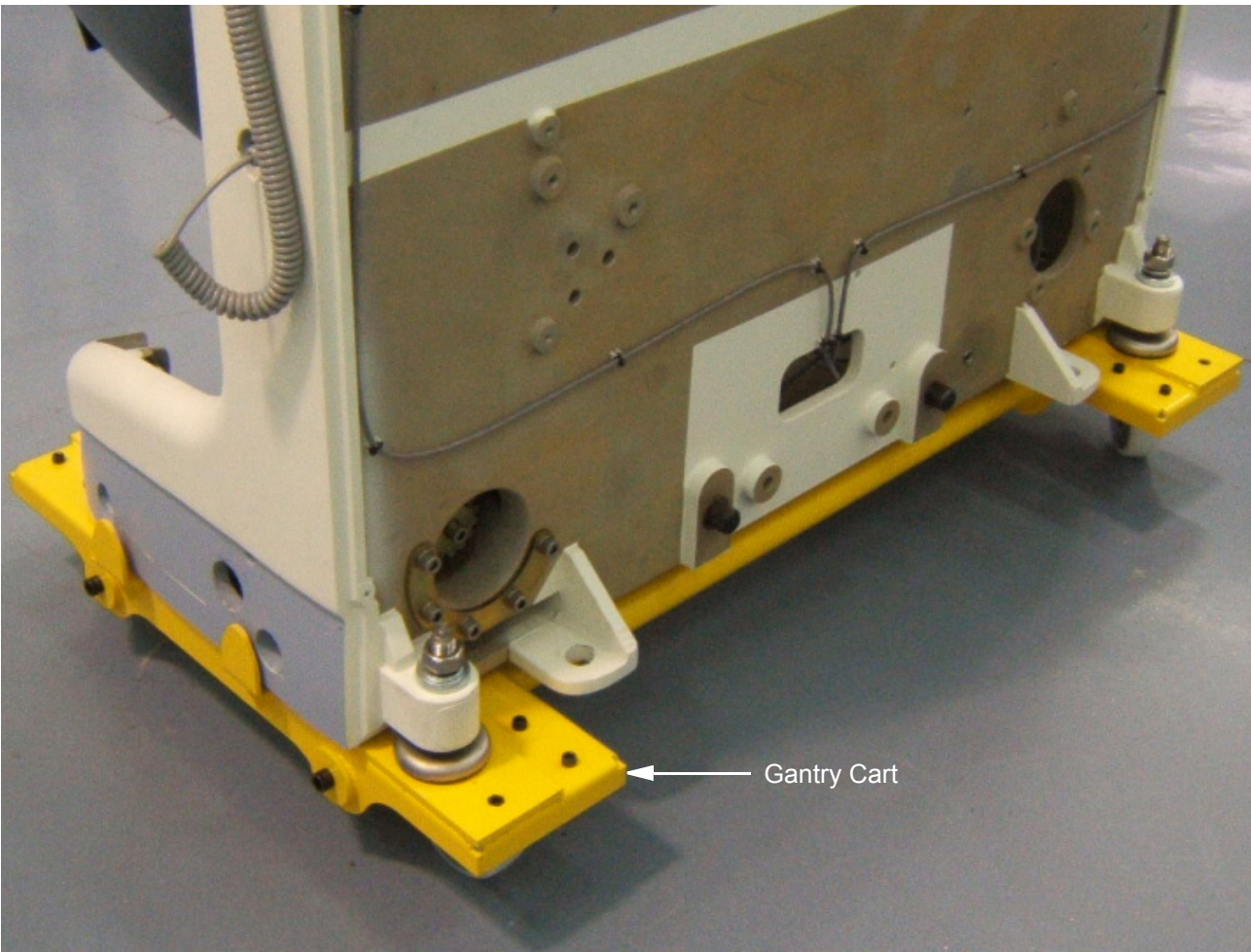


Figure 3-7 Gantry Cart

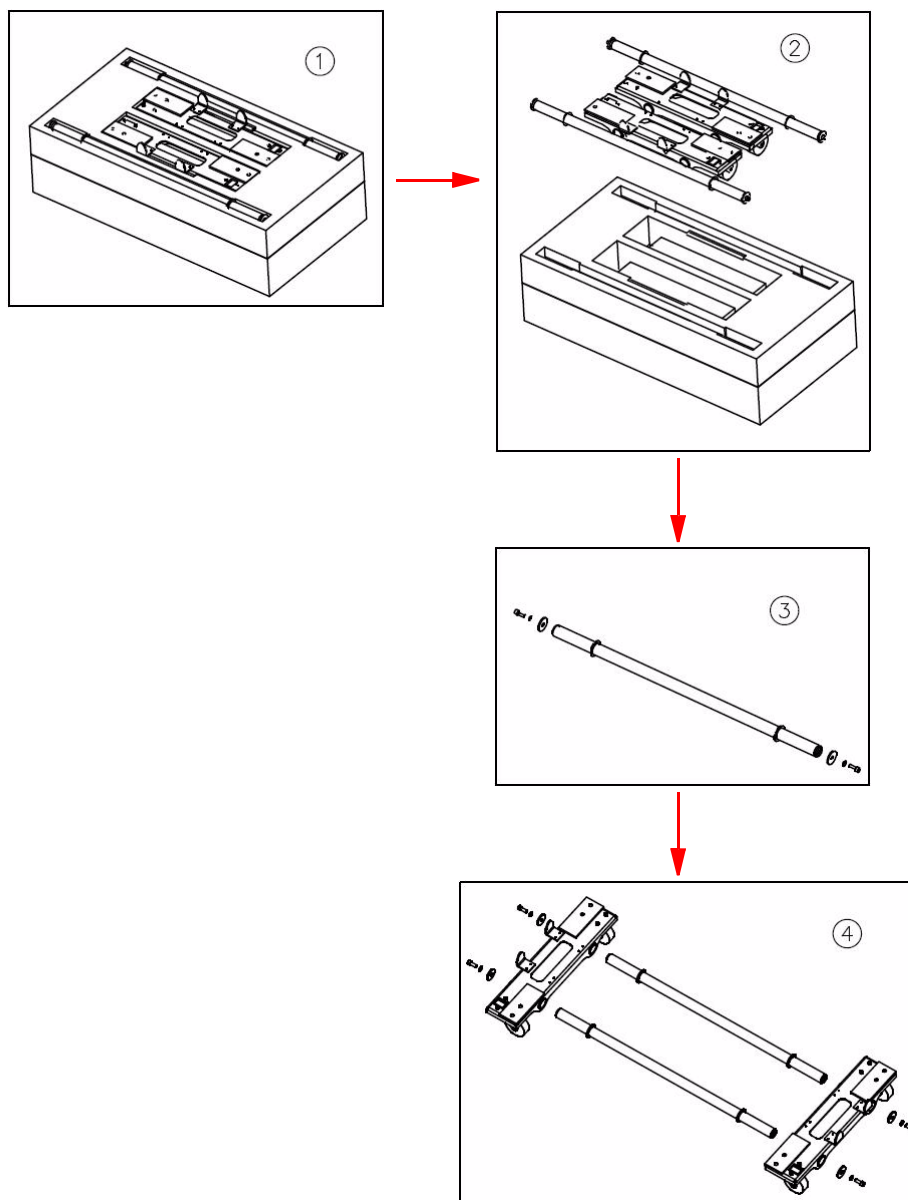


Figure 3-8 Unpacking and Assembling the Gantry Cart - 1

See [Figure 3-9](#) for the continuation of unpacking and assembling the Gantry Cart.

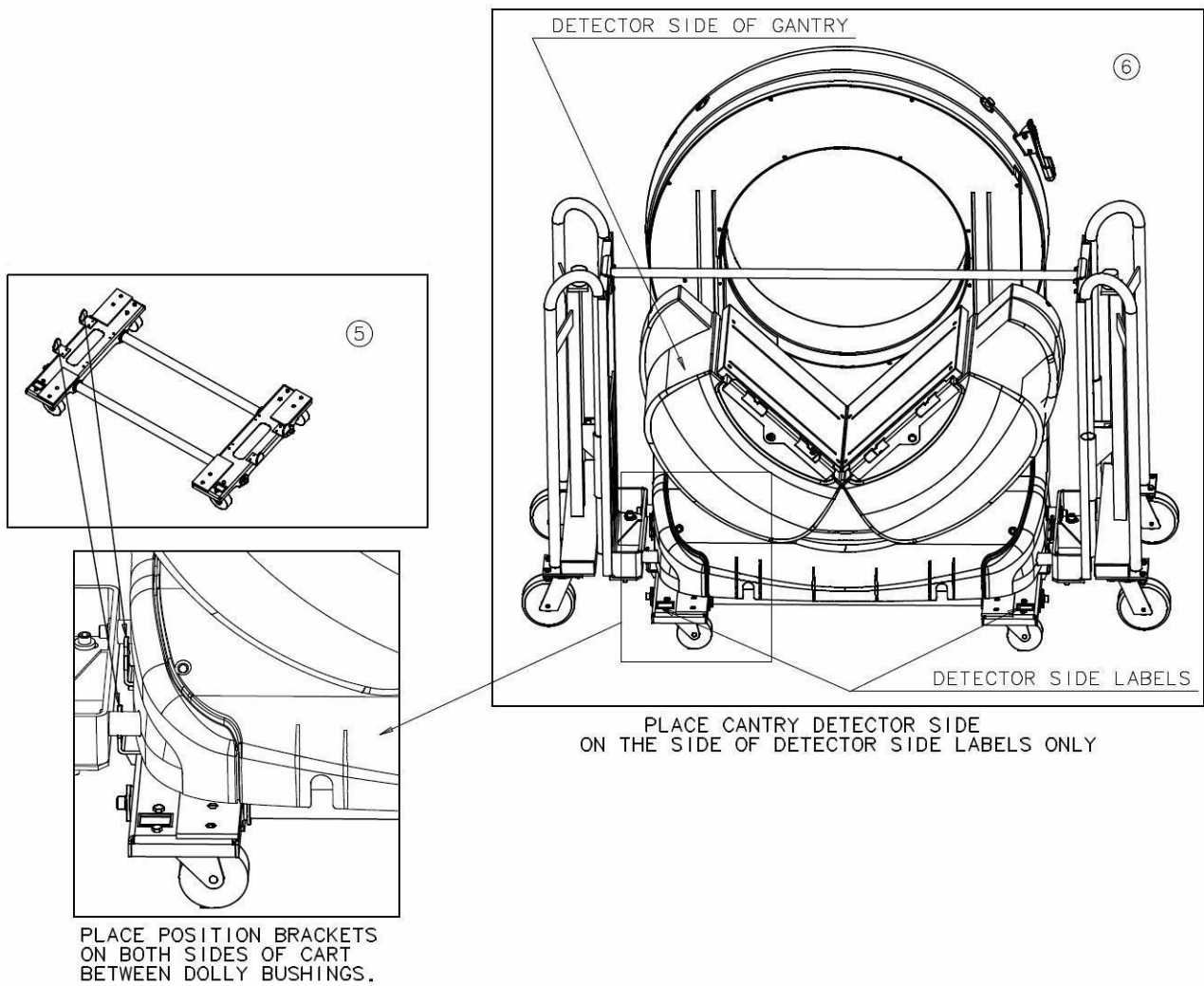


Figure 3-9 Unpacking and Assembling the Gantry Cart - 2

Chapter 4 – Physical Planning of the Site

4.1 Selecting the Site

The Ventri System requires one room, which will contain the following sub-systems:

- Gantry
- Table
- Computer, Monitor, Keyboard and Mouse
- Integrated Power Supply
- Collimator Storage Cabinet

Optional separate rooms are recommended for the following utilities:

- Office/Viewing/Processing Room
- Patient waiting room
- Patient preparation room
- Hot lab

Two examples of scan room layouts (minimum and recommended) are presented in [Figure 4-1](#), [Figure 4-2](#) and [Figure 4-4](#).

The selection of the scan area should be based on the following considerations:

- Feasibility of Emergency Stop Unit installation within operator reach
- Influence of the surrounding rooms (radioactive or magnetic sources)
- Distance to "hot areas" such as:
 - Hot laboratory
 - Patient toilets
 - Patient waiting/preparation rooms
- Distance from diagnostic area such as:
 - Processing room
 - Viewing room
- Floor loading capacity, as per [Section 4.5.1](#)

The layout of the system inside the room should be based on the following considerations:

- Position relative to the camera:
 - Gantry - Acquisition Station cable limitations
 - Convenient accessibility to Gantry and Table for daily activity
- Access to communication lines (for details refer to Chapter 7):
 - Ethernet connection
 - Telephone connection for Modem, if relevant
 - Connection to hardcopy device, if it is to be directly connected to the system
- The clearance area required for servicing the Ventri system.

4.2 Operator Safety

4.2.1 Radiation Shielding

Appropriate barriers such as walls, lead-shielded glass, lead shields, etc. must be installed to protect staff from unnecessary exposure to radiation. Since the Ventri system will involve the use and storage of radio nuclides, a qualified radiological health physicist must be consulted in the design of walls, and/or safety barriers, to assure appropriate attenuation.

Keep in mind that patients become significant sources of radioactivity. Consideration should be given to maximize the distance between the patient and operator during the uptake and acquisition phases of scan procedures.

4.2.2 Background Radiation

In order to facilitate and improve service and field calibration, all radiation sources should be suitably shielded.

In case the room is close to the injection room or to the hot room (where the technologists prepare or receive the radioactive source) or to the patient waiting room (after injection), a careful background level verification should be performed.

Using a standard radiation counter, verify that at a height of between 0.5 to 1.5 meters above floor and a distance of between 0 to 10 cm of the room wall, the radiation background is lower than 0.1 mR/h. In case of failure, a lead shield wall should be added. In most of the cases a 5 mm lead wall will reduce the background level below the above value.

4.3 Required Systems Clearances

Consult your local GE Sales and Service Representative about your specific needs. Some possible room size dimensions are shown in the table below. These room size dimensions are table dependent.

4.3.1 Room Size Dimensions

Room Options	Size in cm (feet)
Minimum room size	267 (8'9") x 359 (11'9")
Recommended room size	290 (9'5") x 412 (13'5")

Component dimensions are in table [Figure 4-6](#) through [Figure 4-10](#) of this document. Consult your local General Electric Installation Specialist for your appropriate room specifications. For equipment clearance requirements, refer to [Section 2.0](#). Remember, sufficient Regulatory and Service clearances must be maintained around equipment for full operation, service and safety.

Cable length is an important consideration in room layout. The system is shipped with standard length cables. See [Table A-5](#).

Note, also, that the cable should enter the gantry from the rear side. Alternate cable entry is possible to the left or right of the gantry.

Excess cable length can be stored behind the Collimator Stand or IPS. Long cable must not be cut or shortened. All NEC 70-E Electrical Regulations must be observed.

4.3.2 Regulatory and Service Clearances

4.3.3 Regulatory Clearances

MINIMUM CLEARANCES UNDER U.S. FEDERAL REGULATIONS AND NATIONAL STANDARDS: 29 CFR 1910 (OSHA), NFPA 70E (STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE), AND NFPA 101 (LIFE SAFETY CODE):

A diagram of clearance requirements for U.S. regulatory compliance is shown in [Figure 4-1](#). See the clearance tables on the following pages for detailed dimensional clearances.

Please note all systems installed in the United States must comply with all Federal and local regulations.

For installations outside the United States, country-specific or other local regulatory clearance requirements must be met.

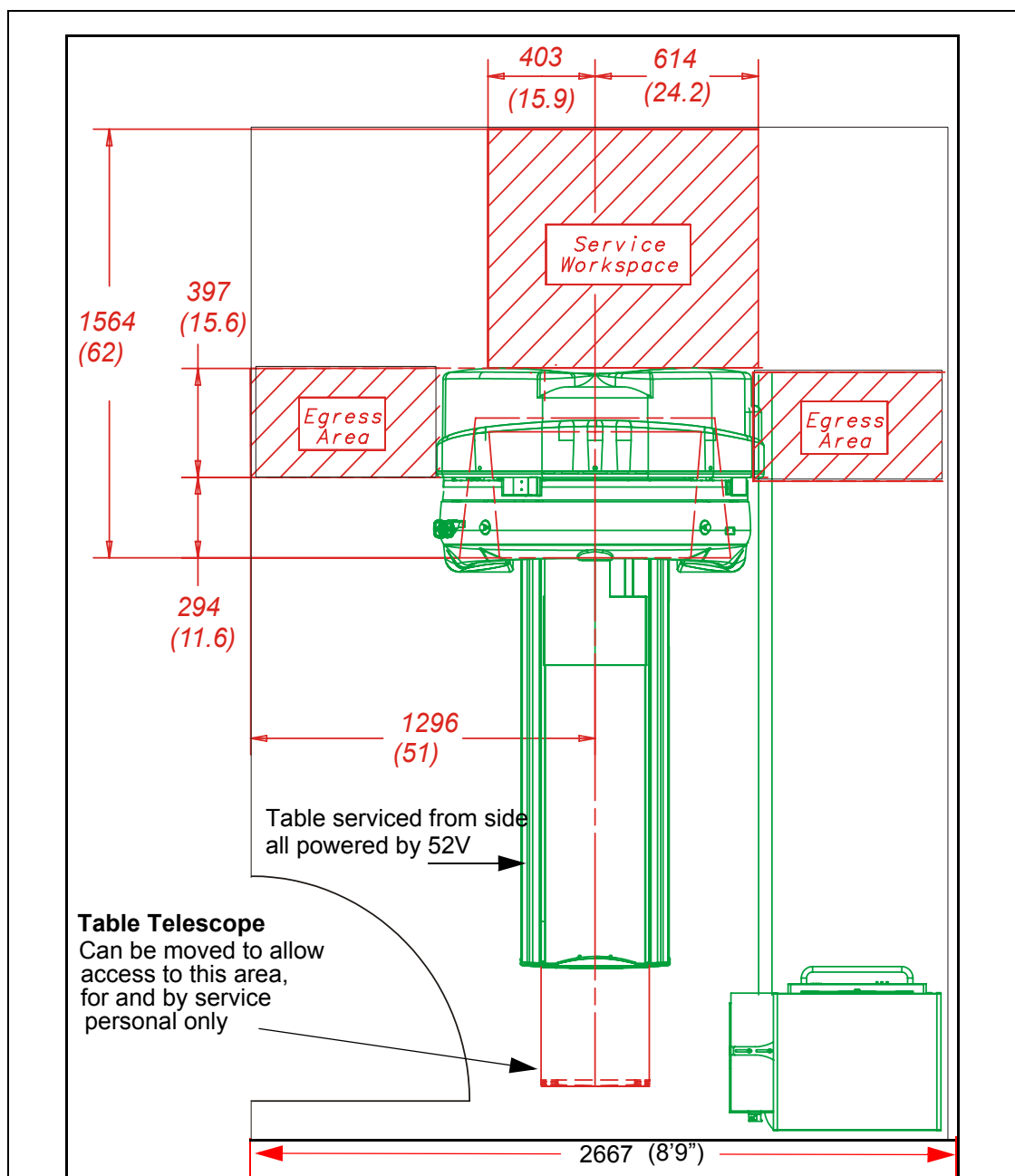


Figure 4-1 Clearance Requirements for U.S. Regulatory Compliance

Note

The Egress Area can be defined either side of the system, depending on equipment positioning and space availability

4.3.4 Regulated Minimum Working Clearance by Major Subsystem

- Requirements apply to equipment operating at 600 V or less, where examination, adjustment, servicing, or maintenance is likely to be performed while live parts are exposed.
- Direction of Service Access is defined as perpendicular to the surface of the equipment being serviced.
- Required regulatory clearance distances must be maintained and may not be used for storage. This includes normal system operation as well as service inspection or maintenance.
- For the Gantry and Table, distances are measured from the enclosure, not the finish covers.

Work Space Requirement	Min Clear Space in mm (inches)	Additional Conditions
Direction of Service Access	914.4 (36)	*48 inches (1219.2 mm), if exposed live parts of 151 - 600 volts are present on both sides of workspace with the operator between *42 inches (1066.8 mm), if opposite wall is grounded and exposed live parts of 151 - 600 volts are present.
Service Access Width	762 (30)	This is the width of the working space in front of the equipment. 30 inches (762 mm) min or the width of the equipment, whichever is greater

4.3.5 Terms and Definitions

EGRESS

The path of exit from within any room. U.S. regulatory requires a minimum of 28 inches (711.2 mm) of continuous and unobstructed space including trip hazards along the path of exit.

WORK SPACE

This is the dimensional box required for safe inspection or service of energized equipment. It consists of depth, width, and height. The depth dimension is measured perpendicular to the direction of access. U.S regulation is minimum of 36 inches (914.4 mm). Additional conditions can increase the

minimum requirement. FCT defines this as the envelope of the component superstructure. For the gantry and table, it is with the patient or external covers removed.

SERVICE ACCESS WIDTH

This is the width of the working space in front of the equipment, a minimum of 30 inches (762 mm), or the width of the equipment whichever is greater.

HEAD CLEARANCE

This is the height dimension of “Work Space”. The height of the workspace measured from floor at the front edge of equipment to ceiling or overhead obstruction(s), 78 inches (1981.2 mm) or height of equipment, which ever is greater.

GROUNDING WALL

Any wall that can be electrically conductive to earth ground. Masonry, concrete, or tile, are considered conductive. Additional commonly found aspects of a wall should also be considered as grounded. This is not an all-inclusive list:

- Medical Gas ports
- Metal door and window frames
- Water sources and metallic sink structures
- Metallic wall mounted cabinets
- A1 disconnect panel
- Equipment Emergency Off panels
- Industrial equipment such as air conditioners and vents
- Expansion joints

The following are not considered as grounded elements of a common wall:

- Standard wall outlet
- Light switches
- Telephones
- Communication wall jacks

MINIMUM

The lowest limit permitted by law or other authority.

DIMENSIONS AND CLEARANCES

Consisting of, or representing the lowest possible amount of degree for freedom permissible for equipment siting. This relationship must meet all safety, service, and regulatory requirements to be acceptable.

PRE-INSTALLATION ESCALATION

Process to consult with Engineering, the Design Center or EHS regarding pre-installation issues related to your siting concerns.

4.4 Room Layouts

Examples of typical room layout is shown in [Figure 4-1](#), [Figure 4-2](#), and [Figure 4-4](#) respectively.

- The minimum room size is 11'9 x 8'9 inches (363 x 253 cm)
- The recommended room size is 13'5 x 9'5 feet (412 x 290 cm)

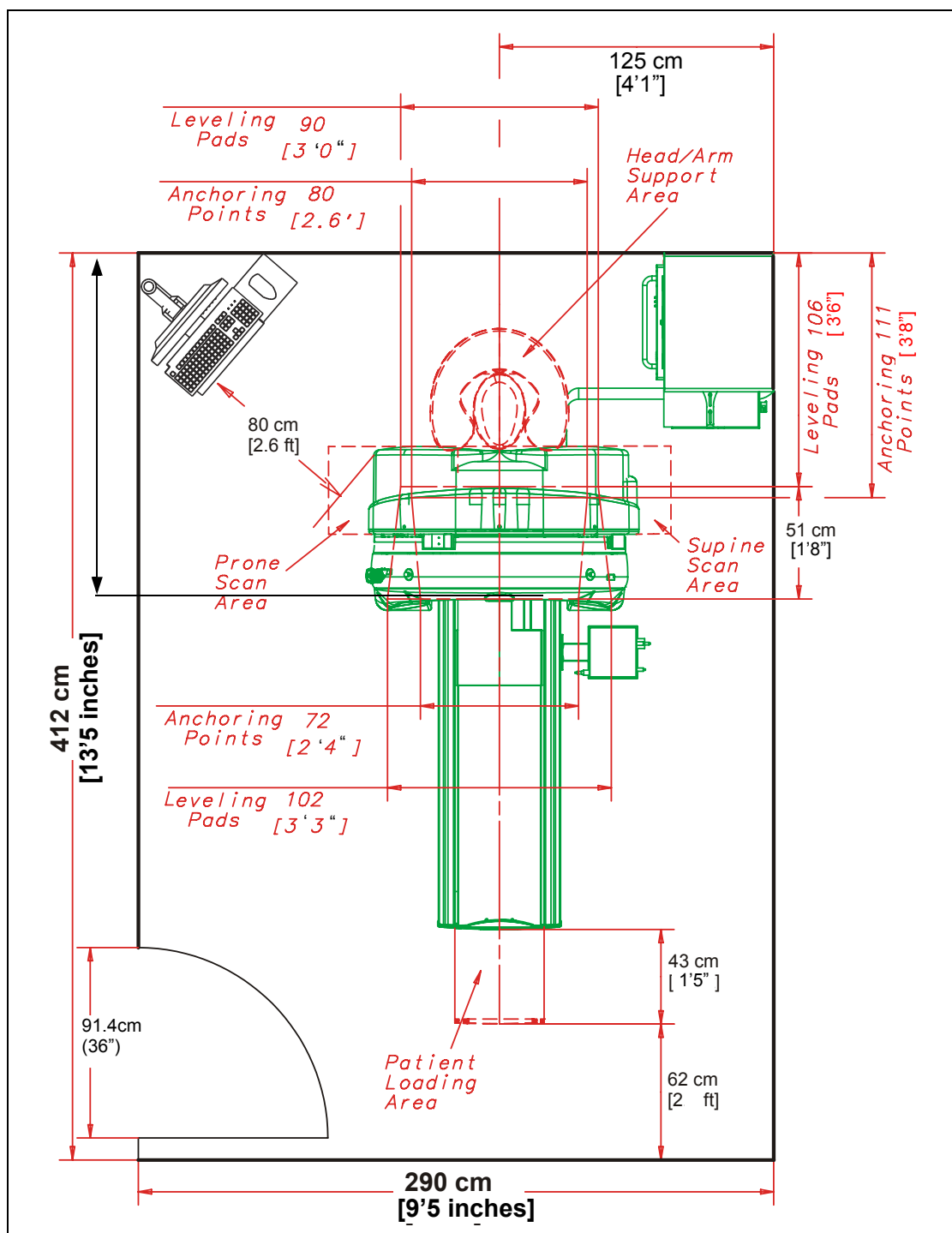


Figure 4-2 Recommended Room Layout - Wall Mounted Computer Console

Note

1. For safety reasons, 1564 (6;2") is the minimum required distance from the wall. Where possible, this distance should be increased
2. The room size of 411.5 (13'5") x 289.6 (9'5") allows for future upgrade to AC option

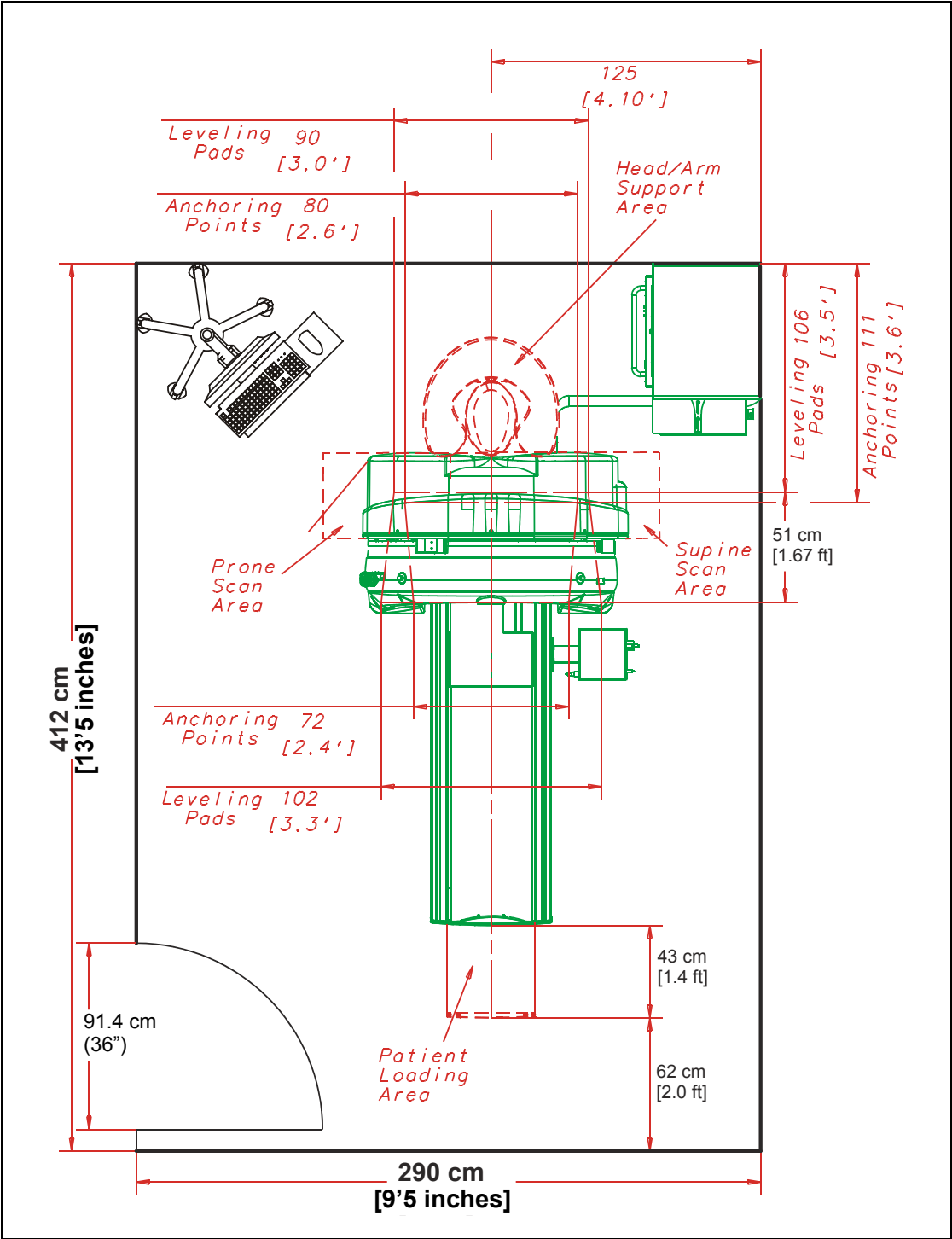


Figure 4-3 Recommended Room Layout - Mobile Computer Console

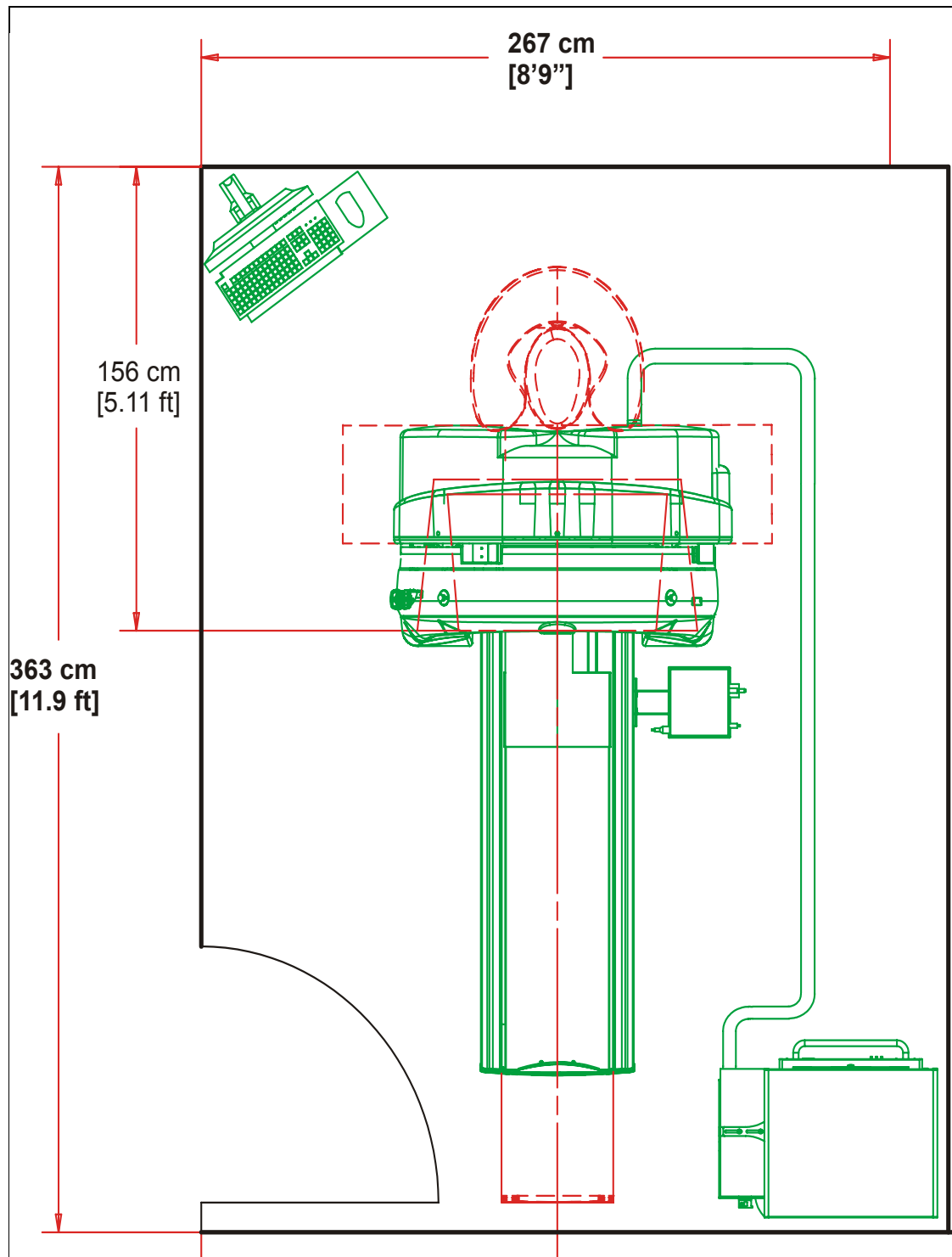


Figure 4-4 Minimum Room Layout - Straight

Note

1. For safety reasons, 1564 (6;2") is the minimum required distance from the wall.
Where possible, this distance should be increased
2. The room size of 411.5 (13'5") x 289.6 (9'5") allows for future upgrade to AC option

4.5 Floor Preparation

The floor must be capable of supporting the weight of the equipment and accessories described in [Section 4.5.1](#).

The floor slope and flatness must meet the requirements listed in [Section 4.5.2](#).

4.5.1 Floor Loading

The Static load of the system on the floor is:

- Static load: Gantry weight of 650 kg (1433 lbs) on four pads above a footprint of 950 x 500 mm (37.4 x 19.7”).
- The Scanning Table weighs about 320 kg (717 lbs).

Note

The front of the table is permanently connected to the Gantry and the back of the table is supported by two pads.

The weight distribution of entire system is shown in [Figure 4-5](#)

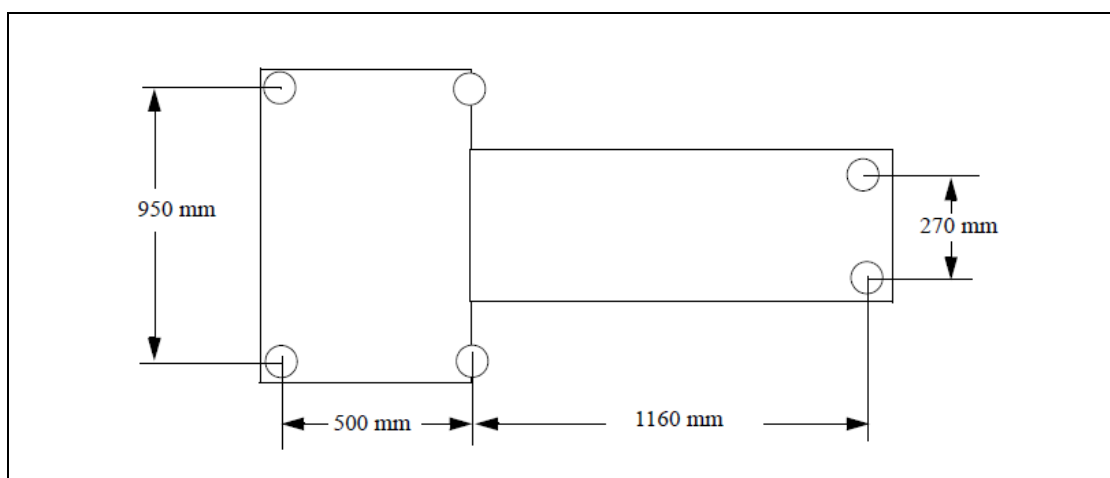


Figure 4-5 Weight Distribution Diagram

4.5.2 Leveling and Flattening the Floor Area

Important

No fill material should be used to compensate for holes or depressions in the floor surface. If necessary, level and flatten the entire floor area.

The floor of the scan room must conform to the following specifications ([Table 4–1](#))

Table 4–1: Floor Leveling Specifications

Slope	Within + $1\frac{1}{16}$ " over 170" (+ 3 cm over 430 cm)
Flatness	Surface should be smooth and have no more than $\frac{3}{16}$ " (0.5 cm) deviation in any 60" (152 cm) throughout the room or system installation area
Floor Surface	Floor should have one single poured surface.

4.6 System Cables

All system cables are routed above ground.

- System power cable from IPS to main distribution box - 5 meters
- Ganty to IPS cable - 4 meters
- KVM switch to monitor/keyboard cable - 5 meters

Chapter 5 – Power Requirements

5.1 Introduction

The Integrated Power Supply (IPS) supplied with the Ventri system transforms and distributes power to all system components. When an Xeleris workstation is supplied, it will receive its power supply from the IPS. The IPS is the only power entry point required to operate the system.

To minimize voltage regulation effects, power wiring between the facility main distribution panel and the IPS should be kept as short as possible.

When routing the power cables, the mains power cord and ground must be run in the same conduit or raceway.

In addition sufficient regular AC Electrical Outlets must be provide to power peripherals and other scan room equipment. Recommendation:

- Two outlets close to the Collimator Storage cabinet
- Two outlets close to the monitor/keyboard area
- Two outlets behind the gantry for service purposes

5.2 System Input Power

5.2.1 Power Source Configuration

The Ventri is designed to operate on a single-phase power source.

A dedicated feeder from the nearest Main Distribution Panel (MDP) should be used to supply power to the system. In accordance with the National Electric Code (U.S.) and similar applicable national and local codes, a protective disconnect device must be provided in the power line supplying the IPS. It must be visible to system service personnel, and must have "lockout / tagout" provisions.

5.2.2 Rating

The Ventri system operates on single-phase power meeting the following specifications.

- **Voltage:** 115 VAC or 230 VAC
- **Rated Power:** 1.8 kVA

Voltage Tolerance	+10%, -5% from nominal
Load Regulation	Maximum 5% for load of 20A
Frequency	50 or 60 Hz \pm 1Hz

Spikes Line to Neutral		
Spikes	Phase Voltage	
	230 V Line	115 V Line
Spike "A"	< 1200 V	< 900 V
Pulse Width	< 10 μ s	< 10 μ s
Rise Time	> 1 μ s	> 1 μ s
Spike "B"	< 800 V	< 400 V
Pulse Width	< 100 μ s	< 100 μ s
Spike "C"	< 400 V	< 200 V
Pulse Width	< 200 μ s	< 200 μ s
High Frequency (Line to Neutral)	< 1V RMS 0.15 to 30 MHz	

5.2.3 Grounding

The ground wire should be bonded to the distribution panel through which it passes in accordance with local codes. The resistance between the IPS ground and the facility earth ground must not exceed 0.5 ohm. In addition, the total resistance between the IPS ground and earth must not exceed 2 ohms.

5.2.4 Grounding

The Ventri System is connected to Ground at a single point (see [Figure 5-1](#)). This point will be on the wall as a Ground Bus with a connection to a 5/16" hole Terminal Lug with a 1/4" screw, flat washer, spring washer and nut.

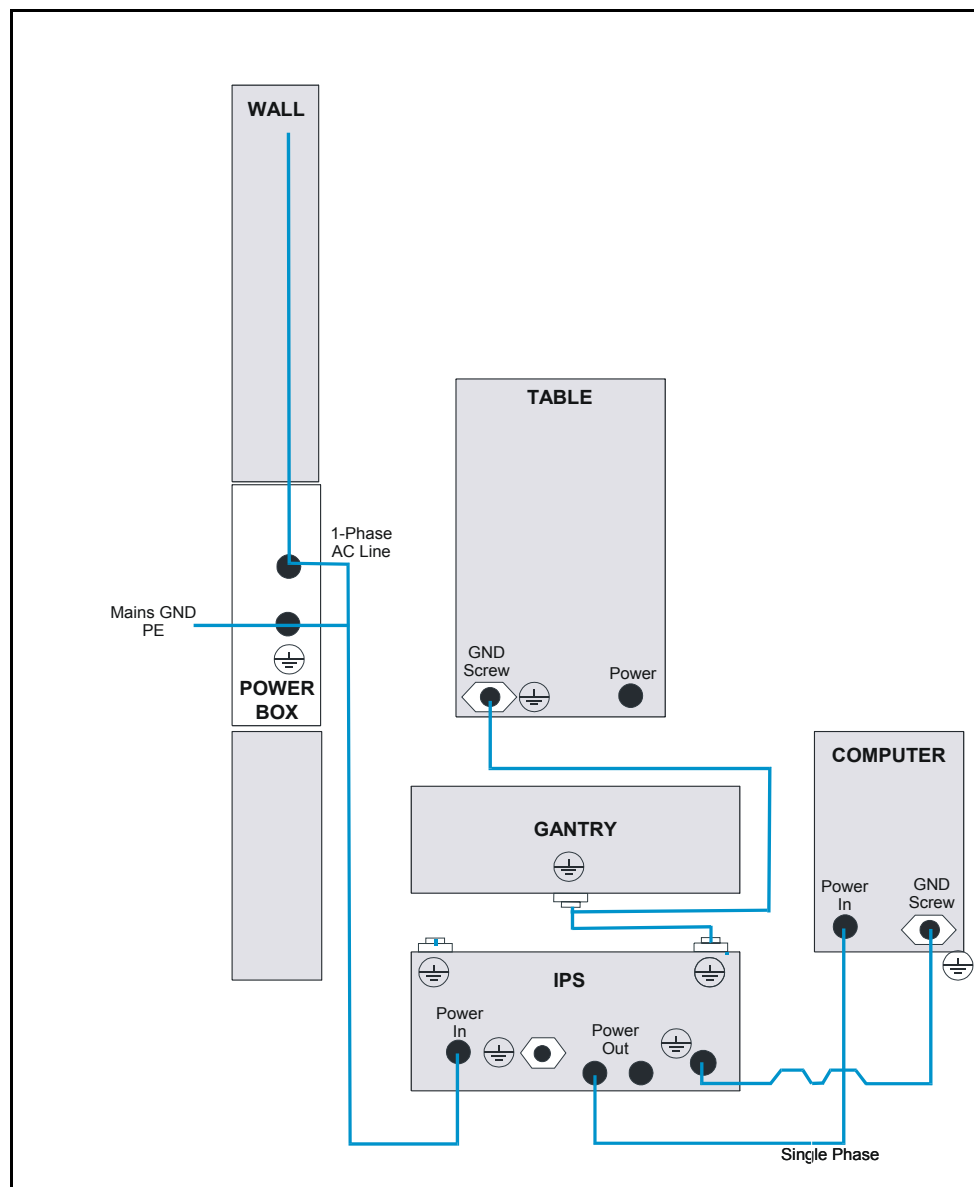


Figure 5-1 System Grounding and Power Distribution

Note

The wall GND point is the patient room PE point, which is the Potential Equalization point.

5.3 Recommended Power Distribution System

A dedicated feeder cable, connected to the facility's main power network, supplies the power to the Ventri system.

An isolation transformer may be added as part of the facility's power network, but is not essential.

The power distribution system should be as follows:

- The system is fitted with a dedicated flexible main power cord with 3 wires (live, neutral and GND).
- One end of the main power cord is permanently connected to the system (IPS) via a strain relief and is not detachable.
- The other end is connected to the facility's power network via a dedicated detachable plug.
- A protective dedicated GND cable is connected between the IPS and the facility's GND. Verify with 5.2.4.
- The main power cord and the protective GND in-between the IPS and the wall outlet should be routed in a conduit.

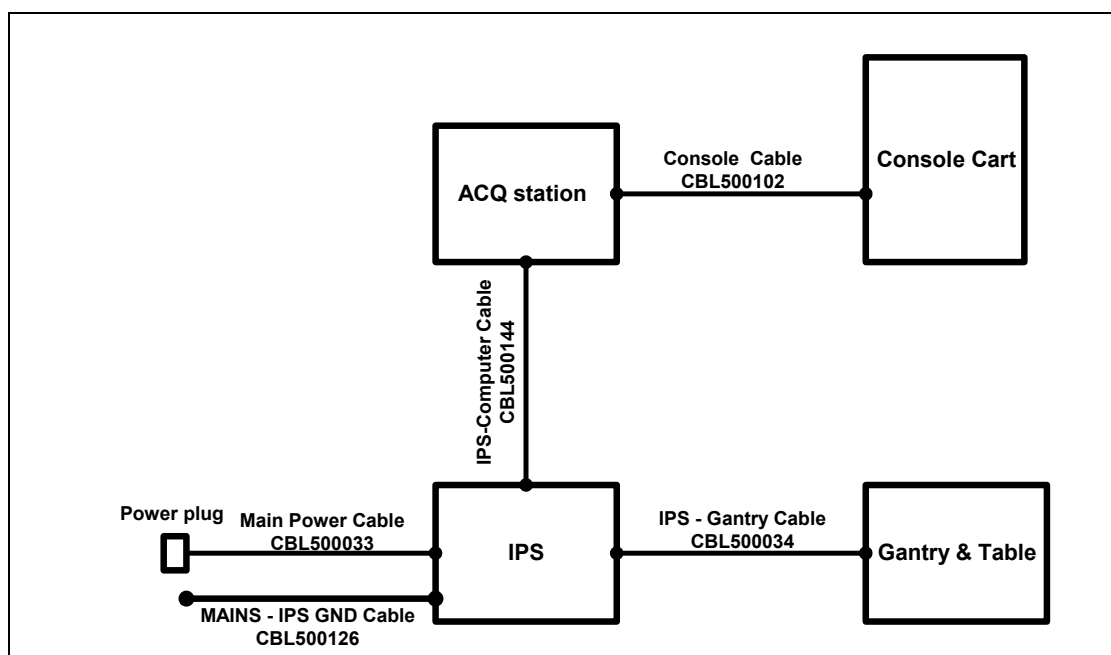


Figure 5-2 Block Diagram of Power Cable Connections

Table 5–1: Cable Specifications

Main Power Cable	CBL500033	<ul style="list-style-type: none"> Length 197” (5 meters) Flexible power cord with 3 wires. Permanent connection to IPS via a Strain relief Plug In connection to a facility power network
IPS – Gantry Cable	CBL500034	<ul style="list-style-type: none"> Length 157” (4 meters) Flexible – protected with 35mm conduit capable of withstanding 350N/100mm pressure 40mm diameter Clamps on ends
Console Cart cable	CBL500102	<ul style="list-style-type: none"> Length 197” (5 meters) Flexible – protected with 35mm conduit
IPS – Computer Cable	CBL500144	<ul style="list-style-type: none"> Length 63” (1.6 meter)
MAINS – IPS GND cable	CBL500126	<ul style="list-style-type: none"> Length 157” (4 meters)

5.4 Power Source Monitoring

A power audit should be conducted at the customer site prior to installation of the Ventri. During the audit, a power line analyzer should be used to check the site power for average line voltage, frequency, sags, surges, and transient impulse activity. A minimum ten-day period that includes two weekends should be monitored that includes several days of normal use.

Some analyzer models, which are suitable for power line monitoring, are:

- Dranetz Model 658
- Dranetz Model 656
- BMI 3630

The data and any known site history of previous power problems with other GE systems or computer installations should be analyzed and reviewed with your GE Power and Ground representative.

Chapter 6 – Environmental Conditions

6.1 Recommended Site Environment Specifications

Each system module comprises numerous electronic and mechanical components, which are sensitive to extreme temperatures, humidity, dirt and air pollution. The operational environment of any Nuclear Medicine system inevitably has a noticeable effect on its reliability. High temperatures increase the failure rate of almost any electronic component. Temperature cycling may induce temporary or permanent changes in electronic equipment and/or mechanical components and can influence the performance of the system. Fast temperature changes can cause physical damage to the Detector's crystal. Unfiltered air in the room can cause damage to the hard disk, floppy disk drive, optical disk, etc.

Therefore, the units of the Imaging System should be installed only in a clean, dust-free, temperature-controlled environment, as specified in [Table 6-1](#).

Table 6-1: Environment Specifications

PARAMETER	REQUIRED ENVIRONMENT SPECIFICATIONS
Temperature	20 - 25 °C (68 - 77 °F)
Maximum Gradient	3 °C / hour (5.4 °F / hour)
Humidity	40 - 70% RH non-condensing
Magnetic Field in Camera Room	Less than 1.2 Gauss

In addition to the specifications listed in [Table 6-1](#), free flow of air is required around the Computer. The Scan Room temperature and humidity are influenced by such factors as volume, temperature, humidity and flow pattern of incoming room air.

Operation is guaranteed up to 27 °C (81 °F). When designing the equipment control system, it should be noted that system cooling is required even in winter months.

Many sites have shut down their cooling facilities in the past and have used external atmospheric air to cool the system. The use of external cold air must be carefully controlled, to correct the temperature, humidity and air cleanliness levels, and ensure proper operation of scanner system.

6.1.1 Ventilation (Gas) Studies

If the Ventri system is going to be used for ventilation (gas) studies, provision must be made for air extraction, as contaminated air near the detectors may affect image quality

6.2 Thermal Loads

The following thermal loads are relevant to the site environment:

- Equipment heat dissipation
- Room heaters and lights
- Number of persons in the scan room
- Dissipation through walls, ceilings, floors, doors, windows
- The thermal loads of the camera main units are listed in [Table 6–2](#).

Table 6–2: Equipment Thermal Loads

Equipment	Watts	BTU/Hour
Gantry	850	2905
Patient Table	600	2047
Computer Acquisition	200	682
Computer Xeleris	200	682
Monitor	80	274
IPS	100	342
UPS (where applicable)	According to manufacturer's specifications	According to manufacturer's specifications
Total	2,030	6932

Note

Any additional equipment such as processing station or multi imager should be considered while calculating the total thermal load.

In addition to the heat generation specifications listed in Table 6-2, the amount of heat dissipated through walls, ceilings, and floors due to lighting, air ducting, heating, air conditioning, etc., should also be considered. The number of persons in the Scanning Site any given moment, will also have an effect on heat buildup.

As environmental factors change, varying levels of heat and humidity will be introduced or dissipate. Heating, cooling and humidity control equipment should therefore be used to maintain the required environmental conditions.

In order to maintain a proper air flow, the air conditioning duct arrangement should be planned so that cool air is not directed to the computer and the Gantry. Exhaust or return air vents should be located in the ceiling above the computer system. Air should be supplied by an overhead duct and diffuser or through a low wall system.

In planning the air conditioning installation, space must be provided for camera maintenance and environmental control system. Environmental control system installation plans must be submitted to the Vendor's Installation Department, in order to facilitate complete site planning.

6.3 EMC Compliance

This system complies with IEC60601-1-2 (2nd Edition - 2001) EMC standard for medical electrical equipment.

6.3.1 General Scope

The System is suitable to be used in the electromagnetic environment, within the limits & recommendations shown in the following tables:

- [Table 1 – Emission Declaration on page 6-6.](#)
- [Table 2 – Immunity Declaration on page 6-6.](#)

Note	This system complies with above-mentioned EMC standard when used with the standard supplied cables.
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6.3.2 Electromagnetic Emission

See [Table 1 – Emission Declaration on page 6-6](#)

6.3.3 Electromagnetic Immunity

- [Table 2 – Immunity Declaration on page 6-6](#)
- [Table 3 – Immunity Declaration con't on page 6-7](#)
- [Table 4 – Separation Distances on page 6-8](#)

6.3.3.1 Limitation Management

Adhering to the distance separation recommended in [Table 4](#), between 150KHz & 2.5GHz, will reduce disturbances recorded at the image level but may not eliminate all disturbances. However, when installed and operated as specified herein, the system will maintain its essential performance by continuing to acquire, display, and store diagnostic quality images safely.

6.3.4 Limitations of Use

6.3.4.1 External components

The use of accessories, transducers, and cables other than those specified may result in degraded **Electromagnetic Compatibility** of the System

6.3.5 Installation Requirements & Environment Control

In order to minimize interference risks, the requirements listed below apply.

6.3.5.1 Cable shielding & grounding

All interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference.

6.3.5.2 Radiated Emissions

This product complies with the radiated emission specifications CISPR11 Group1 Class A standard limits.

The System is predominantly intended for use, in non-domestic environments, and not directly connected to the Public Mains Network. The System is predominantly intended for use (e.g. in hospitals) with a dedicated supply system, as described in the site preparation manual.

6.3.5.3 Power supply distribution - Subsystem & Accessories

All components, accessories subsystems, systems which are electrically connected to the System, must have all the AC power supplied by the same power distribution panel & line.

6.3.5.4 Stacked components & equipment

The System should not be used adjacent to or stacked with other equipment; if adjacent or stacked use is necessary, the System should be observed in order to verify normal operation in the configuration in which it will be used.

6.3.5.5 Static magnetic field limits

In order to avoid interference on the System system, static field limits from the surrounding environment are specified below.

Static field must be less than <1 Gauss in Examination room, and in the Control Area.

Static field must be less than <3 Gauss in the Technical Room.

6.3.6 Electrostatic discharge environment & recommendations

In order to reduce electrostatic discharge interference, install a charge dissipative floor material to avoid electrostatic charge buildup.

The relative humidity shall be at least 30 percent.

The dissipative material shall be connected to the system ground reference, if applicable.


Table 1: Emission Declaration

EMC Emissions Guidance & Declaration for the System		
The System is intended for use in the electromagnetic environment specified below. The customer or the user of the System should assure that it is used in such an environment.		
Emissions Test	Compliance	Electromagnetic Environment Guidance
RF emissions CISPR 11	Group 1	The System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Harmonic emissions IEC 61000-3-2	Not applicable	The System is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Table 2: Immunity Declaration

EMC Immunity Guidance & Declaration for System			
The System is intended for use in the electromagnetic environment specified below. The customer or the user of the System should assure that it is used in such an environment.			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment
Surge IEC 61000-4-5	± 1 kV line-line ± 2 kV line-earth	± 1 kV line-line ± 2 kV line-earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5% U_T (> 95% dip in U_T) for 5 sec	< 5% U_T (> 95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the System requires continued operation during power mains interruptions, it is recommended that the System be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

Table 3: Immunity Declaration con't

EMC Immunity Guidance & Declaration for System			
The System is intended for use in the electromagnetic environment specified below. The customer or the user of the System should assure that it is used in such an environment.			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment Guidance
<p>Conducted RF IEC 61000-4-6</p> <p>Radiated RF IEC 61000-4-3 (alternative method: IEC 61000-4-21)</p>	<p>3 V_{RMS} 150 kHz to 80 MHz</p> <p>3 V/m 80 MHz to 2.5 GHz</p>	<p>3 V_{RMS} 150 kHz to 80 MHz</p> <p>3 V/m 80 MHz to 2.5 GHz</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the System, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter.</p> <p>Recommended Separation Distance</p> $d = \left[\frac{3,5}{3} \right] \sqrt{P}$ <p>(see Table 4)</p> $d = \left[\frac{3,5}{3} \right] \sqrt{P}$ <p>80 MHz to 800 MHz (see Table 4)</p> $d = \left[\frac{7}{3} \right] \sqrt{P}$ <p>800 MHz to 2,5 GHz (see Table 4)</p> <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,^a should be less than the compliance level in each frequency range.^b</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol: </p>
<p>^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the System is used exceeds the applicable RF compliance level above, the System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the System.</p> <p>^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

Note

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people

Table 4: Separation Distances

Recommended separation distances between portable and mobile RF communications equipment and the System			
The System is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the System as recommended below, according to the maximum output power of the communications equipment.			
Rated Maximum Output Power (P) of Transmitter Watts (W)	Separation distance according to frequency of transmitter		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2,5 GHz
	$d = \left[\frac{3,5}{3}\right]\sqrt{P}$	$d = \left[\frac{3,5}{3}\right]\sqrt{P}$	$d = \left[\frac{7}{3}\right]\sqrt{P}$
	Separation Distance meters	Separation Distance meters	Separation Distance meters
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.7	11.7	23.3
For transmitters rated at a maximum output power not listed above, the separation distance can be estimated using the equation in the corresponding column, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.			

6.4 Environmental Tests

6.4.1 Power Source Test

Tests should be performed on site main supplies, prior to the camera installation. The mains tests can be done with a unit Power-line Disturbance analyzer such as “DRANETZ - series 606”. Voltage measurements are as follows:

1. Slow average of mains voltage - $< \pm 10\%$.
2. Surge or sag of RMS voltage - $< \pm 10\%$.
3. Frequency variations - $< \pm 1\%$.
4. Amplitude and duration of spikes higher than 400 V (230 V line), 200 V (120 V line).
5. Ground Conductivity - the resistance between the IPS ground and the facility earth ground must not exceed 0.5 ohm. In addition, the total resistance between the IPS ground and earth must not exceed 2 ohms.

6.4.2 Temperature Tests

Prior to installing the Imaging System, humidity and temperature tests must be performed at the site area. Surveillance requires seven working days on site.

Important

CAMERA WARRANTY AND SERVICE AGREEMENTS ARE CONTINGENT UPON MAINTAINING THE SITE ENVIRONMENT ACCORDING TO ENVIRONMENTAL SPECIFICATIONS.

Chapter 7 – Connectivity

7.1 General

The gamma camera is designed to be connected to a Local Area Network (LAN) and a Remote Area Network (WAN) in order to transfer studies to Processing & Reviewing (P&R) stations, viewing stations and hardcopy devices. For the LAN, Ethernet connectivity is used, while WAN connectivity is provided via Modem or broadband connection. Both LAN and WAN use the Transmission Control Protocol / Internet Protocol (TCP/IP) or File Transfer Protocol (FTP).

Towards this goal the following must be prepared:

- Network connection
- IP Addresses for all stations
- Insite pre-requisites
- Telephone line for modem connectivity, if relevant
- Broadband connection, if relevant

In addition, network information, hardcopy devices data and DICOM data must be prepared prior to system installation, to ensure that the system can be configured properly without delay. Refer to Chapter 2 in the Installation Manual for the required information.

7.2 LAN Connection

The connection to the LAN is done via an Ethernet Adapter installed in the Acquisition Station. Therefore, the LAN connection must be on the wall next to the Acquisition station, so that the cable is not in the path of the Collimator Carts, or patient and operator access to the Table.

The actual connection to the network depends on the physical network media of the hospital, which is normally a Twisted Pair Cable, implementing the 100Base-T standard.

The LAN connection must meet the requirements of the standard used in your hospital or clinic. Consult the hospital network specialist or your local service for specific instructions.

7.3 IP Address

An IP address identifies both the network and the host attached to it.

Network IDs for networks that connect to the worldwide Internet are allocated by a central authority, the Internet Network Information Center (InterNIC), while the Host IDs are allocated by the Local Network Administrator.

For Internet connected networks, ask your local LAN Administrator to allocate an IP address for the camera or contact the InterNIC for allocating an IP address space for your hospital/clinic, whichever applies to your site.

For a camera to be connected over an internal network (that does not connect to the Internet), ask your local LAN Administrator, if any, for allocation of an IP address or consult your local service.

For description of the IP Address structure, refer to relevant chapter in the Installation Manual.

7.4 Broadband For Remote Connectivity.

For broadband connection, a suitably located connection socket should be supplied.

Serviceability strategy for the Ventri is based on remote accessibility via Insite over broadband connection.

Important

Broadband connectivity should be ready prior to system installation in order to allow remote service and customer support from Day One of the installation.

The following forms need to be completed to configure the broadband connection:

- [InSite Broadband - Add System\(s\) to a Connected Site on page 7-5](#)
- [Remote Service Broadband - Customer Site Assessment on page 7-3](#)

7.4.1 Remote Service Broadband - Customer Site Assessment

Site Name: _____	FE Name: _____
City, State: _____	FE Phone: _____
Date: _____	FE Email: _____

1. Does your site currently have a persistent (24x7) Internet connection?	Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Is the GEMS Diagnostic Imaging equipment on the Local Area Network and will it be accessible to the Internet?	Yes <input type="checkbox"/> No <input type="checkbox"/>
3. Does your site have a VPN device today?	Yes <input type="checkbox"/> No <input type="checkbox"/>
4. Is the VPN device one of the models below? Please select the model from the options below." <ul style="list-style-type: none"> <input type="checkbox"/> a) Cisco Pix Firewalls <input type="checkbox"/> b) Cisco Routers <input type="checkbox"/> c) Cisco 3000 Series (Altiga acquisition) <input type="checkbox"/> d) Checkpoint Firewalls Software Version 4.1 and higher <input type="checkbox"/> e) Nortel Contivity Software Version 3.2 or higher <input type="checkbox"/> f) Redcreek <input type="checkbox"/> g) Symantec (Raptor) firewalls <input type="checkbox"/> h) Firebox <input type="checkbox"/> i) Linux S/WAN <input type="checkbox"/> j) Sidewinder <input type="checkbox"/> k) Netscreen <input type="checkbox"/> l) None <input type="checkbox"/> m) Other _____ <p>*If None, the GEMS Connectivity Support Team can help determine device compatibility.</p>	

5. Does your VPN device support "triple DES" Encryption?	Yes <input type="checkbox"/> No <input type="checkbox"/>																					
6. Has approval been given to install this VPN connection? Site Approver's Name _____	Yes <input type="checkbox"/> No <input type="checkbox"/>																					
7. Provide your VPN Installer information. This is the person who will be contacted to schedule the VPN installation. Customer Installer Name: _____ Telephone: _____ Email : _____ Notes: _____ _____ _____																						
8. Field Engineer needs to provide compatible system information. All three fields required: <table><tr><td>System ID:</td><td>IP Address:</td><td>Gateway Address:</td></tr><tr><td>_____</td><td>_____</td><td>_____</td></tr><tr><td>_____</td><td>_____</td><td>_____</td></tr><tr><td>_____</td><td>_____</td><td>_____</td></tr><tr><td>_____</td><td>_____</td><td>_____</td></tr><tr><td>_____</td><td>_____</td><td>_____</td></tr><tr><td>_____</td><td>_____</td><td>_____</td></tr></table>		System ID:	IP Address:	Gateway Address:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
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If you have questions or need assessment support: Contact your Zone Champ or: HQ Support 1-262-524-5261																						
If you have questions or need assessment support in Europe: Contact +33-01-30-70-45-92																						
Once you have completed both pages of this form: Please send it to: Fax# 414-918-4707																						

7.4.2 InSite Broadband - Add System(s) to a Connected Site

Site Name: _____	FE Name: _____
City, State: _____	FE Phone: _____
Date: _____	FE Email: _____

1. Is this site already connected to GE InSite Broadband? If Yes, Enter the System ID of a device that is already connected via Broadband (this helps validate the site) System ID: _____ If No, you are using the wrong form!		Yes <input type="checkbox"/> No <input type="checkbox"/>																		
2. Update/Confirm the Customer IT Contact information. This is the person who will be contacted to add the new System IP Address to their Encryption Domain. Customer IT Contact Name: _____ Telephone: _____ Email: _____ Notes: _____ _____ _____																				
3. Field Engineer needs to provide the new system information. All three fields required: <table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">System ID:</td> <td style="width: 33%;">IP Address:</td> <td style="width: 33%;">Gateway Address:</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </table>			System ID:	IP Address:	Gateway Address:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
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If you have questions or need assessment support in Europe: Contact +33-01-30-70-45-92																				
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Appendix A – Weights, Measurements, Power, Floor and Environmental Requirements

The information provided in this appendix is included throughout the Site Preparation manual but is supplied here for quick reference purposes.

A.1 Weights and Measurements - Crated

Table A–1: Gantry Weights and Measurements (Crated)

Unit	Weight	Dimensions / mm (in)		
	kg (lbs)	Height	Length	Width
Gantry & Detectors	800 (1764)	1800 (70.9)	1900 (74.8)	1000 (39.4)

Table A–2: Patient Table Weights and Measurements (Crated)

Unit	Weight	Measurements / mm (in)		
	kg (lbs)	Height	Width	Depth
Table	500 (1120)	800 (31.5)	700 (27.6)	2100 (82.7)

Table A–3: System Components Container Crated Weights and Measurements

Unit	Weight	Dimensions / mm (in)		
	kg (lbs)	Height	Width	Depth
System Components	± 300 (661) Depending on options	800 (31.5)	1900 (74.8)	1400 (55.1)

Table A–4: Acquisition Computer Weights and Measurements (Crated)

Unit	Weight	Measurements / mm (in)		
	kg (lbs)	Height	Width	Depth
Computer, Monitor & Accessories	100 (220)	938 (36.9)	1325 (52.2)	895 (35.2)

Table A–5: System Cable Lengths

Cable Description	Measurements / mm (in)
Power Cable	500 cm (197")
IPS to Gantry	400 cm (157")
Corner Unit Cable	500 cm (197")
Computer to IPS Network Cable	160 cm (63") 300 cm (118")

A.2 Site Requirements

Table A–6: Floor Leveling Specifications

Slope	Within + 13/16" over 170" (+ 3 cm over 430 cm)
Flatness	Surface should be smooth and have no more than 3/16" (0.5 cm) deviation in any 60" (150 cm) throughout the room or system installation area
Floor Surface	Floor should have one single poured surface.

A.3 Power Requirements

Electrical	
Line Voltage Requirements	115V/AC 20A 230V/AC 10A
Voltage Tolerance	+10%, -5% from nominal
Load Regulation	Maximum 5% for load of 20A
Frequency	50 or 60 Hz \pm 1Hz
Power Ratings	2.2KW

Spikes Line to Neutral		
Spikes	Phase Voltage	
	230 V Line	115 V Line
Spike "A"	< 1200 V	< 900 V
Pulse Width	< 10 μ s	< 10 μ s
Rise Time	> 1 μ s	> 1 μ s
Spike "B"	< 800 V	< 400 V
Pulse Width	< 100 μ s	< 100 μ s
Spike "C"	< 400 V	< 200 V
Pulse Width	< 200 μ s	< 200 μ s
High Frequency (Line to Neutral)	< 1V RMS 0.15 to 30 MHz	

A.4 Environment Specifications

Table A–7: Environment Specifications

PARAMETER	REQUIRED ENVIRONMENT SPECIFICATIONS
Temperature	28 - 24 °C (68 - 75 °F)
Maximum Gradient	3 °C / hour (5.4 °F / hour)
Humidity	40 - 60% RH non-condensing
Max Temperature Gradient	5.4F /hr (3C /hr)
Magnetic Field in Camera Room	Less than 1.2 Gauss

Table A–8: Equipment Thermal Loads

Equipment	Watts	BTU/Hour
Gantry	850	2905
Patient Table	600	2047
Computer Acquisition	200	682
Computer Xeleris	200	682
Monitor	80	274
IPS	100	342
UPS (where applicable)	According to manufacturer's specifications	According to manufacturer's specifications
Total	2,030	6932

A.5 Weights, Measurements and Specifications - Uncrated

Gantry / Detectors / IPS	
Depth (with detectors)	32.7" (83 cm)
Width (with detectors)	49.2" (125 cm)
Height	61.0" (155cm)
Gantry Weight (with detectors)	1433 lbs (650 kg)
Detector Configuration	90 degree
IPS Power Dissipation	100 (watt) 342 (BTU/Hour)
Emergency Stops	One mounted each side of the gantry, and one mounted next to the operator

Table	
Table Length	76.7" (195 cm)
Table Top Width	26.7" (35 cm)
Table Minimum Height	20" (51 cm)
Table Maximum Height	36" (91.4 cm)
Table Weight	705.5 lbs 320 kg)
Maximum Patient Weight	440 lbs (200kg)
Emergency Stops	N/A

Acquisition Station	
Mobile Cart Height (with monitor)	1.60 (m)
Base Dimensions	625 (diameter)
Total Weight (incl cart, monitor, & keyboard)	< 45 (kg)
Heat Dissipation (during use)	N/A
Wall mount option	

Collimator Storage	
Dimensions (depth x width x height)	19.7" x 23" x 47.2" (50 x 58.5 x 120 cm)
Weight (without collimators)	88 lbs (40 kg)
Weight of collimators	2 each x 27 lbs (12 kg)

A.6 Conveyance Clearance Requirements

Transport / Installation / Hallway Width (minimum)	
Elevator Load Capacity	Not less than 1000 (kg) 2200 (lbs) (this calc contain Gantry, Dolly and 2 person inside elevator)
Minimum hall width allowing the Gantry to be wheeled around 90° corners	126 cm (49.6")
Minimum width to allow gantry to move through 45" (1143 mm) doorway	135 cm (53.2")
Minimum hall width allowing the Table to be wheeled around 90° corners	200 cm (78.74")

A.7 Room Dimensions

Room	
Optimal Room Dimensions	The recommended room size is 13.5 x 9.5 feet (412 x 290 cm)
Minimum Room Dimensions	The minimum room size is 8'9" x 11'9" (267 x 363 cm)
Floor Level Flatness	Surface should be smooth and have no more than 3/16" (0.5 cm) deviation in any 60" (152 cm) throughout the room or system installation area
Floor Loading	Static load: Gantry weight of 650 kg (1433 lbs) on four pads above a footprint of 96 x 51 cm (37.8" x 20").
Door Width (Minimum)	34 " 86 (cm)

Appendix B – Unpacking and Conveying

This section is covered in the Ventri Installation Manual, but because the manuals are still inside one of the crates when the consignment arrives, unpacking and conveying instructions have also been included in this manual

B.1 Overview

The best way to tackle a construction project of this complexity is to divide it into smaller, more easily managed tasks. Each task, now becomes a smaller project. At this point, the primary challenge is to coordinate all of these small projects in such a way as to have the entire project completed properly, and on time.

This document will help to bring the often overlooked details to the attention of the Project Coordinator. It will also simplify the task of site preparation for a first time Ventri Project Coordinator.

The equipment and tools required to unpack and convey the Ventri System are listed in [Table B-1](#) and must be available on site **before** the components can be unpacked or moved.

B.2 Delivered Containers

The system is delivered in the following containers:

Gantry Container

- Gantry with detectors installed
- Gantry transportation dollies

Patient Table Container

- Table

System Component Container







The Standard Equipment as well as Optional Components are listed in the table below

Item	Mandatory/Optional
Two sets of collimators	Optional
Bar phantom	Optional
Decoy collimator	Standard Equipment
Two system cables	Standard Equipment
Acquisition accessories	Optional
Acquisition station and accessories	Standard Equipment
Collimator storage cabinet and accessories	Standard Equipment
ECG shelf	Standard Equipment
IV pole	Optional
ECG	Optional
Manuals	Standard Equipment
IPS	Standard Equipment
Monitor shelf, PC card, mobile or wall unit	Optional
UGP500007 Video Position Set Ventri	Optional
UGP500010 KVM switch	Optional
Monitor 19"	Standard Equipment

B.3 Unpacking Tools

The tools which are required for unpacking the containers are shown in [Table B-1](#). These tools should be on site when the delivery truck arrives

Table B-1: Unpacking Tools

Crowbar	
Carpenters Claw Hammer (large)	
Set of Allen keys (inch size)	
Set of Combination Wrenches (inch size)	
Socket Set - Inch Size(1/2 inch drive)	
Tin Snips (Metal band cutter)	

B.4 General Order of Unpacking Procedures

1. *Before* unpacking the camera units, the supervisor must be well acquainted with the safety measures for system unpacking and conveying, detailed in the Safety and Regulatory section of the System Service Manual.
2. *Before* releasing the carrier:
 - a. Inspect the containers/boxes for external damage. If any damage has been found, inform immediately the carrier and your office.
 - b. Check the containers/boxes against the delivery slip and verify that you have all the boxes. Inform immediately the carrier and your office about any missing packages.
3. Unpack the Gantry and Table in the unloading area as described in [Section B.5](#) and [Section B.6](#).
All other units should be unpacked as close as possible to the clinic.
4. Check that no parts have been left in (or attached to) the packing material.



CAUTION

The Gantry is usually shipped with the Detectors installed. It is important to move the Gantry onto the site and into a temperature controlled environment as soon as it is unloaded. Do not remove the foam insulation until the Gantry has been inside the clinic and allowed to stabilize for a period of at least 24 hours.

5. Convey the Gantry into the clinic.
6. Convey all the other units onto the site by means of a service wagon while they are still packed.
7. Transportation Dollies and accessories should be shipped back for recycling
(See “*Cleaning Up the Site and Removing the Shipping Dolly*” in chapter 4 of this manual.

B.5 Gantry

The procedure used for unpacking and conveying the Gantry into the clinic depends on the available unloading equipment, accessibility to the Gantry on the truck, and the nature of the paths and doorways to the clinic.

With a fork lift - provided that fork lift access to the truck is possible.

Using a fork lift requires the following steps:

- Unloading the Gantry from the truck.
- Conveying the Gantry all the way to the clinic (if fork lift access is possible), or, conveying the Gantry to an area where the crate can be removed before moving it on the dolly to its final destination.

For more details, refer to [Section B.5.1.1](#)

B.5.1 Gantry Unpacking and Conveying

B.5.1.1 Unloading the Gantry with a Fork Lift

When the Gantry is unloaded from the truck with a fork lift, it is unpacked on the ground.

	<p style="text-align: center;">CAUTION</p> <p>Check the G-limit indicator attached to the front of the Gantry packing crate (on top of the Fragile label) and verify that its color is white. If the color is red, please notify the carrier that the Gantry was subjected to impact exceeding 10 g, and proceed with unpacking.</p>
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	<p style="text-align: center;">CAUTION</p> <p>The Detectors are extreme sensitivity to temperature gradients. If the temperature in the installation area differs from that of the delivery route and/or ambient temperature, a stabilization period of 1 hour per 3° difference should be allowed. Under no circumstances should the Gantry be unpacked before the required stabilization period</p>
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1. Adjust the forks of the Fork Lift to fit the steel rectangular openings in the Base Pallet of the gantry crate. See [Figure B-1](#)

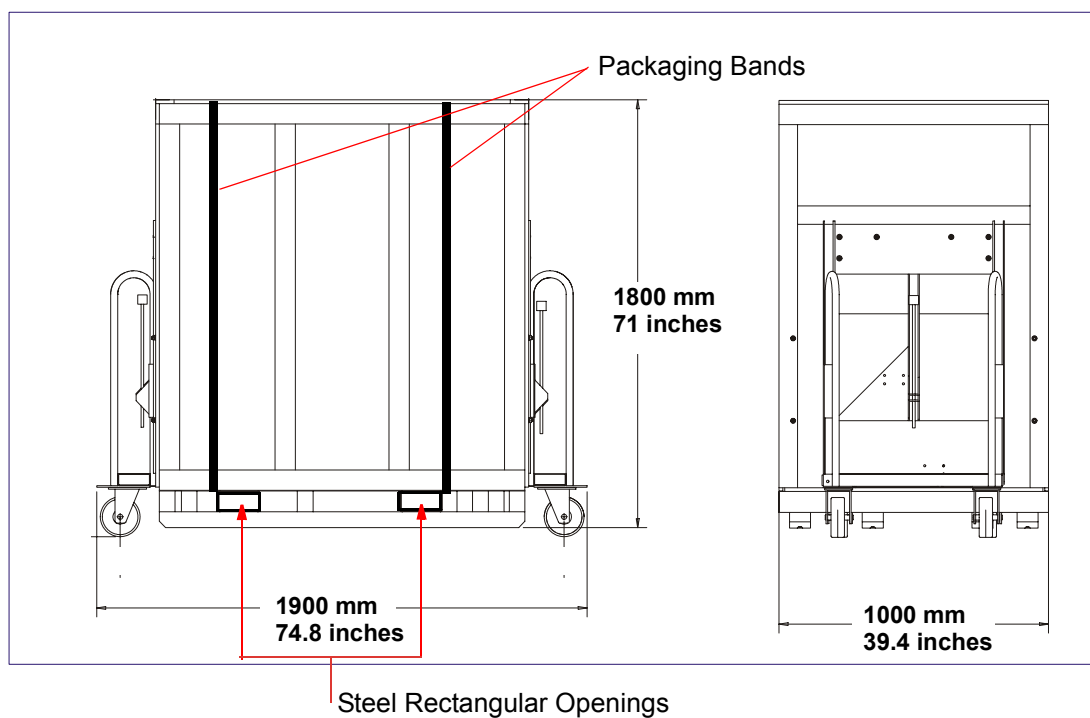


Figure B-1 Crated Gantry

2. Guide the forklift driver to insert the forks into the openings under the Gantry crate, then direct the driver to slowly and carefully move the crate to the location from where it will be partially unpacked before being wheeled into the clinic. See [Figure B-1](#).

**CAUTION**

The Detectors are sensitive to vibrations and shock. Use extreme caution and prevent excessive shocks while handling the Gantry with the Fork Lift.

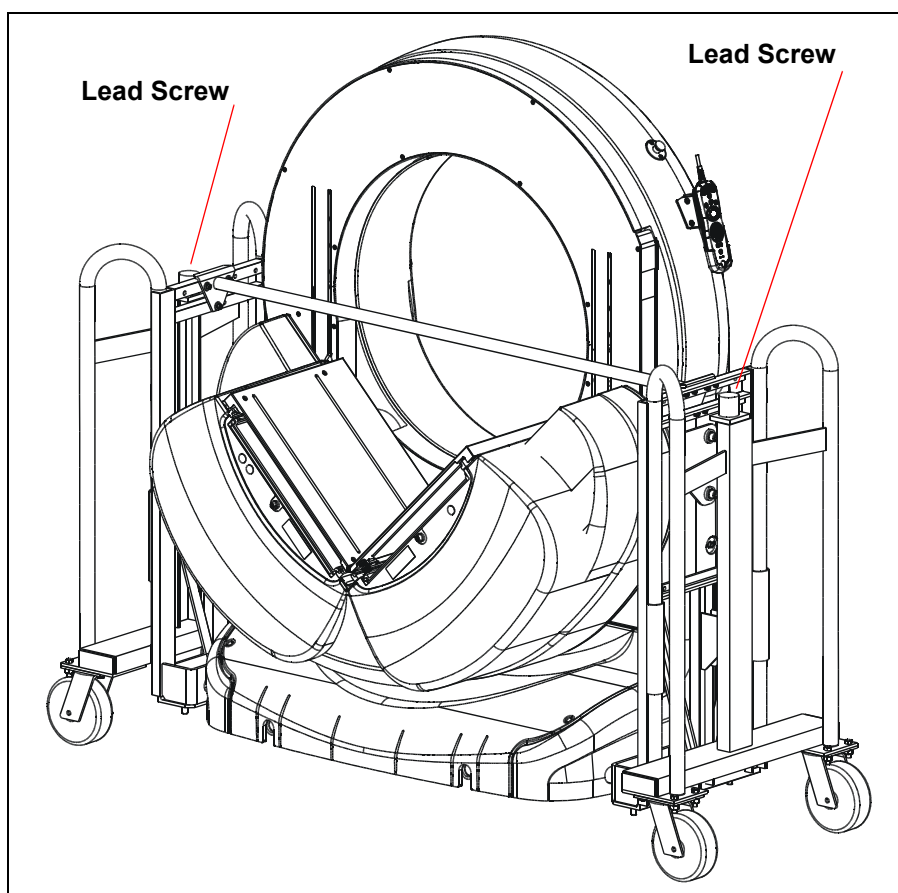


Figure B-2 Gantry Raised and Supported by Dolly Wheels

3. Using lead screws on both Dollies, raise Gantry so that the wheels of the Dolly take up the load.

**CAUTION**

**The Dolly wheels have no brakes.
Move the Gantry very slowly and take extreme care.**

B.5.2 Wheeling the Gantry to the Clinic

1. Before moving the Gantry to the clinic make sure that the conveyance path is free of obstacles and that the Gantry can pass through all entrances, exits and corridors.



CAUTION

Dolly wheels do not have braking mechanisms. If conveying over sloping surfaces extra care should be taken and at least 2 people are required to ensure proper control.

2. Carefully wheel the Gantry into the clinic with one person supervising, one guiding, and at least 2 persons slowly pushing.

Important

The transportation wheels should remain attached until the Gantry is finally positioned for anchoring.

B.6 Patient Table

The table is unloaded from the truck either by a crane or by a fork lift truck. In both cases unload the Table while it is still in its original packing, and anchored to the crate.

Hoisting by crane must only be done with proper hoisting straps, provided by the crane company.

B.6.1 Table Unpacking and Conveying

Use the following procedure to unpack the table.

1. While the Table Crate is placed on a flat ground.
2. Using a screwdriver, remove the clamps securing the crate lid and the side walls.

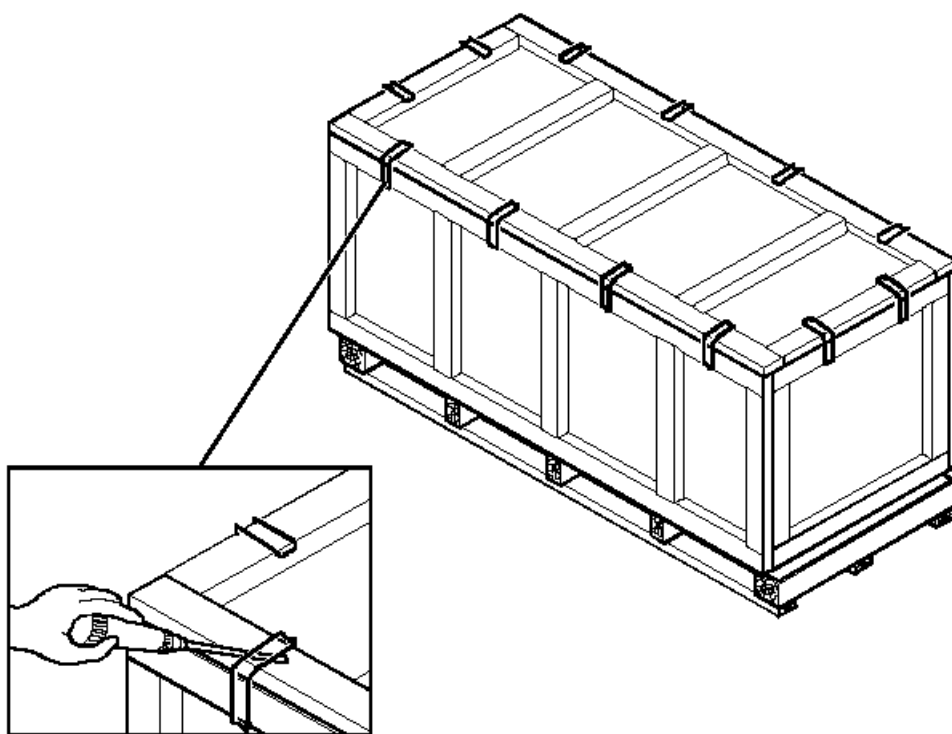


Figure B-3 Removing the Securing Clamps from the Crate

3. Remove the crate lid and then remove the crate walls.

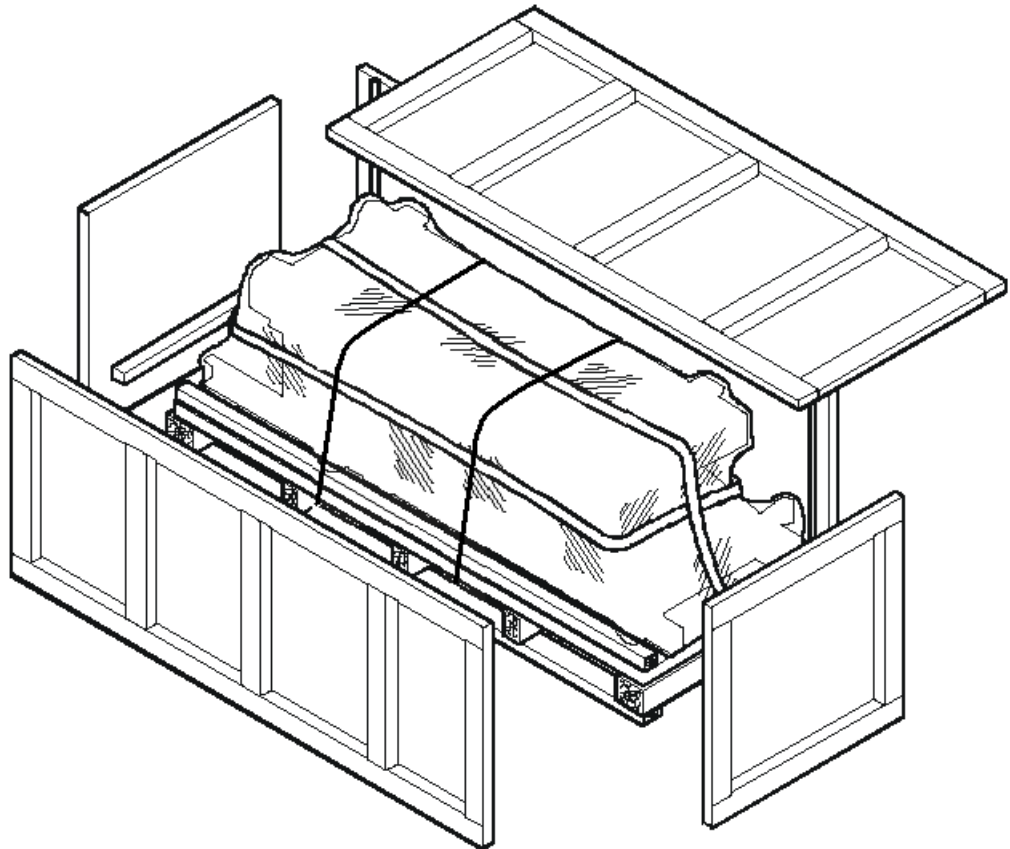


Figure B-4 Removing the Top and Sides of the Crate

4. Carefully cut and remove the two packing bands securing the table to the pallet.

5. Unwrap the plastic sheet that covers the table.

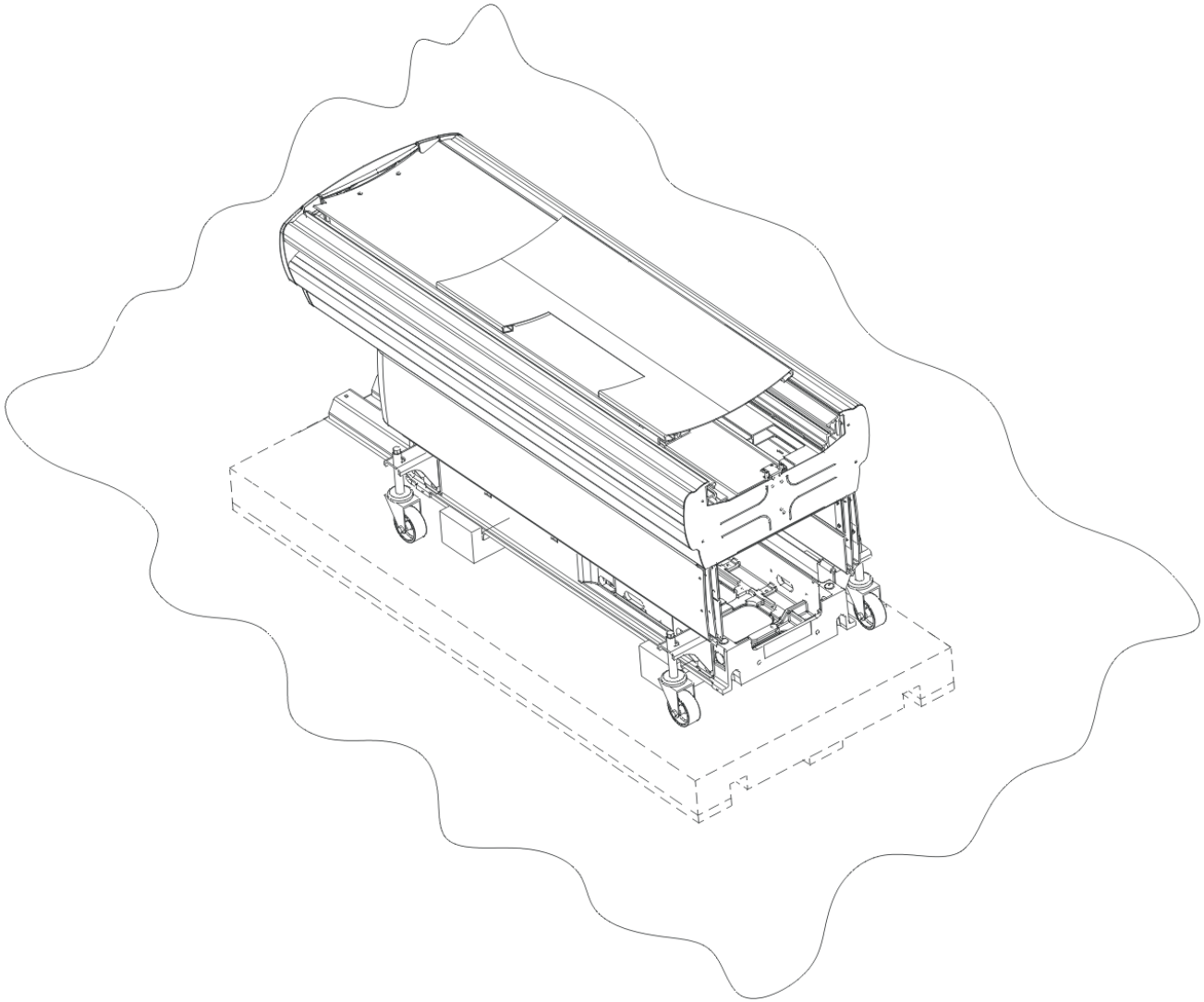


Figure B-5 Table on Wooden PALlet with Plastic Cover Unwrapped

6. Remove all accessories located on top of the table and on the sides of the table.

7. For each of the two rails located at the base of the unit (next to the wheels):
 - a. Pull out the rail until the hole at the end of the rail is visible.

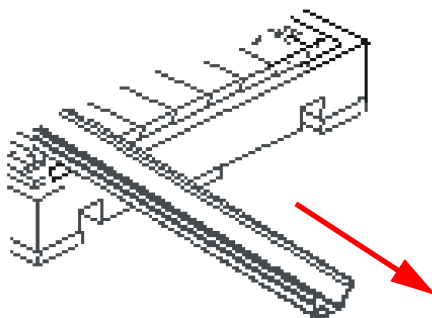


Figure B-6 Pulling Out the Rails

- b. Fit the hole at the end of the rail over the guide pin that is situated at the base of the wooden platform.

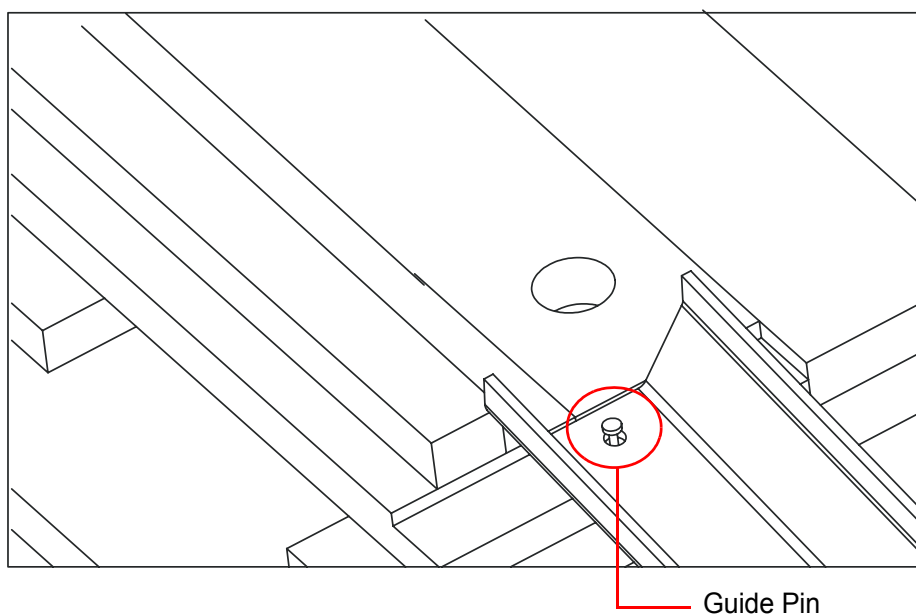


Figure B-7 Fitting the Rail Hole on the Guide Pin

8. Verify that the two rails are parallel.

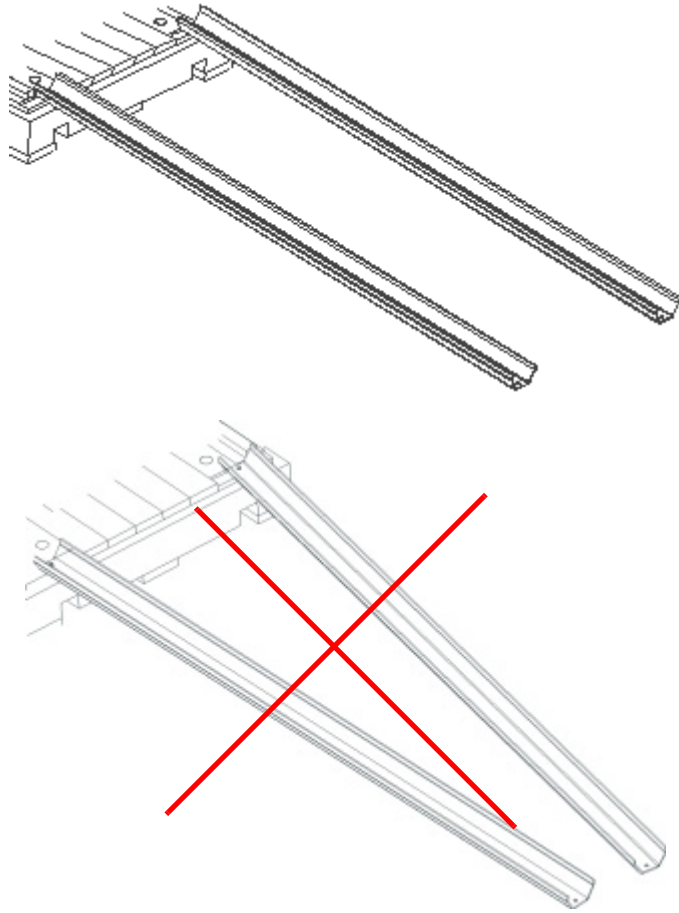


Figure B-8 Verify that the rails are Parallel

9. Using the lifting mechanism on each table wheel, lift the table 5-10 mm above the wooden support blocks.

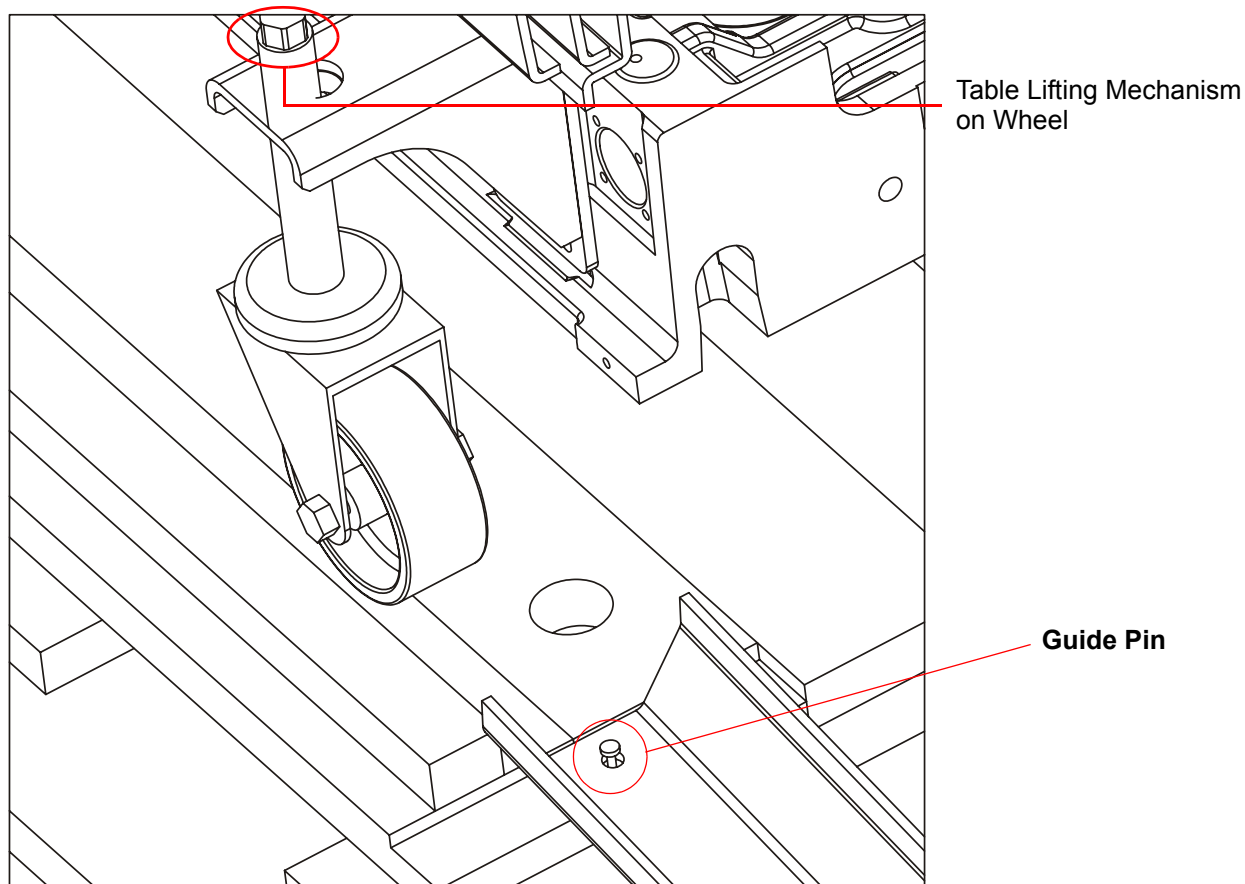


Figure B-9 Table Lifting Mechanism on Wheel

10. Remove the wooden support blocks.

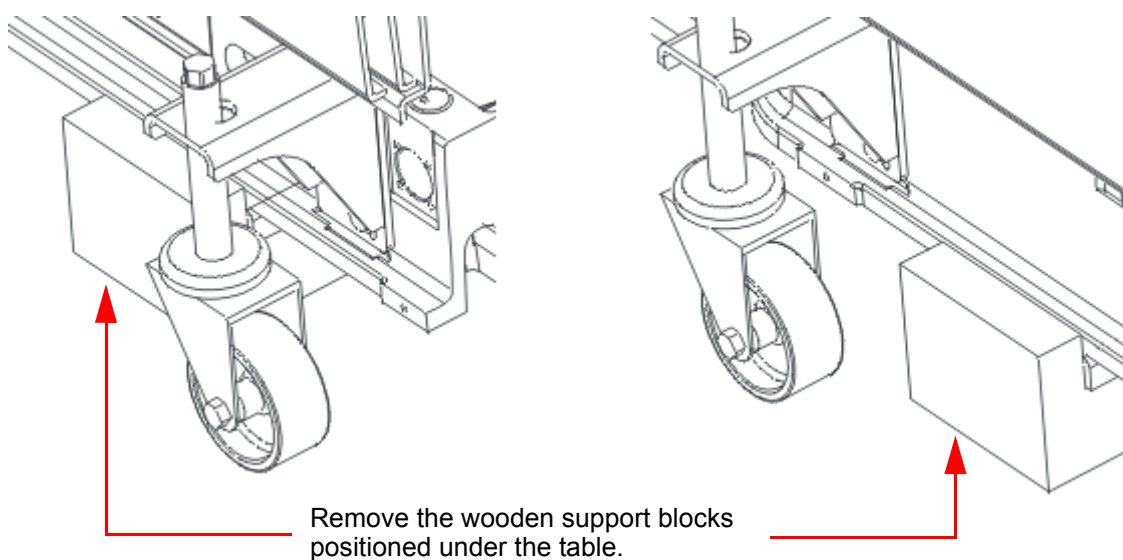
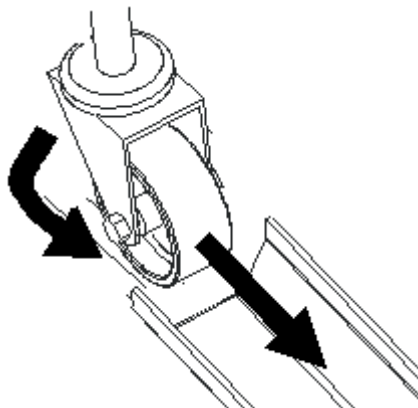


Figure B-10 Removing the Wooden Support Blocks

11. Rotate the wheels so that they are in line with the rails.



12. Carefully and slowly push the table so that the two wheels closest to the rails mount the rails.

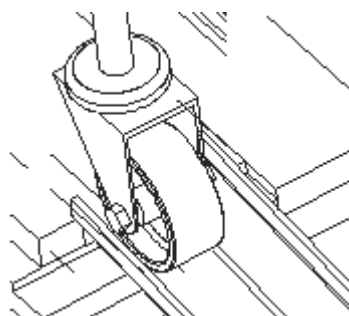


Figure B-11 Guiding the Table onto the Rails

13. Carefully and slowly begin to push the table down the rails while checking the position of the two “back” wheels.
14. Before the two “back” wheels mount the rails, verify that the “back” wheels are aligned with the rails.
15. Carefully and slowly guide the two “back” wheels onto the rails and finish guiding the table down the rails onto the floor.

B.7 Conveyance Access and Clearance

From the unloading site, there must be a free path to wheel the components to the installation area, or into a lift which will carry them to the correct level. The size and weight specifications of the system components are given in [Table B–2](#), and [Table B–3](#).

It is important to verify that the route selected has sufficient clearance and load carrying capacity. Special facilities must be provided if the units are to be transferred from an unloading site outside the building

B.7.1 Access Specifications

The Weights and Measurements listed below **include** the moving wheels

Table B–2: Gantry - Weights, Measurements and Clearance

Minimum hall width allowing the Gantry to be wheeled around 90° corners	1,260 mm (49.6")
Minimum width to allow gantry to move through 45" (1143 mm) doorway	1,350 mm (53.2")

Note

The Moving Kit wheels have no braking mechanism.
Do NOT move or leave the Gantry on inclined surfaces.

Table B–3: Patient Table - Weights, Measurements and Clearance

Minimum hall width allowing the Table to be wheeled around 90° corners	2,000 mm (78.74")
Path slope	< 4% (4 cm / 100 cm; 1.57" / 39.37")
Table length	1,800 mm (71")
Weight of Table mounted on moving wheels	320 kg (717 lb.)

Appendix C – Floor Checking Procedure

This procedure provides details on how to verify that the floor is both flat and level before system installation is to begin. Measurements should be taken left-to-right **or** right-to-left, front-to-back **or** back-to-front, and diagonally in **either** direction. Refer to [Figure C-1](#).

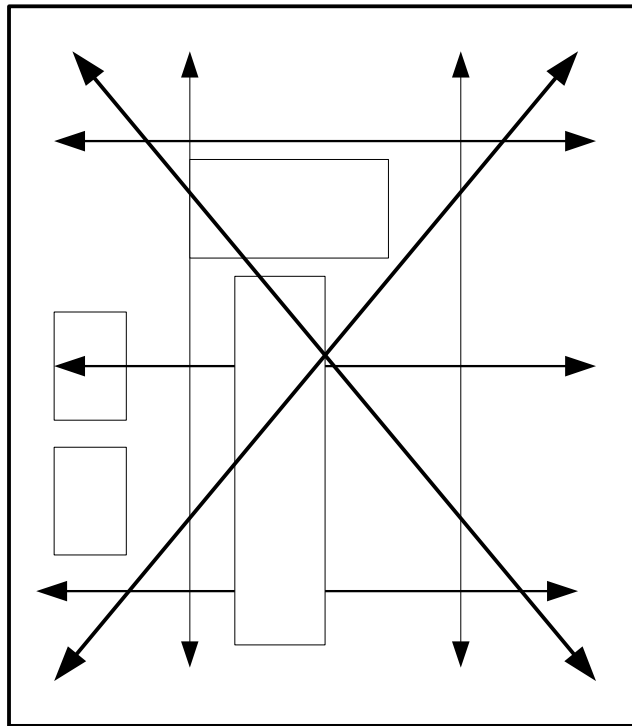


Figure C-1 Measurement Directions

1. The floor slope should be within $\pm 1\frac{3}{16}$ " over 170" (± 3 cm over 430 cm). Refer to [Figure C-1](#).
 - a. Place laser level on floor.
 - b. Make sure that the laser leveling device is absolutely level.
 - c. Turn on laser.
 - d. Use a ruler to measure the height of the laser light from the floor next to the laser level. (This is reference point on the ruler for all other measurements.) Refer to [Figure C-2](#).

Note

Depending on make and model of the laser level, the beam will be fanned out to form a horizontal line, typically having a spread of 90°.

- e. Keep the laser ON and use a ruler to measure the height of the laser light beam at various points 170" from the laser. The measurement from the floor should be within $1\frac{3}{16}$ " (3 cm) of the original laser light reference point. Repeat at various points and directions as shown in [Figure C-1](#)

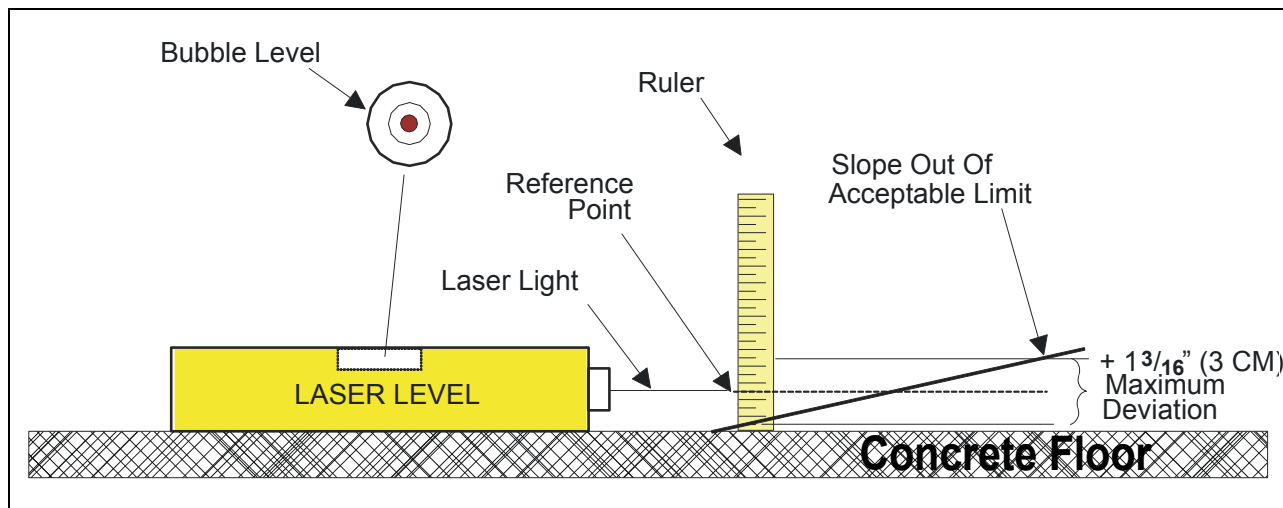


Figure C-2 Slope Measurement

The floor surface should be smooth and have no more than $\frac{3}{16}$ " (0.5 cm) deviation in any 60" (150 cm) segment in all the room area. Refer to [Figure C-3](#).

Any measurements out of acceptable limits are an indication that the floor needs to be leveled with some sort of leveling compound. See [Section C.1](#) for details

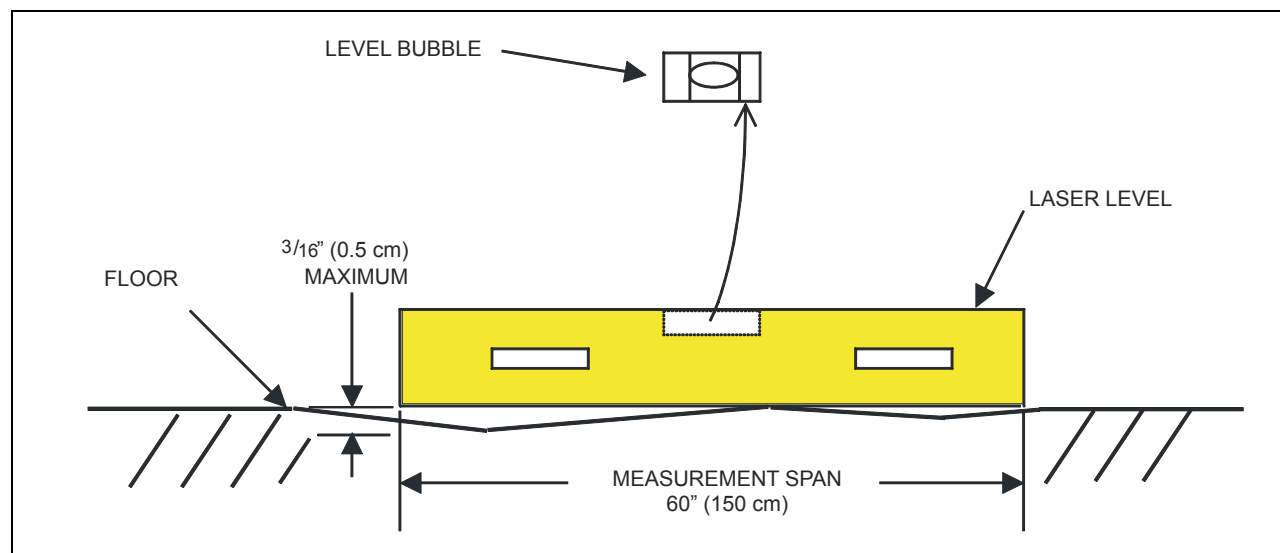


Figure C-3 Surface Flatness

2. Verify surface flatness for the entire room; use a straight edge that is 60” (150 cm) long, upon completion of the room.

Note

No fill material is allowed as a patch to compensate for surface deviations. Patches will eventually crack and pop out.

Where unacceptable deviations exist, the whole room (minimum system area) should be re-surfaced. See [Section C.1](#)

C.1 Corrective Action

When the floor does not meet level and flatness specifications, the floor will need to be corrected. The entire area of the installation room should be levelled. The GE Field Engineer (FE) performing the inspection must immediately notify the Project Manager of Installation (PMI) about any deviation in specifications. The PMI will notify the customer, and together they can work with their contractors, to develop a schedule to correct the floor.

Note

It is imperative that this deviation in specifications and its follow-up plan be promptly communicated to all applicable personnel.

It is recommended to use Micorox X-tra Fluid Grout, Mipolam 410, or any other similar material. The materials used to flatten the floor must be anti static.