GE Healthcare

Discovery VCT

Pre-Installation Manual

OPERATING DOCUMENTATION

5166283-100
Revision 9

IMPORTANT PRECAUTIONS

LANGUAGE

ПРЕДУПРЕЖДЕНИЕ (BG)	Това упътване за работа е налично само на английски език. • Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод. • Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа. • Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.
警告 (ZH-CN)	本维修手册仅提供英文版本。 • 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。 • 未详细阅读和完全理解本维修手册之前，不得进行维修。 • 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。
警告 (ZH-HK)	本服務手冊僅提供英文版本。 • 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。 • 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。 • 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他的危險。
警告 (ZH-TW)	本維修手冊僅有英文版。 • 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。 • 請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。 • 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。
UPOZORENJE (HR)	Ovaj servisni priručnik dostupan je na engleskom jeziku. • Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod. • Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik. • Zanemarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.
VÝSTRAHA (CS)	Tento provozní návod existuje pouze v anglickém jazyce. • V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka. • Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah. • V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.

ADVARSEL (DA)	Denne servicemanual findes kun på engelsk. • Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse. • Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.
WAARSCHUWING (NL)	Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar. • Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is. • Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.
WARNING (EN)	This service manual is available in English only. • If a customer's service provider requires a language other than english, it is the customer's responsibility to provide translation services. • Do not attempt to service the equipment unless this service manual has been consulted and is understood. • Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.
HOIATUS (ET)	See teenindusjuhend on saadaval ainult inglise keeles • Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest. • Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist. • Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.
VAROITUS (FI)	Tämä huolto-ohje on saatavilla vain englanniksi. • Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla. • Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen. • Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.

ATTENTION (FR)	Ce manuel d'installation et de maintenance est disponible uniquement en anglais. • Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire. • Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris. • Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.
WARNUNG (DE)	Diese Serviceanleitung 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 diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben. • Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.
ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)	Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά. • Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης. • Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις. • Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.
FIGYELMEZTETÉS (HU)	Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el. • Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészíttetése. • Ne próbálja elkezdeni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték. • Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.
AÐVÖRUN (IS)	Þessi þjónustuhandbók er aðeins fáanleg á ensku. • Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálaþjónustu. • Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin. • Brot á sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.
AVVERTENZA (IT)	Il presente manuale di manutenzione è disponibile soltanto in lingua inglese. • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.

警告 (JA)	このサービスマニュアルには英語版しかありません。 • サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。 • このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。 • この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。
경고 (KO)	본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다 . • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우 , 번역 서비스를 제공하는 것은 고객의 책임입니다 . • 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오 . • 본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자 , 사용자 또는 환자에게 부상을 입힐 수 있습니다 .
BRDINJUMS (LV)	Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā. • Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu. • Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas. • Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.
ĮSPĖJIMAS (LT)	Šis eksploatavimo vadovas yra tik anglų kalba. • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas. • Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploatavimo vadovo. • Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.
ADVARSEL (NO)	Denne servicehåndboken finnes bare på engelsk. • Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse. • Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått. • Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.
OSTRZEŻENIE (PL)	Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim. • Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go. • Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.

ATENÇÃO (PT-BR	Este manual de assistência técnica encontra-se disponível unicamente em inglês. • Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.
ATENÇÃO (PT-PT)	Este manual de assistência técnica só se encontra disponível em inglês. • Se qualquer outro serviço de assistência técnica solicitar este manual noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.
ATENȚIE (RO)	Acest manual de service este disponibil doar în limba engleză. • Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere. • Nu încercați să reparați echipamentul decât ulterior consultării şi înțelegerii acestui manual de service. • Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.
ОСТОРОЖНО! (RU)	Данное руководство по техническому обслуживанию представлено только на английском языке. • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод. • Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.
UPOZORENJE (SR)	Ovo servisno uputstvo je dostupno samo na engleskom jeziku. • Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge. • Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo. • Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.

UPOZORNENIE (SK)	Tento návod na obsluhu je k dispozícii len v angličtine. • Ak zákazníkov poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednos″ou zákazníka. • Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obluhu a neporozumiete mu. • Zanedbanie tohto upozornenia môže spôsobi″ zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.
ATENCION (ES)	Este manual de servicio sólo existe en inglés. • Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual. • 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.
VARNING (SV)	Den här servicehandboken finns bara tillgänglig på engelska. . • Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster. • Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken. • Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.
DIKKAT (TR)	Bu servis kılavuzunun sadece ingilizcesi mevcuttur. • Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer. • Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz. • Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation "Damage in Shipment" written on all copies of the freight or express bill before delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14-day period.

To file a report:

- Call 1-800-548-3366 and use option 6.
- Contact your local service coordinator for more information on this process.

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

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, calibrations and testing shall be performed by qualified GE Healthcare 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 engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE's field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

IMPORTANT...X-RAY PROTECTION

X-ray equipment, if not properly used, may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The General Electric Company, GE Healthcare Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that anyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the General Electric Company, GE Healthcare Group, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective materials and devices are available. It is urged that such materials or devices be used.

IMPORTANT...RADIOACTIVE MATERIAL HANDLING

Only employees formally trained in radioactive materials handling and this equipment are authorized by the GE Healthcare Radiation Safety Officer to use radioactive materials to service this equipment.

GE Healthcare Services is required to notify the applicable U.S. state agency PRIOR to any source service event involving pin source handling. See NUC/PET Radioactive material guides for specific instruction or contact your EHS Specialist.

A radiation survey must be performed when a pin source has been removed and replaced. See Radiation Survey Form Instructions or contact your EHS Specialist.

Rev 2 (July 21, 2005)

OMISSIONS & ERRORS

Customers: please contact the GE Medical Systems Sales or Service representatives.

GE personnel, please use the current problem reporting process to report all omissions, errors, and defects in this publication.

TRADEMARKS

Powerware is a registered trademark of the Eaton Corporation.

All other products and their name brands are trademarks of their respective holders.

Revision History

Revision	Date	Reason for change
1	5/10/06	Initial release
2	9/13/06	Changes: • Provided measurements in metric as well as English. Chapter 1 Introduction • Added Quick Install information. • Added Two-Step Install information. • Revised pre-installation checklist for “Site-Required Information”. Chapter 4 Room Planning • Provided new diagrams for air flow for Gantry. Chapter 5 Environmental Conditions • Provided new diagram for “Typical HVC”. • Added EMI Envelope diagram. Chapter 6 Floor Loading and Weights • Added upper floor seismic drawing. • Updated component dimensions and weights. Chapter 7 Delivery Information • Updated component dimensions and weights. Chapter 8 Power Requirements • Revised information regarding main disconnect control when installed in a country other than the United States. Chapter 9 Interconnection Information • Updated system interconnect schematic to 5191799SCH.
3	3/19/07	Chapter 4 Room Planning • Provided new diagrams for radiation scatter plots.
4	5/02/08	**ECR 2053297**: Updated Chapter 9, Tables 9-2 and 9-3, to add Signal Cable (Gantry to RPM unit). **PQR: 131626366**: Chapter 7, Table 7-5, clarified color of dollies and castors **SPR FCTge36010:** Chapter 4, Section 5.1 Removed bullet allowing for remote mounting of console. **Per George Farrington:** • Chapter 4, Section 8, Network Connections: added the acceptable broadband network speed specification. • Chapter 4, Section 5.2, Storage Cabinet and Equipment: updated Table 4-8 Gantry Cover Dollies.

Revision	Date	Reason for change
5	9/12/08	**FCTge36009**: Updates to Chapters 1 - 4. • Finished floor and wall requirements • Construction site requirements • Relocatable building installations • System siting requirements • Update of system PMI tasks • Site-ready visit requirements **FCTge40534:** Updates to Chapter 4, Figure 5-2 (Service Clearances). **Important Precautions:** Updated to include new languages
6	02/06/09	Legal Notes "Trademarks" moved to Important Precautions; deleted Legal Notes chapter. **FCTge44028** Updates to allow for differences in access depending on location of door in relation to scanner. Chapter 4 "Room Planning": • Updated Sections 2.1.2 Egress, Section 2.3, Section 4.1 • Updated Table 4-1, Table 4-5 • Added new Section 5.1 Scan Room Layouts and Figures 4-6 and 4-7
7	27-Oct-09	**Important Precautions:** Updated to include new languages. Chapter 1: Added Surface Penetration Permit to Table 1-7. Chapter 8: Added warnings to Sections 2.4 and 3.0. **FCTge51303:** Removed reference to Seismic mounting kit R4390JC.
8	16-Nov-09	**CR13255445:** Updated Table 7-1 and 7-4 PET Gantry dimensions.
9	12-Sept-12	**HCSDM00096594:** Updated Chapter 4, Section 9 Notice for 20 cm water phantom.

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Chapter 1
Introduction

This direction contains physical and electrical data necessary for planning and preparing a site for installation of the Discovery VCT scanner.

Pre-installation work is defined as site preparation for installation of the scanner. It is the responsibility of the purchaser to arrange and pay for this work. Pre-installation work includes:

- Installation of electrical conduit, junction boxes, ducts, outlets, and line safety switches.
- Installation of interconnection wiring that is AWG stranded copper. The electrical contractor shall ring out and tag all wires at both ends. Color-coded wires are recommended for easier identification. Wires shall be continuous without splices. Ground wires must conform to local codes.
- Any site renovation.
- Alterations and modifications to products not specifically included in the sales contract.

All work must conform to local building and safety codes. Unless specifically mentioned, GE Healthcare does not provide or install wires, conduits, junction boxes, and ducts as illustrated in this publication.

All site plans, preliminary concepts and final working drawings must be reviewed by GE Healthcare Architectural Planning prior to construction or approval.

Contact your local GE Healthcare sales representative for complete information regarding your site-specific room layout.

Section 1.0
Site Readiness

Site readiness is a requirement that must be achieved to install a Discovery VCT product. For your convenience, a site-ready visit inspection shall be performed at least three (3) days prior to the installation date. The site inspection must conclude with a minimum of a conditional pass status to be ready on the requested installation delivery date. *Site-ready inspections on the delivery date will not be acceptable unless prior arrangements have been made.*

Pre-Installation and Site-Ready Tools:

- Pre-Installation Quick Start Kit & Video
- System Floor Template
- Pre-Installation Checklist
- Pre-Installation Block Diagram
- Site Room Layouts
- Power and Grounding Inspection
- Pre-Installation Support

Section 2.0
Responsibility of Purchaser

2.1 Customer Room Prep Items

The Discovery VCT air intake is near the bottom of the gantry and draws air in through a filter in the gantry heater assembly. Fine dust as listed below will clog the filter and be deposited throughout the gantry, table, console and PDU electronics. This fine dust cannot be completely removed and can be damaging to electronic components.

For these reasons, the scanner should be the last item installed in the suite area.

“Pre-installation” is work necessary to plan and prepare a site for installation of equipment.

Pre-installation work helps the user (customer) avoid:

- Application delay and scheduling
- Surprise siting discoveries
- Installation confusion
- Waste of manpower

The following MUST be completed before installation work can begin for a Discovery VCT scanner:

- Completely finished:
  - Walls painted or have final wall covering
  - Ceiling tiles installed and no remaining ceiling work is strongly recommended
  - Final floors covering installed with no remaining dust causing floor work is strongly recommended
  - All room millwork installed as shown on the site print
  - All plumbing work in the suite is completed
  - No construction in or around the scan suite area that will produce:
    * Concrete dust
    * Drywall dust
    * Ceiling tile dust
    * Wood sawdust or shaving
    * Dust tracked into the suite area
- Active broadband connection
  - A completed network connection is strongly recommended for ALL installations.
  - A GE Healthcare network specialist may be needed to complete the VCN connection. This may take a week or longer to schedule.
- Power available to A1, with provision for Lockout/Tagout at the A1 disconnect

  If a UPS is needed, a GE A1 breaker is needed to complete this installation. Refer to the electrical section for more details.

⚠

NOTICE **SERVICE NOTICE: An improperly-prepared site (i.e., one that is in a state of construction) can result in increased installation time.**

A scanner installed in a dirty environment is more prone to contamination, which can result in decreased reliability and increased scanner downtime.

2.2 Purchaser Site Preparation Work

This list below describes many of the items to consider when planning for a system replacement or designing a room for new equipment.

- Determine room dimensions and verify that doorways are large enough for the scanner system.
- Install appropriate conduits and duct work for system cables. If additional components are needed in the Discovery VCT suite, their connection consideration must be determined and completed.
- Install junction boxes of correct size with covers at locations shown in installation plan.
- A1 main disconnect installation
- Install power supply of correct voltage output and adequate KVA rating.
- Install local disconnects, including proper over-current protection.
- Install “steelwork” or other suitable support work for mounting equipment on walls or from ceiling.
- Camera should be on-site at the time of installation.
- Complete all suite and room alterations and modifications.
- Verify that room shielding is adequate for the system being installed
- Review structural requirements - including floor vibration, levelness, and thickness
- Review HVAC requirements including system regulation and patient comfort.
- Review operational clearances to see if your daily used items fit, such as beds and carts.
- Emergency medical equipment should also be considered
- Storage cabinets and sink (if needed) must be shown on the site print

These contractors and others may be needed to help confirm that the site meets all installation requirements:

- Structural Engineer and /or Architect
- HVAC contractor
- Electrical contractor
- Qualified radiological health physicist

The project manager or sales will deliver a copy of the pre-installation quick start kit.

The above items can be found in the remaining chapters in this manual.

It is suggested that this work be completed at least three days prior to delivery.

2.3 Manufacturer’s System Level Siting Requirements

These siting requirements are the minimum that must be met in order to install a new or replacement system.

- Network communication in place and active
- Meets all scan room regulatory and service requirements
- Meets all minimum scan room structural requirements
- Meets minimum scan room HVAC requirements
- Meets minimum scan room electrical requirements
- Reviewed radiation protection section in the Pre-Installation manual
- All in room items shown on the final GE Healthcare site print and the final print is on site
- No construction in the scan room or neighboring suite areas

- Includes all finished doors, floors, windows, ceilings, and walls, with all plumbing and cabinets already installed. (Finished Floor Exception 1 on page 59 and Finished Floor Exception 2 on page 59 may apply. Finished Walls Requirements on page 60 may apply.)
- All necessary parties have received the Quick Start Kit and reviewed the requirements

It is suggested that this work be completed at least three days prior to delivery.

2.3.1 Meeting Site-Ready Requirements

The site-ready visit will take place at least three days prior to the delivery date. The site-ready visit is intended to verify that all of the siting requirements are met and the site is ready for installation.

The site-ready visit will result in a report to the project manager indicating one of the following:

Pass - All recommended items are present, completed and the site is ready for installation.

Conditional Pass - Issued when 80% of all the tasks are completed and all parties agree that the remaining 20% will be completed by the installation delivery date.

If a “Conditional Pass” is granted on the inspection date, the project manager must present conclusive evidence that unfinished tasks are completed and that the site is ready for delivery one business day prior to delivery.

Fail - Issued when less than 80% of the task are completed and all parties cannot agree that the remaining work will be completed by the requested installation delivery date. Failed sites will be rescheduled when all items are completed.

2.3.2 Quick Installs

Quick installations are described as sites with minimum room improvements needed. These include, but are not limited to, the following items:

- Existing electrical disconnect device, wire size and grounds meet all of the above requirements.
- Existing structural items, including floor thickness of 5" (127 mm) minimum, meet all of the above requirements
- Existing HVAC capacity and regulation meet all minimum requirements
- Existing scanner suite meets all regulatory and minimum size requirements
- Existing facility can accommodate the delivery and meet all delivery requirements

Quick Installs are subject to the following restrictions:

- Quick installs must have a new room print that accurately reflects the rooms to be upgraded.
- Existing floor anchors from a non-VCT system CANNOT be reused.
- New floor anchors must be a minimum of 4" (101.6 mm) from any existing floor penetrations.

Quick Installs typically involve a weekend de-install and room prep completion, with a next business day delivery and installation.

2.3.3 "Two-Step" and Upgrade Installs

A "Two-Step" installation is the practice of temporarily installing one CT system in a site with the intention of upgrading the site to a different CT system at a later date.

- For a "two-step" installation to be considered, the room must meet the minimum room requirements for the project being upgraded.
- As with any upgrade installation, "two-steps" are subject to ALL of the siting requirements imposed by the upgrade/final system. This includes the recommended room size as well as electrical, structural and HVAC requirements.
- Two-steps and other upgrades may be done as "Quick" Installs. In this case, all requirements described in Section 2.3.2 (above) also apply.
- It is the customer's responsibility to check that all requirements are met
- Rooms that do not meet the minimum requirements for the final product must either upgrade (or enlarge) their room, or consider the "Left-Side Limited Access" option.

2.3.4 Construction Site Installations

A *construction installation* describes installations at sites without an occupancy permit, often with ongoing construction. In general, construction sites fail to meet the recommended specifications for delivery of the system. GE Healthcare does not recommend construction installations, as they can result in delays, increased costs, and possible damage to the system. When construction-site delivery proves unavoidable, the installation falls into one of two categories:

- Full construction site with completed radiology area
- Full construction site with limited delivery access

Review the following categories to determine which most closely matches the condition of the planned installation site.

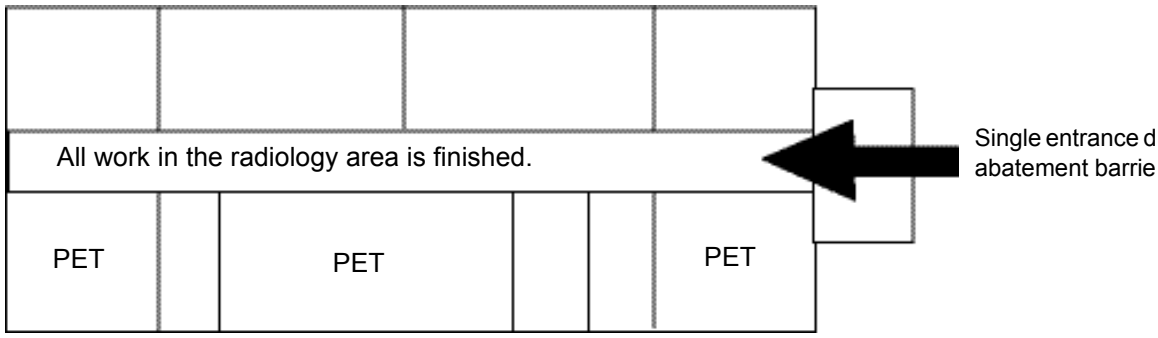


Figure 1-1 Full construction site with completed radiology area

2.3.4.1 Full Construction Site with Completed Radiology Area

This type of site consists of a finished, dust-free, occupancy-ready radiology suite. While there is no remaining construction in or around the scan suite area, there may be ongoing construction in other areas. At the time of delivery such sites feature:

- Dust control measures deployed in the radiology suite area.
- Scan suite access limited to a single entrance (see Figure 1-1).
- Radiology suite sealed off from the remaining construction area.
- Operational HVAC, with a positive air pressure within the radiology suite.

In addition, the radiology suite at such a site REMAINS in a dust-free, occupancy-ready state after delivery and throughout the remaining construction phase.

2.3.4.2 Full Construction Site with Limited Delivery Access

This type of site allows delivery during ongoing construction of the radiology suite area. At such sites, delivery occurs prior to site completion, but the product remains stored until a finished, dust-free, occupancy-ready radiology suite area is ready. This type of site requires the Discovery VCT to be delivered in a sealed package with dollies. Delivery to the storage area may require a lift truck or riggers. Installation work begins only when the site reaches the completed, dust-free, occupancy-ready radiology suite requirement.

Note: If delivery requires vertical or horizontal lifting, the PMI adds the necessary identifier to the order.

2.3.5 Relocatable Building Installations

A relocatable building is made in a factory and delivered to the site of its permanent location. Relocateable buildings qualify as fixed sites and must satisfy all of the requirements of a fixed site. The PET scanner and table must be mounted on a solid concrete floor. Any other floor type installations must be designed by the customer's structural engineer and meet all GE Healthcare's specifications listed in this manual.

Refer to Gantry and Patient Table Mounting Requirements on page 57 of this manual for further information.

Section 3.0
Site-Ready Inspection Visit

3.1 Overview

To ensure timely delivery and installation, GE recommends that the customer complete all necessary work and schedule a site-ready visit prior to the delivery date.

The visit verifies that the site meets all system siting requirements and results in a call or report to the Project Manager of Installation indicating a site-ready condition and confirming that the installation can proceed.

Use the Customer Installation Checklist to ensure that the site meets ALL requirements.

The customer and/or the customer's contractors must confirm that all work was completed, including floor levelness PRIOR to delivery.

3.2 Project Manager of Installation Tasks

The GE Healthcare Project Manager of Installation (PMI) assists the purchaser in meeting all system siting requirements.

3.2.1 Pre-Installation Delivery Tasks

The PMI also performs the following pre-installation delivery tasks:

- Determines the delivery type: ground, dock, or tilt-bed truck.
- Determines if delivery requires tilt dollies or riggers; orders dollies and lifting crates, as needed.
- Determines if the delivery requires the use of floor protection.

Determines if ground delivery requires the use of a tilt-bed truck, and informs GE Transportation of the need for a tilt-bed truck.

3.2.2 Site Review with Customer

A site-ready visit should occur prior to the delivery date. This visit verifies that the site meets all system siting requirements and confirms that installation can proceed. During the site-ready visit, a GE representative confirms that the site meets all of the strongly recommended site-ready conditions including floor levelness, and delivery route readiness. Lifting options and construction site packaging must be ordered prior to delivery and cannot be added on-site.

3.3 Customer Tasks for Site-Ready Visit

A day-of-installation site-ready visit is not allowed. All site-ready visits must be at least 3 business days prior to delivery. If no site-ready visit is done, all pre-installation work must be completed to deliver and start the installation.

Site-specific items must be verified before the installation can begin. Site-ready requirements are:

- HVAC requirements met
- All structural requirements met
- All electrical requirements met
- Broadband installed and operational
- Meets room size minimums
- Has a completed room site print
- Power and grounding completed
- Pass a site-ready inspection

The site must meet all conditions in Purchaser Site Preparation Work on page 21 and Manufacturer's System Level Siting Requirements on page 21 plus these additions reviewed at the site-ready visit.

3.4 Site Ready Review

The GE Healthcare project manager will review the site delivery process with you to determine how to best transfer the equipment from the transportation truck to your room.

This site-ready inspection will review and check these items:

- Delivery information:
  - Determine delivery route into the scan room
  - Determine if riggers are needed
  - Determine if elevators, doorways and hallways are adequate for delivery
  - Determine if floor protection is needed
  - Determine if a tilt bed truck is needed for ground delivery and ordered
- Regulatory Requirements:
  - Room size meets the minimum requirements
  - Site print is present and accurately reflects the room size and layout.
  - No grounded walls are present in the regulatory clearance areas
  - All regulatory clearances space is met
  - Room meets all local codes
- Manufacturer Requirements: All requirements listed in Manufacturer's System Level Siting Requirements on page 21 must be met.
- Purchaser's Site Preparation Work: All actions listed in Purchaser Site Preparation Work on page 21 must be completed.

Section 4.0
Customer Installation Checklists

Table 1-1 : Site-Necessary Information

Information for the Site *Must be completed before the scheduled delivery date*
Hospital name as it appears on the system screens: _____
Network ID numbers / IP addresses _____ Camera: _____ PACS: _____ AWW: _____ Other - Specify type & ID: _____ Other - Specify type & ID: _____
Camera setup information: IP address _____ Host Name:_____ Broadcast: _____ Netmask: _____
AW Direct Connect address:_____
Should HIPAA be enabled? No___ Yes ___
Should automatic downloads be enabled? No___ Yes ___

Table 1-2 : Schedule Date Commitments

GE Y N	Cust Y N	Dates
	❒ ❒	Has the project schedule been verified with facilities department, contractor, and GE?
	❒ ❒	Will the committed site-ready date be met?
❒ ❒	❒ ❒	Does the completion date for any/all construction meet or precede the delivery date?
❒ ❒	❒ ❒	Is the Power & Ground survey complete? Date: _____ Hospital contact: _____
	❒ ❒	Site-Ready visit is scheduled. Date: _____
	❒ ❒	Delivery date is scheduled. Date: _____
	❒ ❒	Installation date is scheduled. Date: _____
❒ ❒	❒ ❒	Installation timing: A: Weekdays___ B: Weekend___ C: Quick Install___ If B or C, have all sub-contractors been notified? No___ Yes ___
❒ ❒	❒ ❒	Does the delivery and/or installation date need to be adjusted?
	❒ ❒	First-Use date is scheduled. Date: _____
❒ ❒	❒ ❒	Applications/Training dates: On-Site Training Date: _____ Healthcare Institute Training Date: _____

Table 1-3 : General Site Planning

GE Y N	CUST Y N	General / Site Requirements *Must be completed 5 weeks before scheduled delivery date*
❒ ❒	❒ ❒	Have final drawings been approved and distributed to the contractors?
❒ ❒	❒ ❒	Are final drawings “signed off” to approve equipment layout / orientation?
❒ ❒	❒ ❒	Do the actual room dimensions match those on the final drawings?
	❒ ❒	Has the radiologist health physician reviewed and approved the room layout and shielding requirements?
	❒ ❒	Have any additional requirements or questions about the installation been discussed with GE? List: _____ _____ _____ _____
	❒ ❒	Is there a person assigned to review and verify that all installation requirements are met? Name: _____
	❒ ❒	Have the specific site requirements been discussed with the contractor? Refer to the GE final drawings specifications. (See Table 1-4 below.)
	❒ ❒	Has the responsibility of cabling, installing, and interfacing accessories not on the order been discussed?
	❒ ❒	Are all third-party vendors identified, notified and scheduled? (Examples: Netcom, Medrad, etc.)
	❒ ❒	Have all regulatory requirements been met per Main Disconnect Control on page 114?
	❒ ❒	Have all electrical requirements been met per Regulatory and Service Clearances on page 38? (Main disconnect, A1 panel meets requirements for safe servicing.
	❒ ❒	Will existing network, broadband, and camera cable drops reach new locations and will they meet the requirements and function with Discovery VCT? If not, what are the requirements? List: _____ _____ _____
❒ ❒	❒ ❒	Have all necessary radioactive material licenses and approvals been obtained for the equipment and facility?
	❒ ❒	Does the site have a radiation license allowing PET isotopes and GE68? A copy of customer's site radiation license must accompany order entry package. Otherwise, installation will be delayed.

Table 1-4 : References for Specific Site Requirements

Sections for Specific Requirements	
• Room Planning - Chapter 4 - Room Planning	• Floor Loads & Weights - Chapter 6 - Floor Loading and Weights
• Environment - Chapter 5 - Environmental Conditions	• Power - Chapter 8 - Power Requirements
• Radiation Protection - page 63	• Delivery - Chapter 7 - Delivery Information
All work by contractors must be completed before the scheduled delivery date.	

Table 1-5 : Equipment Compatibility

GE Y N	Cust Y N	Equipment *Must be completed 5 weeks before scheduled delivery date*
❒ ❒	❒ ❒	Has the order been reviewed for completeness and compatibility with existing equipment? Typical equipment: Remote monitors ____ AWW relocation ____ Cardiac option ____ Injectors ____
❒ ❒		Are interfaces to existing and/or new accessories ordered and planned for accordingly?
❒ ❒	❒ ❒	Have the following peripheral locations been included in the site drawings? EKG monitor___ Injector control___ Laser camera ___ UPS ___ 2nd Monitor___
❒ ❒	❒ ❒	Will GE Healthcare provide additional services per contract negotiations?
❒ ❒		Are correct length cables on order?

Table 1-6 : Network Connections

GE Y N	Cust Y N	Network Installation and Setup *Must be completed 5 weeks before scheduled delivery date*
❒ ❒	❒ ❒	Have IP addresses and Host Names been obtained? No___ Yes ___
❒ ❒	❒ ❒	Will a network camera be used? No___ Yes ___
❒ ❒	❒ ❒	**Mandatory:** Is the network installed, are network jacks installed, and is the entire network tested?
❒ ❒	❒ ❒	**Mandatory:** Broadband VPN installed/setup?
❒ ❒	❒ ❒	**Mandatory:** Are network software options ordered ____ HIS RIS option ___ DICOM print ___ AWW ____
	❒ ❒	**Optional:** Has modem option ordered? _____ (Requires a site escalation)
❒ ❒	❒ ❒	**Optional:** Is the Discovery VCT service telephone line identified and installed for InSite? *(Electrical, mechanical, etc.)*

Table 1-7 : Miscellaneous Tasks

GE Y N	Cust Y N	Other *Must be completed before the scheduled delivery date*
	❒ ❒	Arrangements made in the schedule to allow adequate time for remodeling, if necessary (such as wall, floor, or ceiling repair work, painting, other cosmetic finishes)
	❒ ❒	Have arrangements been made to clean the floor *after* equipment removal and *prior* to the installation of the new equipment?
❒ ❒	❒ ❒	Is de-installation of existing equipment needed? No__ Yes ___ Removal date _____
❒ ❒	❒ ❒	Is there a trade-in of existing equipment? No __ Yes __ GoldSeal _____
❒ ❒	❒ ❒	Delivery route identified and verified with the proper hospital personnel? No__ Yes __ Elevators and doors checked for size and weight constraints? No__ Yes __
❒ ❒	❒ ❒	Have appropriate arrangements been made with traffic for delivery? No__ Yes __
❒ ❒	❒ ❒	Will acceptance/performance testing or biomedical testing be needed? No__ Yes __ Date: _____
❒ ❒	❒ ❒	Are trash and/or recycling bins available for the removal of papers, boxes, etc. during the installation? No__ Yes __
❒ ❒	❒ ❒	Has the GEHC Surface Penetration Permit been completed before equipment delivery? (A copy of this form must be sent to GEHC as defined in the permit.) No__ Yes __

Pre-Installation Block Diagram

Rev 02/23/06

Chapter 2
Pre-Installation Overview

NOTICE **Prior to beginning the pre-installation process for a Discovery VCT system, it is highly recommended that the user review the Pre-Installation Video (DVD) provided in the Discovery VCT Quick Start Kit.**

Before a Discovery VCT system can be installed, all pre-installation requirements must be complete. These issues are particularly important:

- Chapter 4, Room Planning, Section 7.0 Structural Requirements
- Chapter 4, Room Planning, Section 9.0 Radiation Protection
- Broadband standard
- Site-Ready Visit
- Chapter 5, Environmental Conditions, Sections 1.0 Temperature and Humidity Specifications & 2.0 Temperature and Humidity Monitoring (HVAC Requirements)
- Chapter 8, Power Requirements (Site Power Audit Required)
- Chapter 9, Interconnection Information

Site-specific items must be verified before the installation can begin.

Section 1.0
Dust/Dirt Contamination

The Discovery VCT (consisting of console, PDU, table and gantries) is highly susceptible to airborne contaminants, especially concrete and drywall dust. Due to the possibility of contamination, these systems should NEVER be installed in a construction site.

NOTICE **Any site with unfinished floors, walls or ceilings is considered a construction site, and is not suitable for system installation.**

Section 2.0
Chemical Contamination

Wet film processors must never be installed in the same room as the scanner, due to the possibility of chemical contamination of components. Such chemicals can contribute to increased equipment failures, increased system downtime, and decreased reliability. Film processor equipment installation must meet the manufacturer's requirements (such as ventilation specifications) and all applicable national and local codes. Also, consideration should be given to the location of this equipment and chemical fumes relative to human contact as it relates to locating this equipment and chemicals in the control room.

Section 3.0
Walls, Ceiling, and Floor

All walls, ceiling, and flooring must be completed before installation can begin.

Discovery VCT scanners can only be installed on a 5" (127 mm) concrete floor.

Section 4.0
Broadband

For information on broadband requirements, refer to Chapter 4, Section 8.0, on page 61.

Section 5.0
Phone Lines (Modem Option)

One phone line must be installed at or near the console and be operational prior to installation:

- Analog line (optional for modem use)

Section 6.0
Overview

The Discovery VCT series systems use adjustable leveling pads to support the gantry, PET image ring and table assembly as listed in Table 2-1 below.

Using the GE print to establish the room layout, make sure all the regulatory operating, and service clearances shown on the print are observed. Using the template (PN 5173765) shipped with the system, locate the anchor holes. Make sure they clear structural interferences in the floor.

Clean the area. Free the mounting surface of any material that may interfere with the positioning and leveling of the system.

1.) Lay out the 3 floor templates (PN 5173765.)

2.) Start with the Gantry template—align per the GE print.

3.) Place the table template over the top of the Gantry template. Align the scan and table center-lines and secure the templates to the floor. Make sure there are no potential clearance issues.

4.) Make sure the floor is level (per Figure 2-1) across the templates.

Note: Tiles (or other resilient flooring) around all holes will be cut during the installation process.

Table 2-1 Anchors and Pads on System Components

Subsystem	Number of Anchors with Leveling Pads	Number of Leveling Pads Only
Table	4	3
CT Gantry	4	4
PET Gantry & Base	7	2

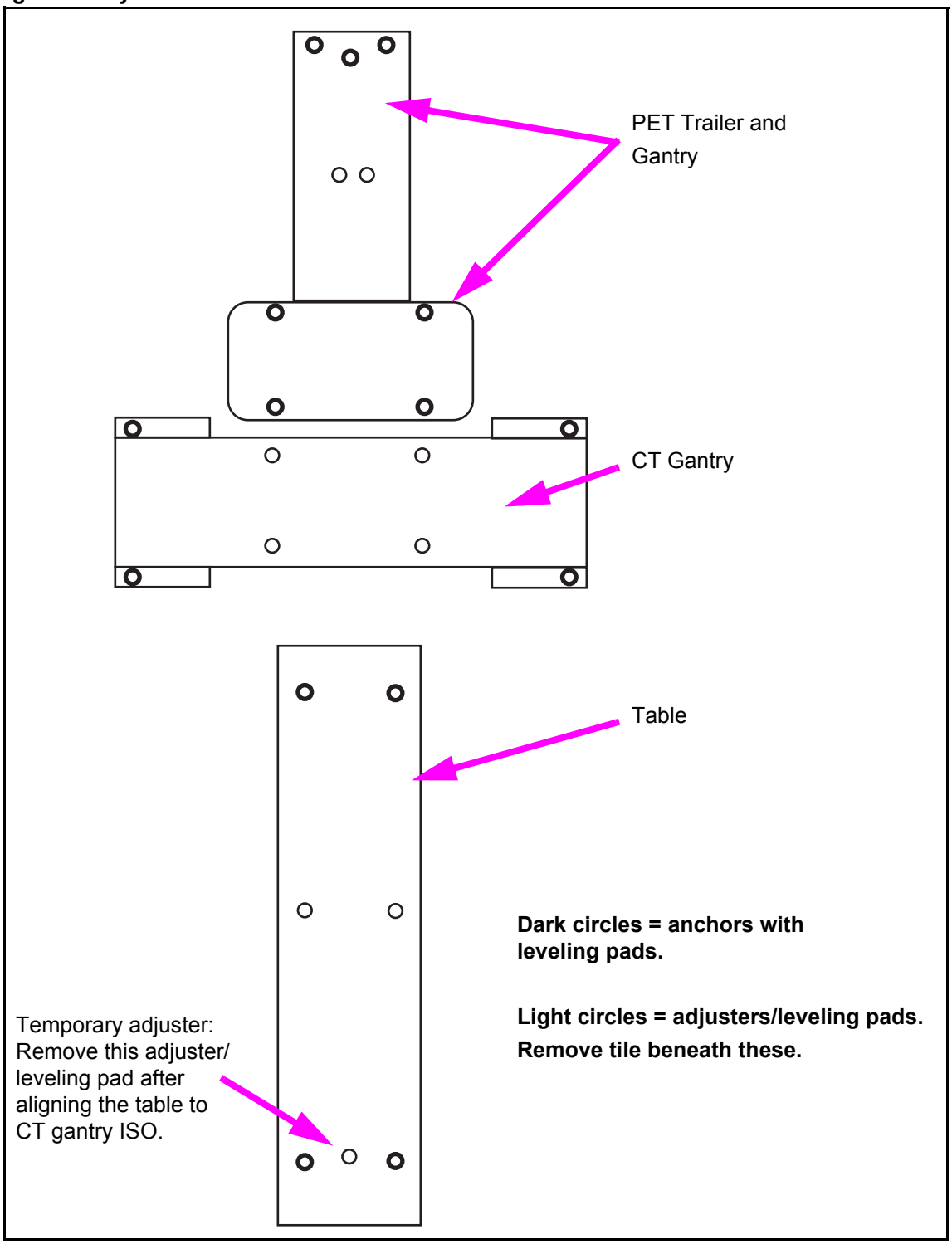
FLOOR LEVELNESS SPECIFICATION

- 1/8” (0.125") over 10’
- 3 mm over 3048 mm

This should be measured on the template over the table/gantry area shown in Figure 2-1.

These specifications apply to *any* area within not only the template area but also within the areas illustrated in Figure 4-1 on page 38 and Figure 4-2 on page 42.

Figure 2-1 System Leveler Pad Locations



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Chapter 3
System Catalog

Section 1.0
Option Catalog Numbers

The following is a list of system options requiring site planning work for the Discovery VCT. *For a complete list of system options, contact the local GE Healthcare Sales representative or visit us at http://www.gemedical.com. Refer to the instruction manuals supplied with specific options for respective details.*

Table 3-1 Discovery VCT Global Installation Options and Kits

CATALOG NUMBER	OPTION DESCRIPTION (COMMENTS)
B7850GD	MKE Gantry Dolly Only
P5064ZZ	International Gantry Dolly only
E7014LA	GE Color Printer only
E8203JA	GE Color Printer, includes cassette
P5050PZ	Boom-in-Room Kit
B7864CB	SmartScore EKG Monitor and Recording Device (Contains more than the monitor)
E8007RC	SmartScore EKG Monitor only
B7540RB	Bar Code Reader
B7700MG	Glob al Modem Kit

Section 2.0
Base Scanner System

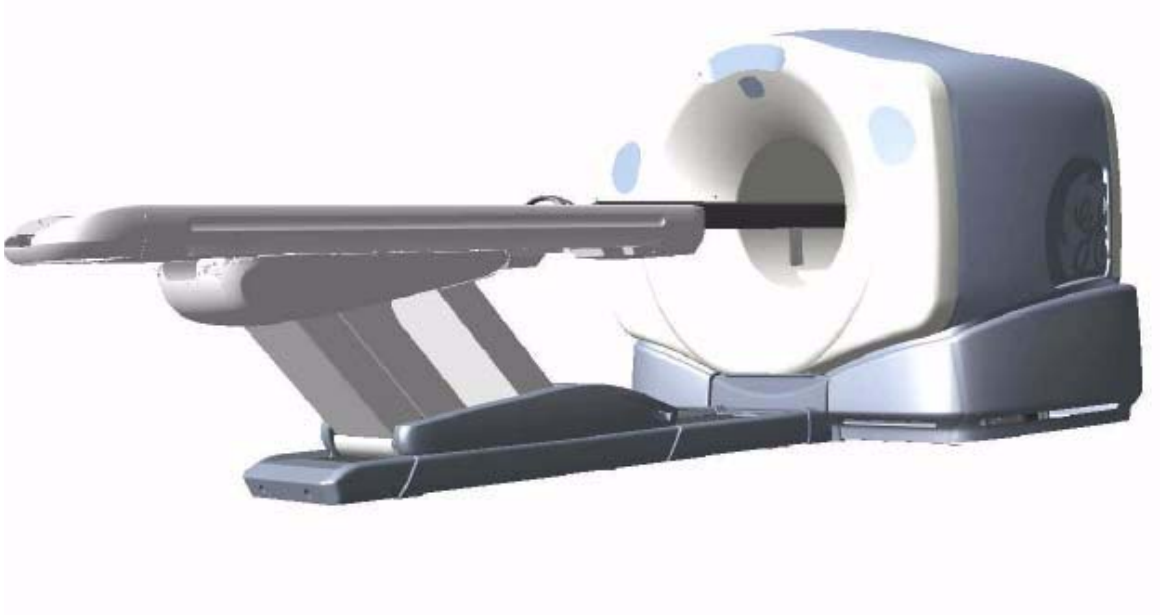
2.1 Application

The Discovery VCT scanner system includes hardware and software to support patient data acquisition and image analysis for whole-body positron emission tomography and computed tomography.

2.2 Configuration

The base scanner system (table and gantry) is configured as shown. All scan and analysis functions are controlled from the operator's console (not shown), located in an adjoining space with a full view of the patient.

Figure 3-1 Base Scanner System



Chapter 4
Room Planning

Section 1.0
Strongly Recommended Systems Clearances

Consult your local GE Healthcare Sales and Service Representative about your specific needs.

Some room size dimensions are shown in the table below.

Table 4-1 Room Dimensions

Room	Minimum*	Recommended**
Scan Room Size*** Door Opposite Tube Exchange Side	13 ft 7 in x 25 ft 9 in (4140 mm x 7849 mm)	14 ft 7 in x 25 ft 9 in (4445 mm x 7849 mm)
Scan Room Size*** Door on Tube Exchange Side	14 ft 7 in x 24 ft 9 in (4445 mm x 7849 mm)	14 ft 7 in x 24 ft 9 in (4420 mm x 7849 mm)
Control Room Size	8 ft 0 in x 14 ft 0 in (2438 mm x 4267 mm)	9 ft 0 in x 14 ft 6 in (2743 mm x 4420 mm)

* May require a second door at rear of system (or side of system opposite to primary door) for alternate egress.

Minimum size of scan room may require a second door at rear of system (or side of system opposite to primary door) for alternate egress.

** Recommended room sizes accommodate potential system upgrades, such as for Discovery VCT.

***See the following Figures for scan room clearance requirements: Figure 4-1, Figure 4-6, and Figure 4-7.

Additional component dimensions are available in Figure 4-9 through Figure 4-12 of this document. Consult the local *GE Healthcare* Project Manager of Installation for your appropriate room specifications.

For equipment clearance requirements, refer to Regulatory and Service Clearances on page 38.

Note: Regulatory clearances cannot be compromised under any condition!

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 Discovery VCT is shipped with standard long length cables, with a set of short cables (B7864JB) available as an option. See the electrical page of the GE print for your specific requirements.

Excess cable length cannot be stored behind the console or PDU. Long cabling must not be cut or shortened. Excess cable may be stored in cable wall or floor duct, provided sufficient space is available. All NEC 70-E Electrical Regulations regarding conduit or duct fill must be observed.

Section 2.0
Regulatory and Service Clearances

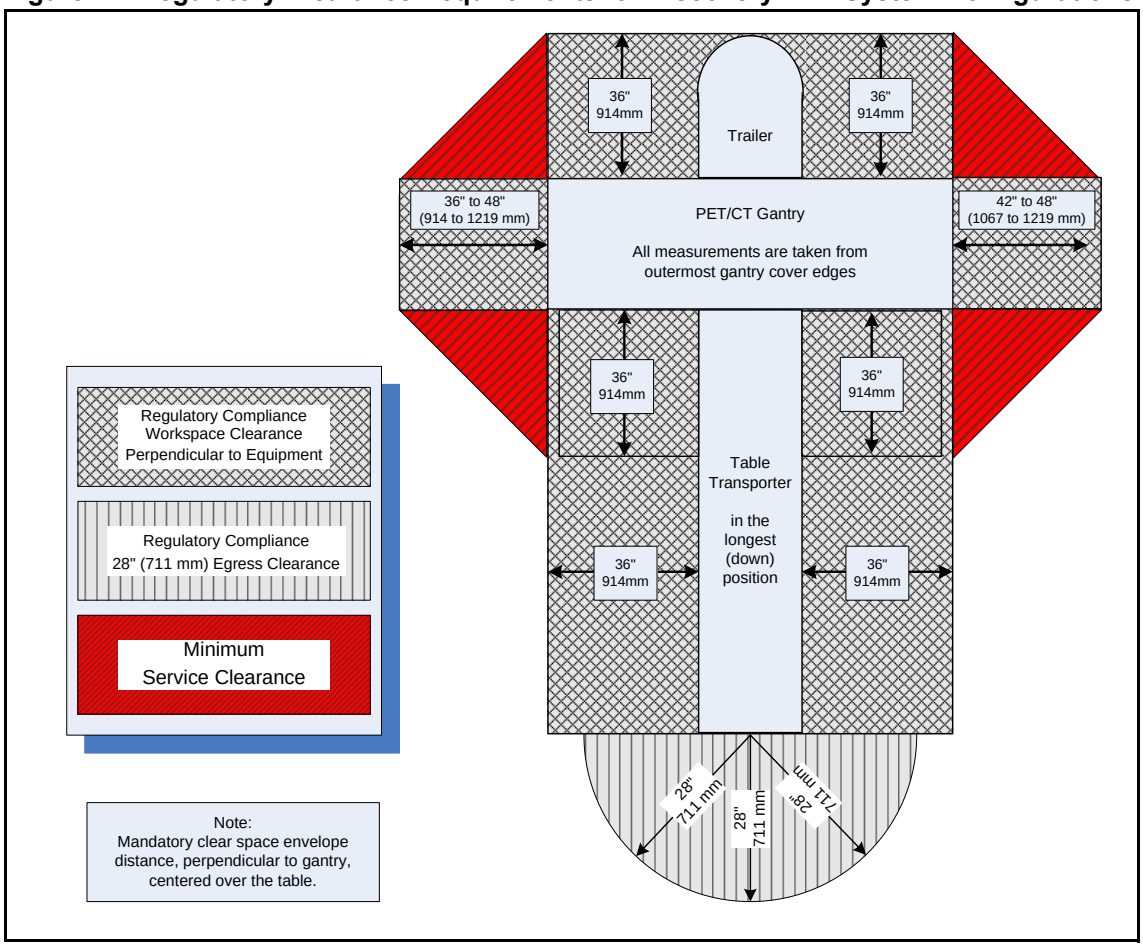
2.1 Regulatory Clearances

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):

Figure 4-1 is a diagram of clearance requirements for U.S. regulatory compliance. See clearance tables on the following pages for detailed dimensional clearances.

Please note that 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 Regulatory Clearance Requirements for Discovery VCT System Configurations



Note: See Section 2.2 for Service Clearances.

2.1.1 Regulated Minimum Working Clearances 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.
- 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.

Table 4-2 Console

Work Space Requirement	Minimum Clear Space in Inches	Additional Conditions
Direction of Service Access	N/A No exposed live part hazards	

Table 4-3 NGPDU

Work Space Requirement	Minimum Clear Space in Inches	Additional Conditions
Direction of Service Access (Front of PDU)	36* (914.4 mm)	*48 in. (1219 mm), if exposed live parts of 151 - 600 volts are present on both sides of workspace with the operator between. *42 in. (1066 mm), if opposite wall is grounded and exposed live parts of 151 - 600 volts are present.
Service Access Width (Left/Right of workspace)	30 (762 mm)	This is the width of the working space in front of the equipment. 30 in. (762 mm) min or the width of the equipment, whichever is greater
Head Clearance	78 (1981.2 mm)	The height of the workspace measured from floor at the front edge of equipment to ceiling or overhead obstruction(s). 78 in. (1981 mm) or height of equipment, whichever is greater

- For the Gantry and Table, distances are measured from the enclosure, not the finish covers.

Table 4-4 Gantry

Work Space Requirement	Minimum Clear Space in Inches	Additional Conditions
Direction of Service Access (All Sides)	36* (914.4 mm)	*48 in. (1219 mm), if exposed live parts of 151 - 600 volts are present on both sides of workspace with the operator between. *42 in. (1066 mm), if opposite wall is grounded and exposed live parts of 151 - 600 volts are present.
Service Access Width (Left/Right of workspace)	30 (762 mm)	This is the width of the working space in front of the equipment. 30 in. (762 mm) min or the width of the equipment, whichever is greater.

Table 4-5 Table

Work Space Requirement	Minimum Clear Space in Inches	Additional Conditions
Direction of Service Access (Table Head)	N/A	
Direction of Service Access (Table Sides)	36* (914 mm)	
Direction of Service Access (Table Foot)	28* (711 mm)	*18 in. (457 mm) minimum for Front Gantry Cover removal only if unobstructed egress space of 28 in. (711 mm) is maintained around the equipment for room exit behind the gantry.
Service Access Width (Left/Right of workspace)	30 (762 mm)	This is the width of the working space in front of the equipment. 30 in. (762 mm) min or the width of the equipment, whichever is greater.

2.1.2 Terms and Definitions

EGRESS

The path of exit from within any room. U.S. regulatory recommends a minimum of 28 in. (711 mm) of continuous and unobstructed space including trip hazards along the path of exit.It is the customer's responsibility to provide a means of egress.

WORK SPACE

This is the dimensional box strongly recommended 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 in.s (914 mm). Additional conditions can increase the minimum requirement. FCT defines this as the envelope of the component superstructure. For the NGPDU, it is with the front panel removed. 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 in. (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 in. (1981 mm) or height of equipment, whichever is greater. (See Chapter 4.3.)

GROUNDED 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.

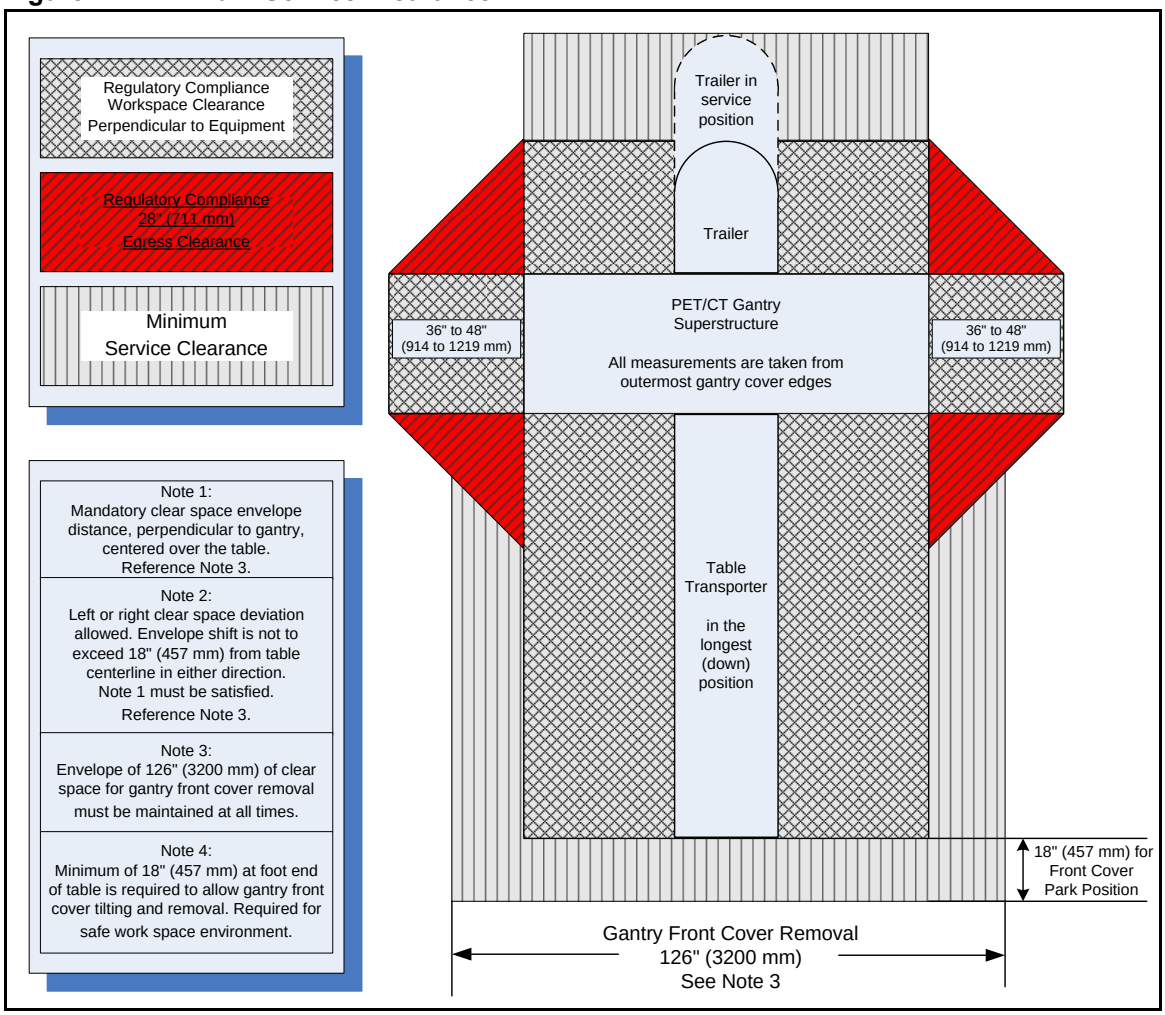
PRE-INSTALLATION ESCALATION

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

2.2 Service Clearances

Servicing of the Discovery VCT system can be safely performed within the regulatory envelopes defined in Section 2.1, Regulatory Clearances, however sufficient space must be maintained to remove the covers from the system. To achieve this clearance for the gantry, clear space must be available to maneuver the gantry covers mounted on the service dollies. One service engineer can accomplish this. If such space is not available, then two service engineers are strongly recommended for gantry cover handling. This must be clearly communicated with the Customer.

Figure 4-2 Minimum Service Clearance



2.3 Service Clearances for Single Service Engineer

- Gantry front cover removal requires the use of the “Tilting Cover Dollies.” These dollies allow the Service Engineer to separate the cover from the gantry, tilt the cover 90 degrees, roll the cover to the foot end of the table, and then tilt the cover an additional 90 degrees such that the front cover is now upside-down relative to the normal system mounted condition. Figure 4-2 illustrates the minimum clear space necessary to achieve this operation. The gantry front cover must be removed to a position that satisfies the minimum regulatory clearances.
- The gantry rear cover, with service dollies installed, requires a width 94 in.s (2387.6 mm) and a depth of 23 in. (584 mm) of clearance for removal as shown in Section 3.0, Figure 4-3. Sufficient space must be calculated to move the cover either straight back or to a side of the table to satisfy the minimum regulatory clearance shown in Figure 4-2. This means the rear cover cannot violate the workspace on the rear or either side of the gantry.
- If gantry service requires both the front and rear covers be removed, then these covers must be positioned within the room in such a manner as to not violate the regulatory clearances on any side of the gantry. This may necessitate removing the covers from within the suite. This should be discussed with the customer and provisions made to accommodate this potential event.
- A single Service Engineer can safely perform servicing of the table. Sufficient clear space must be available to maintain regulatory clearances when the table covers or cradle are removed.
- In your room layout design, service shall have a clear and unobstructed access to the gantry tube change area for all major component replacements. This clearance can be different depending on the location of the door to the scan room, in relation to the layout of the scanner. These components must be able to reach the service area by one service engineer, without lifting or rigging. Major components include:
  - CT X-ray tube in crate
  - High voltage tank(s) in crate
  - Slipring in crate
  - Detector assembly

2.4 Power Distribution Unit (NGPDU) Service Clearance

Positioning of this component must be considered for regulatory compliance as defined in Section 2.1, Regulatory Clearances.

2.5 Console Service Clearance

The console does not present an exposed live parts hazard. However, it is recommended that a minimum working space depth of 48 in. (1219 mm) and full width of the console be maintained at all times for service activity. Additionally sufficient space needs to be provided for repositioning of the console and side clearance for rear service access. See Figure 4-8 for a typical control room layout.

Section 3.0
System Clearances

Figure 4-3 Discovery VCT Minimum Clearances

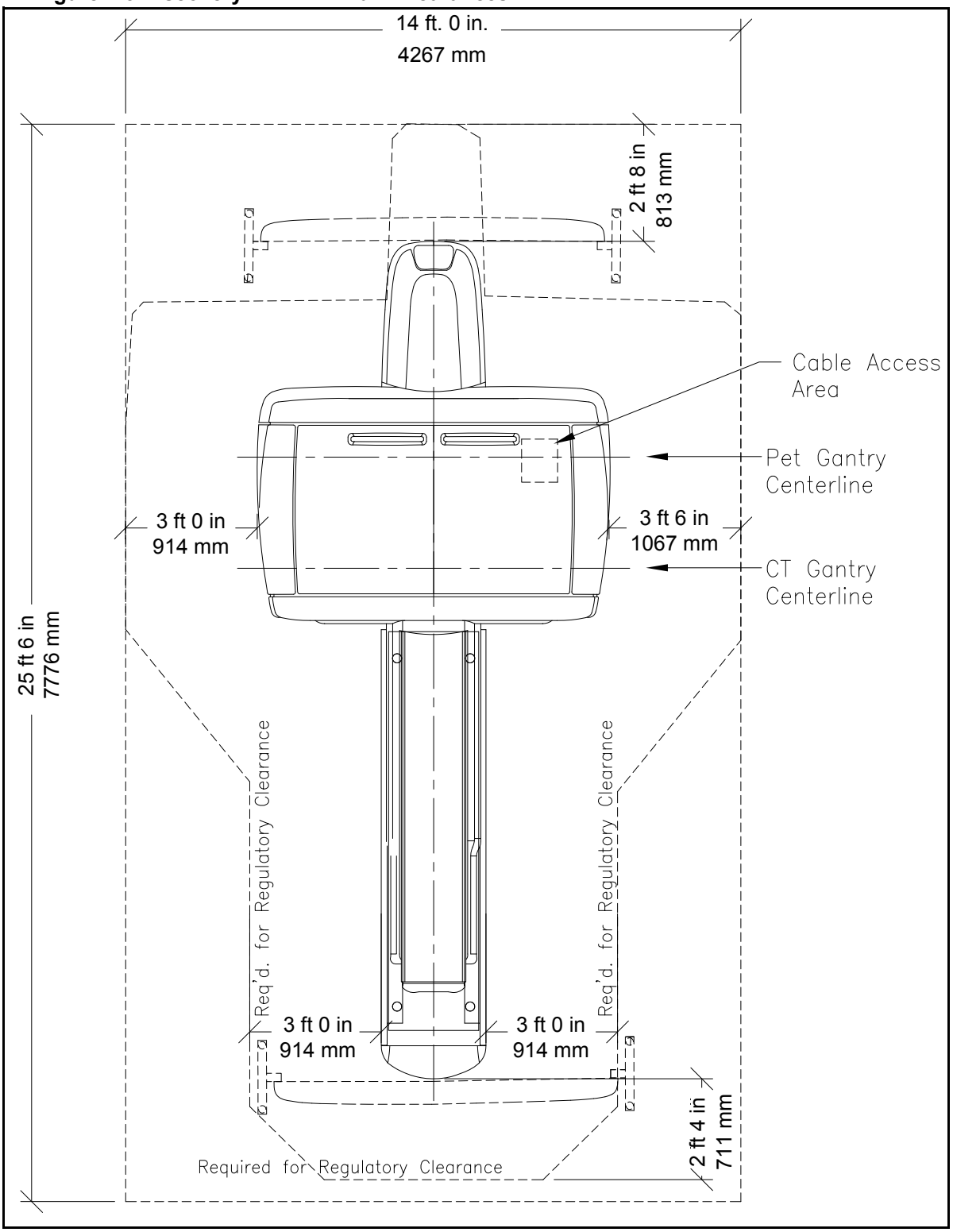


Figure 4-4 Gantry Front Cover with Service Dolly Dimensions

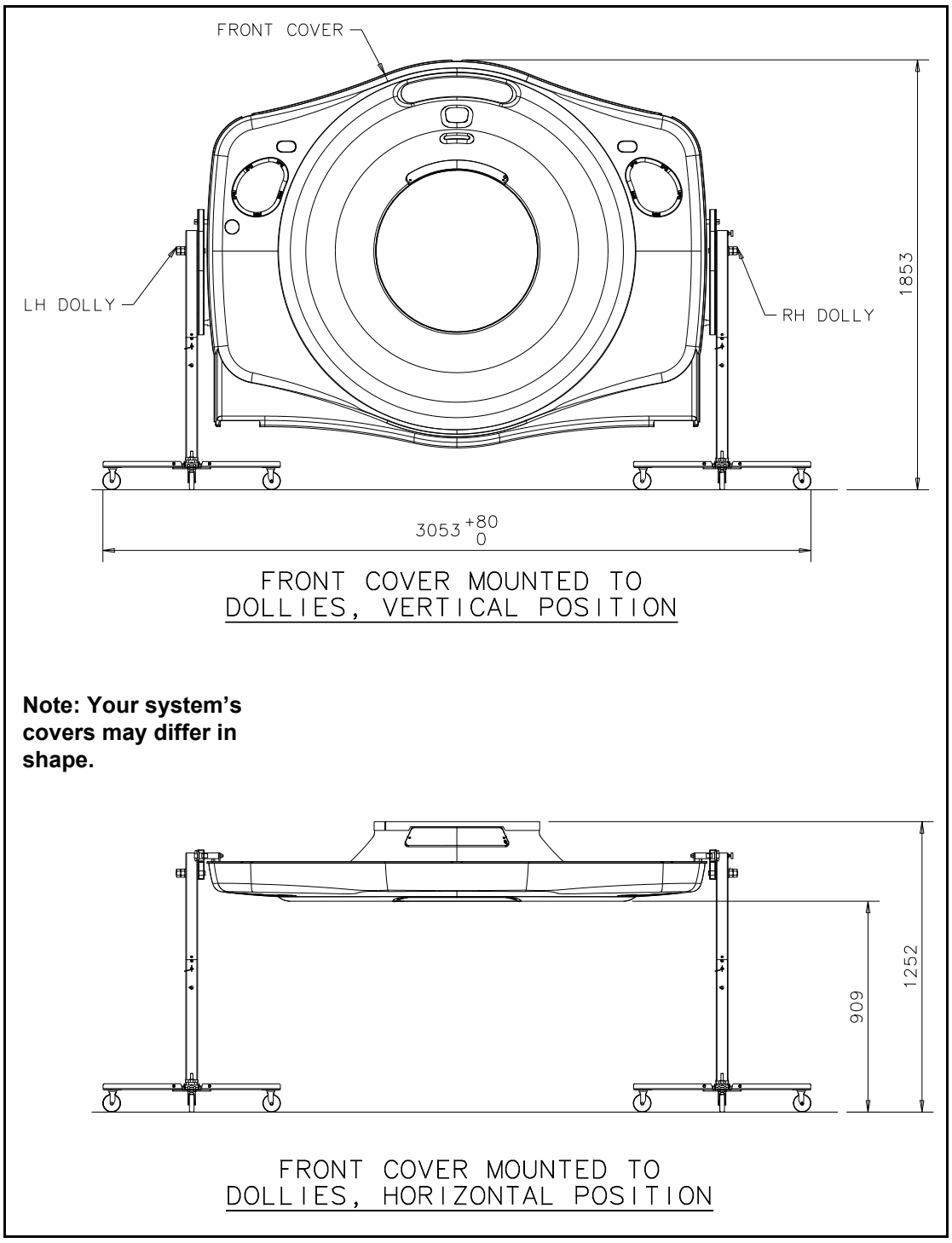
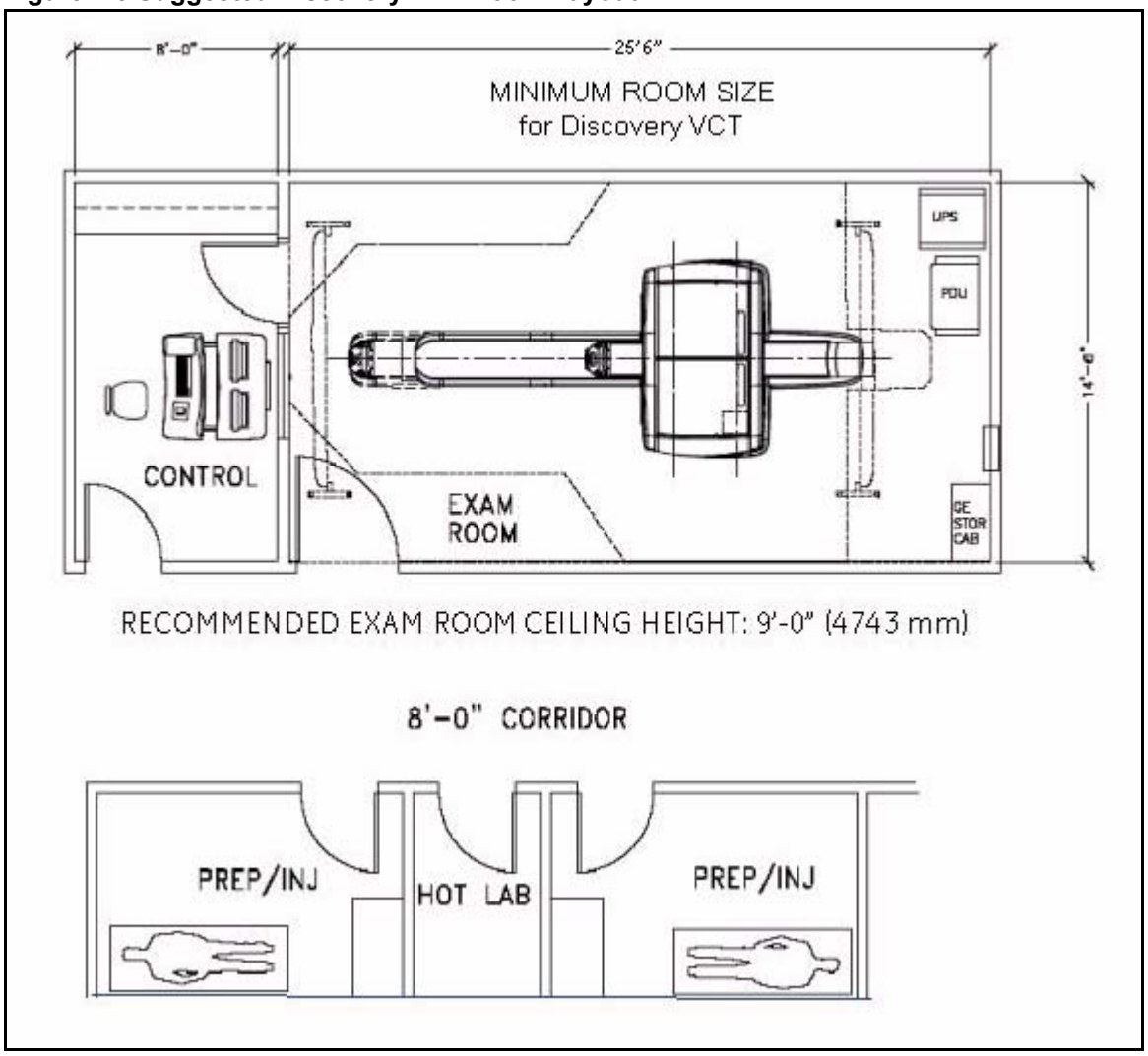


Table 4-6 Dimensions of Accessories

DESCRIPTION	WIDTH		DEPTH		HEIGHT	
	Inch	mm	Inch	mm	Inch	mm
Remote Color Monitor (LCD)	16.25	413	8	203	16	406
Color printer	23	584	18	457	7	178

Figure 4-5 Suggested Discovery VCT Room Layout



Note: Figure 4-5 shows one suggested suite layout. Consult regulatory requirements in your region for local requirements and layouts.

Section 4.0
Common Dimensions and Clearances

4.1 Minimum Room Dimensions

- Scan room
  - Door Opposite side of the tube exchange: 13 ft 7 in x 25 ft 9 in (4140 mm x 7849 mm)
  - Door on Same side of tube exchange: 14 ft 7 in x 24 ft 9 in (4445 mm x 7849 mm)
- Control room: 8 ft 0 in X 14 ft 0 in (2438 mm X 4267 mm)

Additional dimensions are available in Figure 4-9 through Figure 4-12 of this document.

Ask the local *GE Healthcare* Project Manager of Installation to provide a copy of the site-specific room layout with dimensions.

4.2 System Clearances During Normal Operation

- Finished ceiling to floor: 108.0 in (2743 mm)
- Back of console to wall: 6.0 in (152 mm)
- Back of console host cabinet to wall: 6.0 in (152 mm)
- Back of PDU to wall: 6.0 in (152 mm)

4.3 Ceiling Pedestal Mount

- Minimum acceptable distance for ceiling pedestal mount lowest point to floor injector or monitor: 96 in (2438 mm)
- Recommended distance for ceiling pedestal mount lowest point to floor injector or monitor: 108 in (2743 mm)

Note: Refer to Ceiling Heights on page 57.

Section 5.0
Recommended Layouts

5.1 Scan Room Layouts

Figure 4-6 Minimum Dimensions for Room Layout with the door on the opposite side of the tube exchange side of the room.

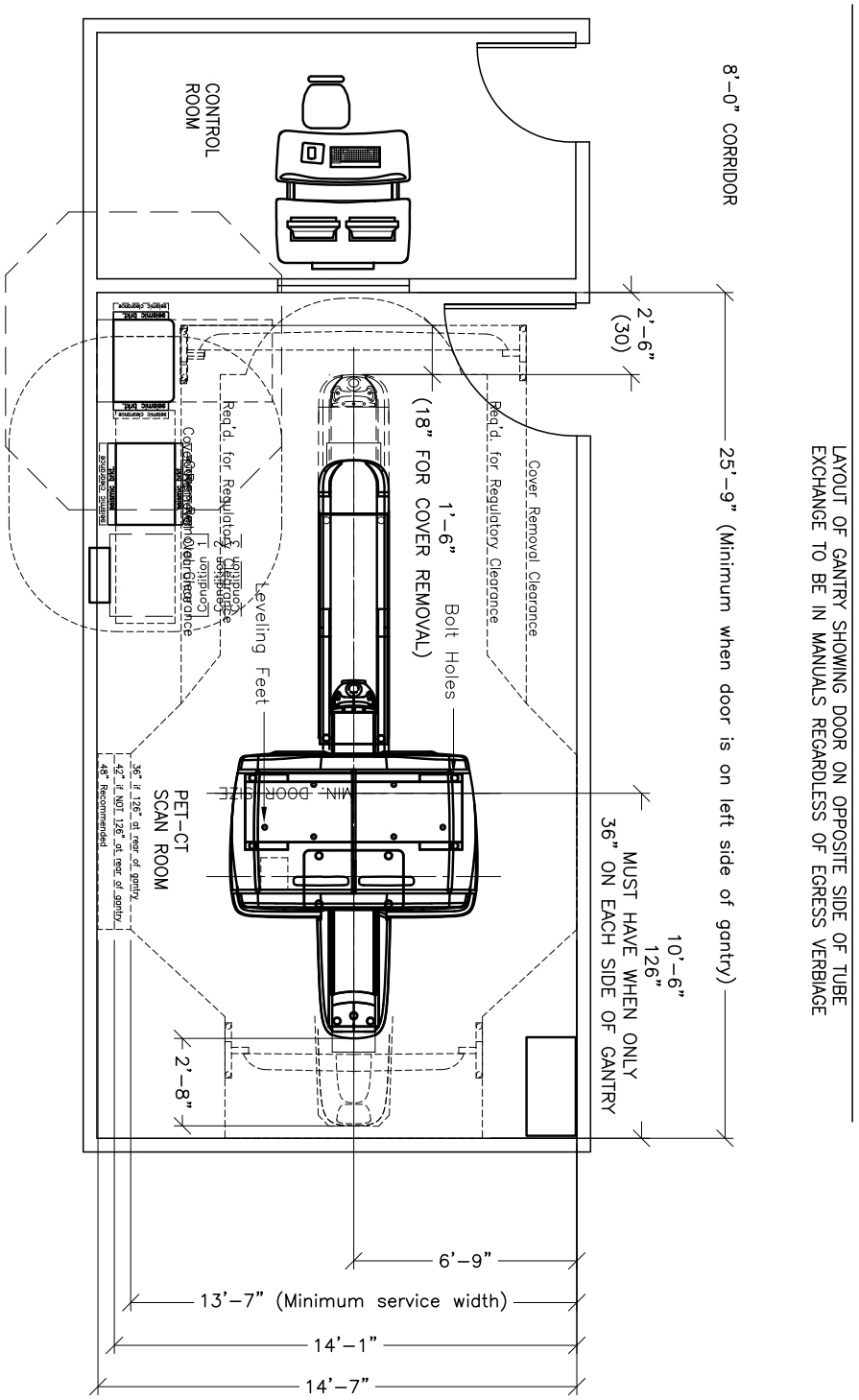
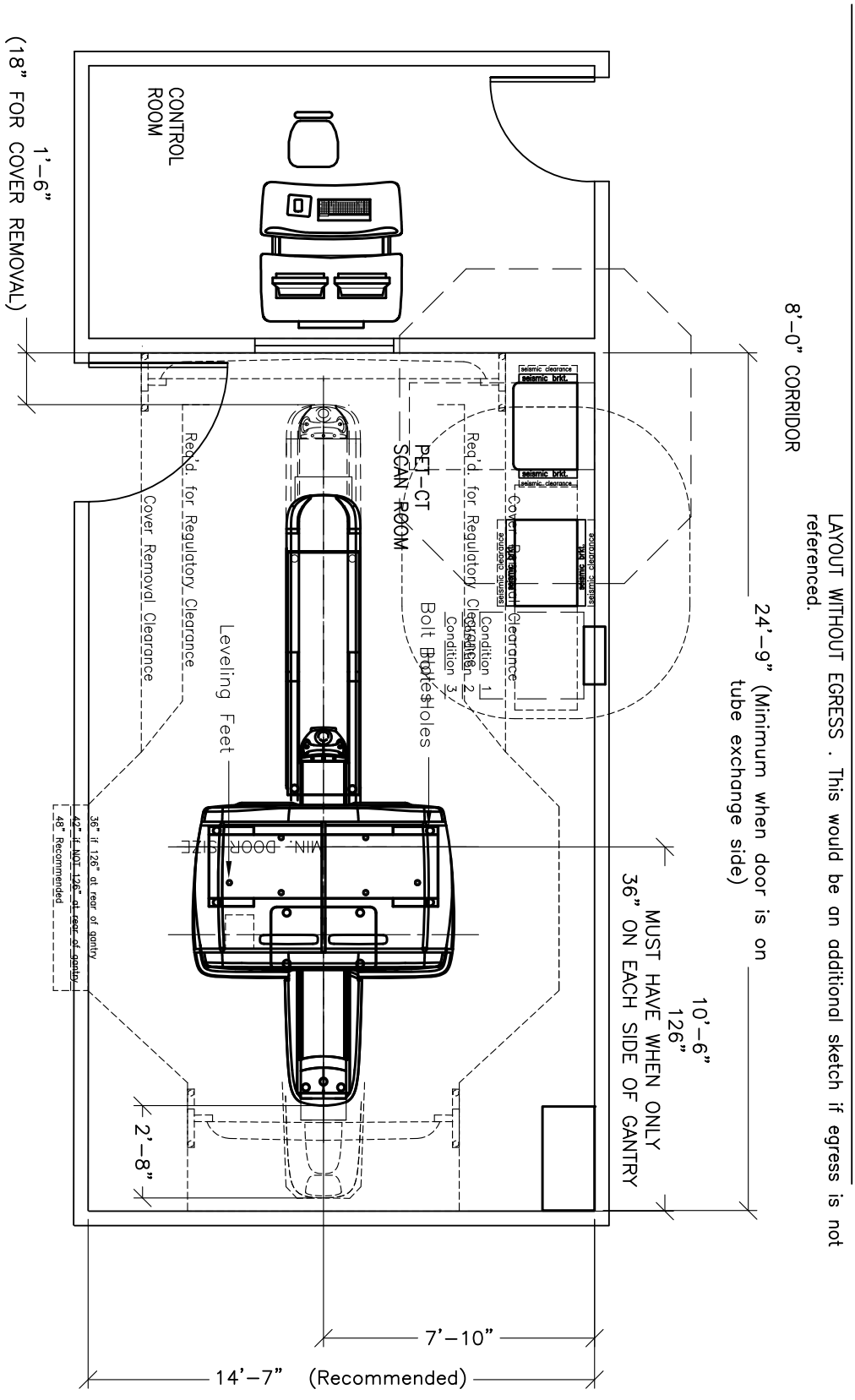
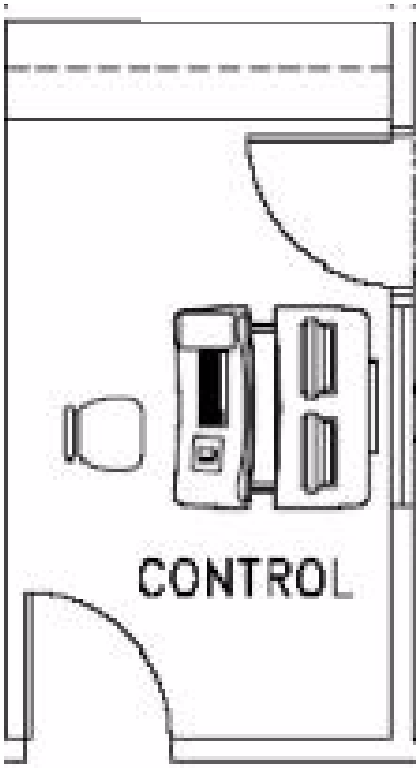


Figure 4-7 Minimum Dimensions for Room Layout with the door on the tube exchange side of the room



5.2 Control Room Considerations

Figure 4-8 Typical Control Room Layout



- The control room must provide a suitable operating environment for the console electronic and operator working comfort.
- The console cannot be dismantled or have components removed or rearranged in configurations other than as shipped.

Note: Cables CANNOT be extended.

- A suitable work area, which is within reach of the operator's console, should be provided for placement of the injector control. The technologist should have full view of the patient while using the injector. Injector controls differ in dimensions depending on the brand selected.
- A PACS, workstation, image printer, or filming device are often placed in the console control room area, and sometimes may be directly linked to the console.
- Additional components, although linked via network or Ethernet cable, are not powered from the console.
- Additional room power and network connection should be considered when reviewing the console work space.

5.3 Storage Cabinet and Equipment

A storage cabinet is provided by GE Healthcare to store all supplied service equipment. (See Table 4-7 for equipment list.) This storage cabinet should be located in the scan room suite area for easy service access.

Table 4-7 Storage Cabinet and Equipment

Item	Size	Weight (total)
Storage Cabinet	18 in D x 36 in W x 42 in H (46 cm x 91 cm x 107 cm)	60 lb (27.2 kg) (approximately)
QA Phantom (water filled)	7.9 in x 5.9 in (20 cm x 15 cm)	12 lb (5.4 kg)
PET Phantom (VCQ)	17.7 in x 13.8 in x 7.9 in (45 cm x 35 cm x 20 cm)	2 lb (0.9 kg)
Phantom Holder	9.8 in x 9.8 in (25 cm x 25 cm)	8 lb (3.6 kg)
FE Box (purple)	11.8 in x 15 in x 11.8 in (30 cm x 38 cm x 30 cm)	15 lb (6.8 kg)
Install Support Kit (box)	11.8 in x 11.8 in x 15 in (30 cm x 30 cm x 38 cm)	20 lb (9.1 kg)
Tube Hoist Kit	30.3 in x 3.1 in and 15 in x 5.9 in 77 cm x 8 cm and 38 cm x 15 cm)	20 lb (9.1 kg)
Balance Weight Kit	(box)	73 lb (33 kg)

Table 4-8 Gantry Cover Dollies

Item	Size	Weight (total)
Rear Cover Dollies (Hang behind cabinet)	21 in x 33 in (53 cm x 84 cm)	25 lb (11.3 kg)
Front Cover Dollies	33.5 in x 7.9 in and 33.5 in x 5.9 in (85 cm x 20 cm and 85 cm x 15 cm)	35 lb (15.9 kg)

5.4 Advantage Workstation (AW)

Refer to Pre-Installation Manual 2111833 and Installation/Service Manual 2111831. For document access, please refer to GE Healthcare's Common Documentation Library web site.

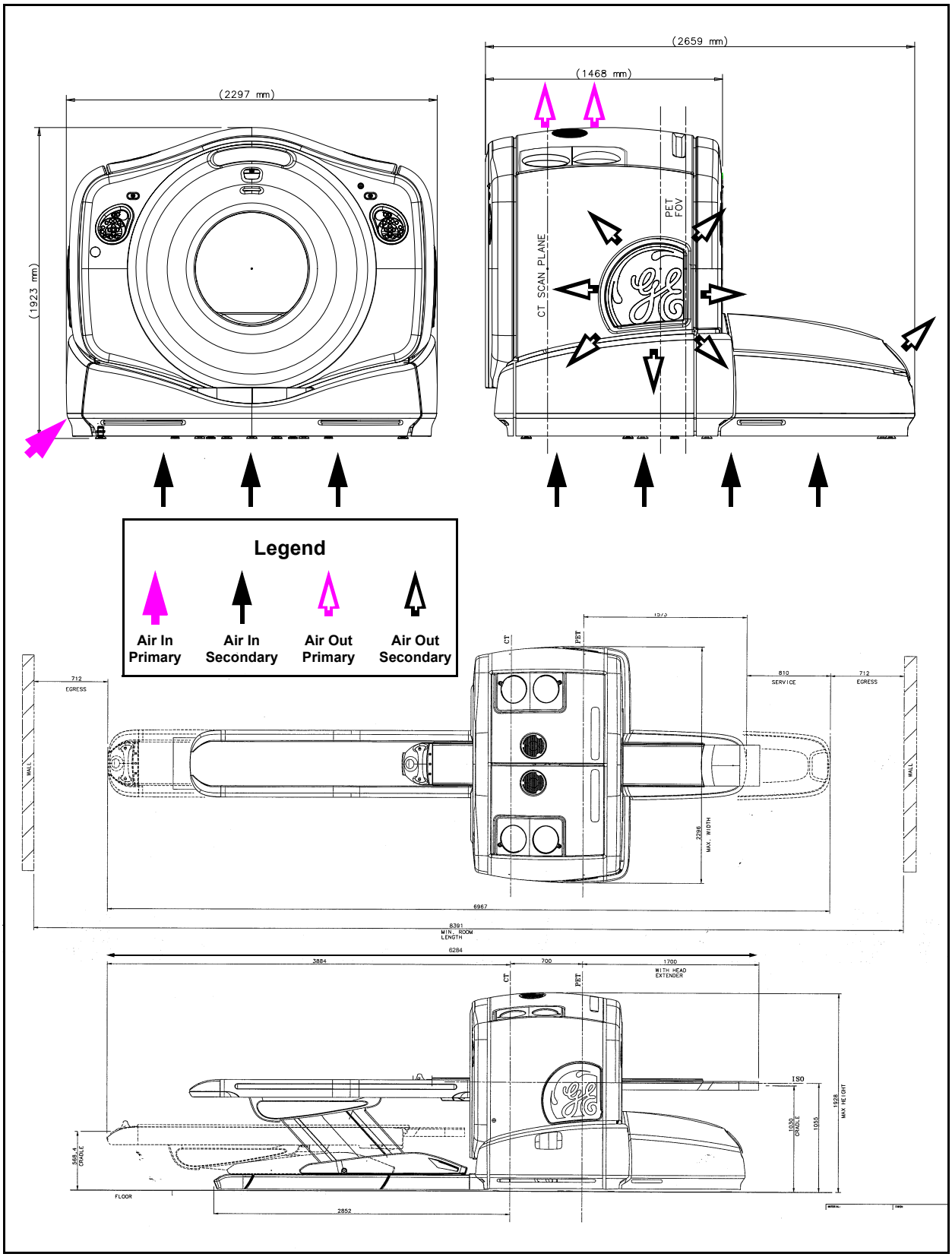
Section 6.0
Primary Component Dimensions

Table 4-9 Discovery VCT Subsystem Dimensions

Description	Width		Depth		Height	
	inch	mm	inch	mm	inch	mm
PET-CT Gantry (overall)	90.4	2297	104.7	2659	75.7	1923
Table (at max elevation; 1" [25 mm] below Discovery VCT Gantry ISO center; depth from cradle end to back cover)	25.6	650	135.8	3450	42.1	1070
Power Distribution Unit (PDU)	27.6	700	21.6	550	41.8	1062
Operator's Console	49	1238	48.3	1228	32	807
LCD Color Monitors (2)	16.25	413	8	203	16	406
UPS	22	559	37	940	37	940
A1 Disconnect: • E4502AE (125A) • E4502AF (150A)	Not Applicable					

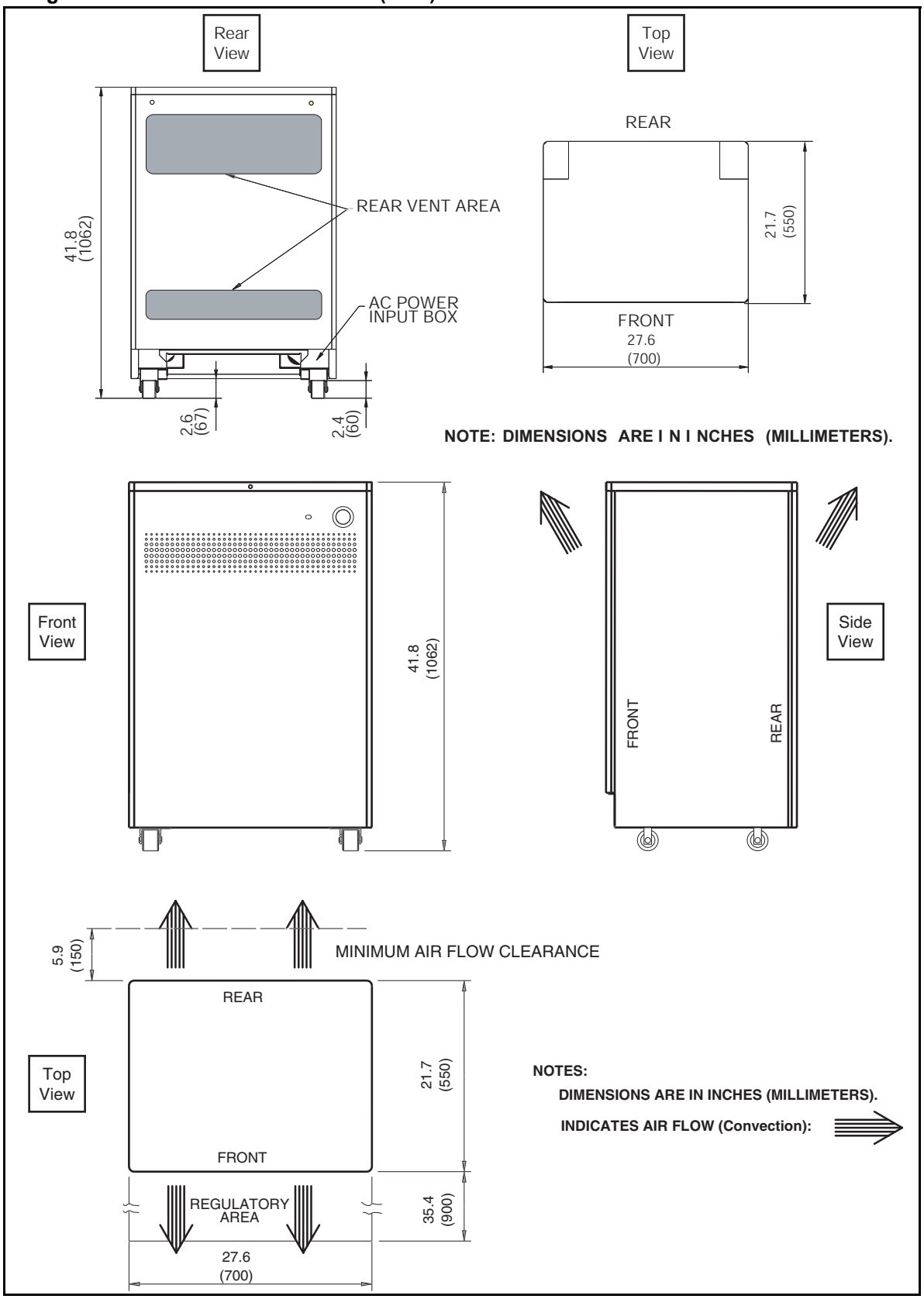
6.1 Gantry and Patient Table

Figure 4-9 Gantry and Patient Table Dimensions and Air Flow



6.2 Power Distribution Unit

Figure 4-10 Power Distribution Unit (PDU) Dimensions

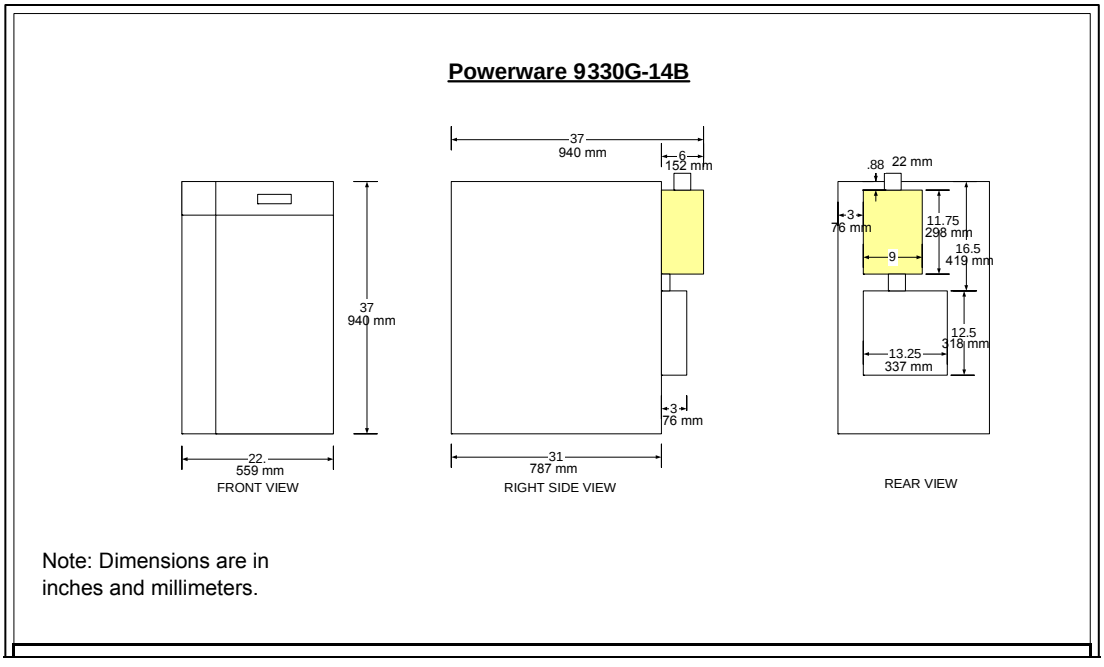


6.3 Uninterruptible Power Supply

The Powerware 9330G-14B Partial System UPS has been selected for use with the Discovery VCT scanner. For more information on this product, see the manufacturer's Web site at http://www.powerware.com.

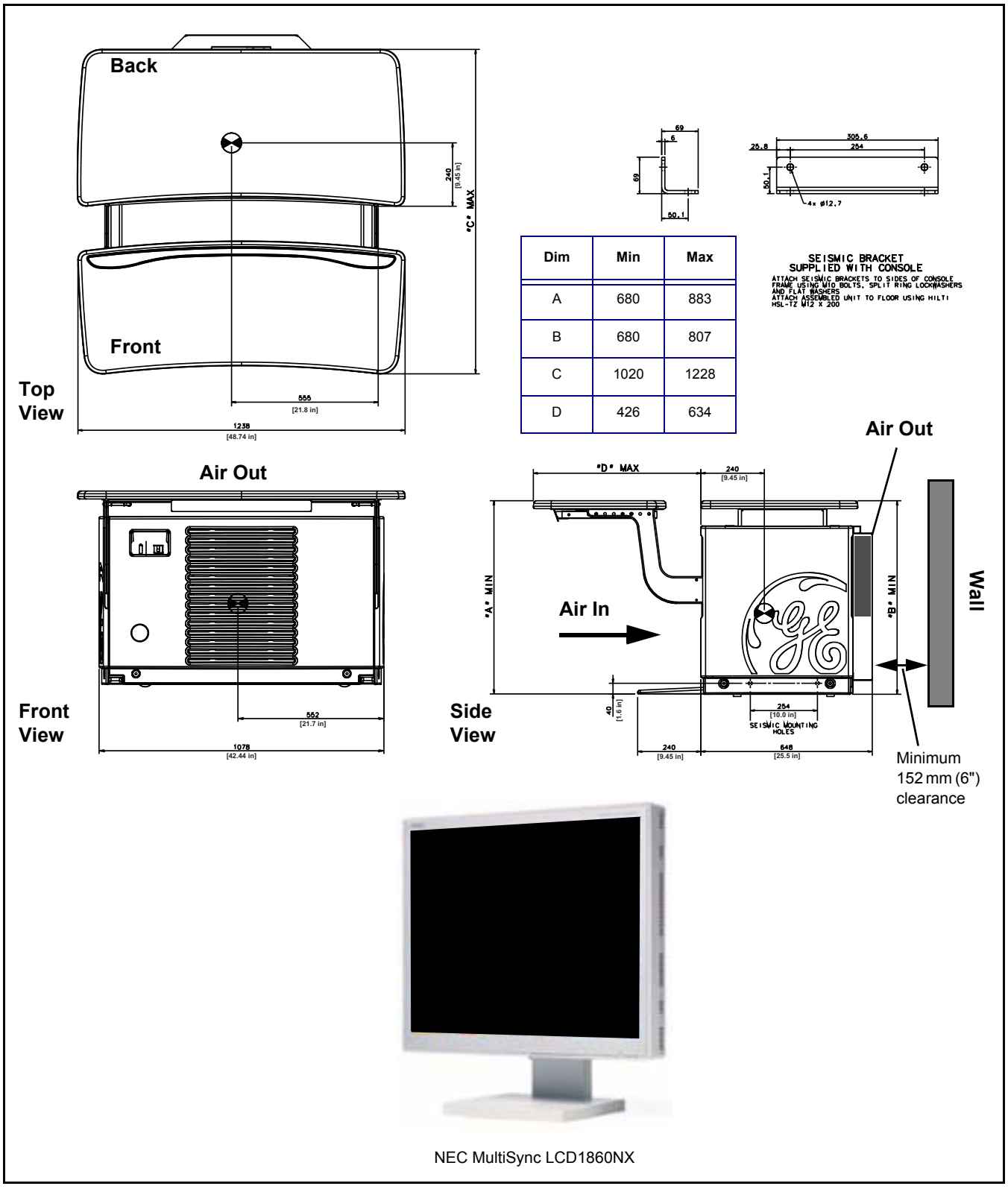
Note: Powerware products seen online are similar to those sold by GE Healthcare but will not work when used with our systems.

Figure 4-11 Powerware 9330G-14B Partial System UPS Dimensions



6.4 Operator's Console

Figure 4-12 Operator's Console Dimensions



Dim	Min	Max
A	680	883
B	680	807
C	1020	1228
D	426	634

NEC MultiSync LCD1860NX

Section 7.0
Structural Requirements

7.1 Ceiling Heights

- Minimum acceptable ceiling height: 96 in (2438 mm)
- Recommended ceiling height: 108 in (2743 mm)

Note: Refer to Ceiling Pedestal Mount on page 47.

7.2 Gantry and Patient Table Mounting Requirements

WARNING POTENTIAL FOR PATIENT INJURY! Improperly-secured table may tip, dislodging patient. Proper anchoring is key to maintaining patient safety during system operation.

NOTICE **It is the purchaser's responsibility to provide an approved support structure and mounting/ method for all floor types other than those listed. *GE Healthcare* is not responsible for any failure of the support structure or method of anchoring, including seismic requirements. *GE Healthcare* is not responsible for methods other than those listed.**

Table and gantry mounting dimensions are shown in Figure 4-9, on page 53. Refer to Chapter 6 for additional details of floor loading, component weights, and gantry and table installation and anchoring.

Anchor gantry and table to floor by a means that will maintain their relative alignment and meet applicable building and other local codes, including seismic structural mounting requirements.

Floor structure must be capable of withstanding the occupied weight of table and gantry, and the individual contact area loading of these components. Refer to Table 4-10 for each of the three (3) major components of the Discovery VCT system.

Support areas of the patient table and gantry must rest on solid concrete, not resilient tile or carpeting as these will slowly yield over a period of time and disturb alignment of table to gantry. Factors that could cause misalignment between gantry and table due to floor sag should be considered. The cradle can carry a 450 lb (204 kg) patient. Center of gravity changes as cradle cantilevers. Take into consideration all other moving weights such as gurneys or personal equipment. Refer to Chapter 6 for gantry and table mounting details.

Table 4-10 Floor Loading Specifications

Component	Floor Loading Kgf/sq meter (lbf/sq ft)	Effective Floor Load Area * Sq meters (sq feet)	Maximum Foot Pad Pressure ** MPa (psi)
CT Gantry	1448 (296)	1.41 (15.2)	1.69 (245)
PET Gantry	6180 (1266)	0.34 (3.7) ***	1.9 (280)
Table	963 (197)	0.87 (9.40)	1.5 (216)

* Area bounded by outermost footpads (not stabilizers).

** Assumed floor pad area of 4.123 sq inches (104.7 sq mm).

*** Area bounded by four (4) front foot pads while gantry is in operating position.

7.3 Flooring

7.3.1 Minimum Floor Thickness

For any installation on a floor with a rating less than the values listed in Table 4-10, consult a structural engineering specialist to determine any necessary enhancements.

Support areas of the patient table and gantry must rest on at least 5 in (127 mm) of solid concrete, not resilient tile or carpeting which will slowly yield over a period of time and disturb alignment of table to gantry.

Factors that could cause misalignment between gantry and table due to floor sag should be considered. The cradle can carry a 450 lb (204 kg) patient. Center of gravity changes as the cradle cantilevers.

Take into consideration all other moving weights such as gurneys or personal equipment. Refer to Chapter 6 for gantry and table mounting details.

7.3.2 Floor Anchors

A qualified person must verify that the site and method of anchoring are adequate to support loads and maintain table-to-gantry alignment.

Location of supporting beams and columns may dictate position of table-to-gantry assembly. Use of flush floor duct or conduit in the floor may significantly affect floor strength. The method and placement of anchoring through bolts must not reduce the structural strength of floor.

The floor anchors provided in the installation kit are designed to be used *only* on concrete floors that meet the 5 in (127 mm) concrete floor requirements. All other anchoring methods and/or use on floor types other than the 5 in (127 mm) concrete minimum must be verified by the customer's engineering contractor, at the customer's expense, indicating that the anchors they chose meet the stated GE minimum load requirements. The customer's contractor is responsible for the installation of all anchors other than those shipped with the system or any anchors to be installed in non-approved flooring.

7.3.3 Non-Concrete Floors

If installing the Discovery VCT system on a type of floor that fails to meet the 5 in (127 mm) concrete floor requirements, the customer, at their expense, shall provide acceptable anchoring and mounting methods that meet all the structural requirements listed in Structural Requirements on page 57 of this Site Planning Guide.

7.3.4 Floor Strength

Concrete floors must have a minimum strength of f'c = 2000 psi (1.4 X 10^7 MPa) at 28 days for mounting floor anchors. It is the responsibility of each customer to have appropriate tests performed to determine and measure concrete strength. The *GE Healthcare* Service representative can assist.

Consult *GE Healthcare* Installation Support Services for further details.

7.3.5 Floor Levelness

The Discovery VCT room floor levelness requirement is important for accurate patient positioning. Floor levelness in the Scan Room must not be greater than 0.125 in (3 mm) between depression and high spots over any 120 in. (3048 mm) distance within the area of the gantry and the area around the table. (Refer to Figure 4-3 or Figure 4-5.)

No part of floor surface within the table and gantry and no part of the two interface areas between the table and gantry should be higher than the support area for table and gantry.

Note: The use of shims is not suitable to achieve floor levelness when installing this product.

7.3.6 Floor Vibration

The Discovery VCT equipment may be sensitive to vibration in the frequency range of 0.5 to 20 Hz depending on the amplitude of the vibration. It is the customer's responsibility to contract a vibration consultant or qualified engineer to implement design modifications to meet the specific limits, However, it is ultimately the customer/architect/engineer responsibility to design the site solution.

7.3.6.1 Steady State Vibration

The maximum steady state vibration transmitted through the floor should not exceed 10^{-3} m/s^2 rms maximum single frequency above ambient baseline from 0.5 to 80 Hz (measured in any 1 hour during a normal operating period).

7.3.6.2 Transient Vibration

The behavioral characteristics must be such that any measurable transient disturbance must also be minimized to less than 0.01 m/s^2 peak-to-peak.

7.3.6.3 Equipment Location

To minimize interference, the Discovery VCT equipment should be placed on a solid floor, located as far as possible from the following vibration sources:

- Parking lots
- Roadways
- Subways
- Trains
- Hallways
- Elevators
- Heliports
- Hospital power plants containing pumps, motors, air handling equipment and air conditioning units

7.3.7 Finished Floor Requirements

Installation requires a finished floor in the scan and control rooms. The scan room must be level by 6 mm (1/4 in) over the table and gantry area to be acceptable. You cannot use shims to level the floor. Eight or more floor covering openings that are 101.6 mm (4 in) in diameter are made to ensure the table and gantry rest on a solid surface. These floor penetrations can be sealed if necessary. These requirements apply to all installation types.

FINISHED FLOOR EXCEPTION 1

For sites replacing their scan room floor covering after the table and gantry are installed, the floor can be clean-finished with dust-free concrete. The finish floor in the scan room requires no dust-producing operations when applying final floor covering.

FINISHED FLOOR EXCEPTION 2

Facilities under new construction that have a finished radiology area with a single controlled-access and dust abatement barrier, can have a finished concrete floor in the scan room. The finished concrete floor in the scan room requires no dust-producing operations when applying final floor covering.

7.4 Walls

7.4.1 Scan Window

NOTICE **The operator must be able to observe the patient from the Operator Console during normal system operation.**

Refer to Figure 4-5. The recommended patient viewing window dimensions are 48 in. wide by 42 in. high (1219 mm x 1067 mm). The location of the window depends upon the location and orientation of the Operator Console and workspace.

7.4.2 Finished Walls Requirements

Finished walls inside the scan and control rooms must be painted at the time of installation. This requirement applies to all installation types.

A finished walls exception is made for the following condition:

In new construction and upgraded facilities, a primer coat of paint is acceptable for equipment installation. However, the final coat of paint must be applied using a brush of some type (e.g. roller or bristle). The final coat of paint cannot be applied using a spray method.

Section 8.0
Network Connections

The Discovery VCT system connects to the network through the operator console. A patch cable connects the console to a wall box. The system requires an IP address for the operator console.

Broadband is considered the standard network connection for Discovery VCT. Broadband connections should use one of the following Category 5 patch cables:

The Discovery VCT system is connected to the network through the console. A high speed connection 1000 baseT with 100 baseT is acceptable.

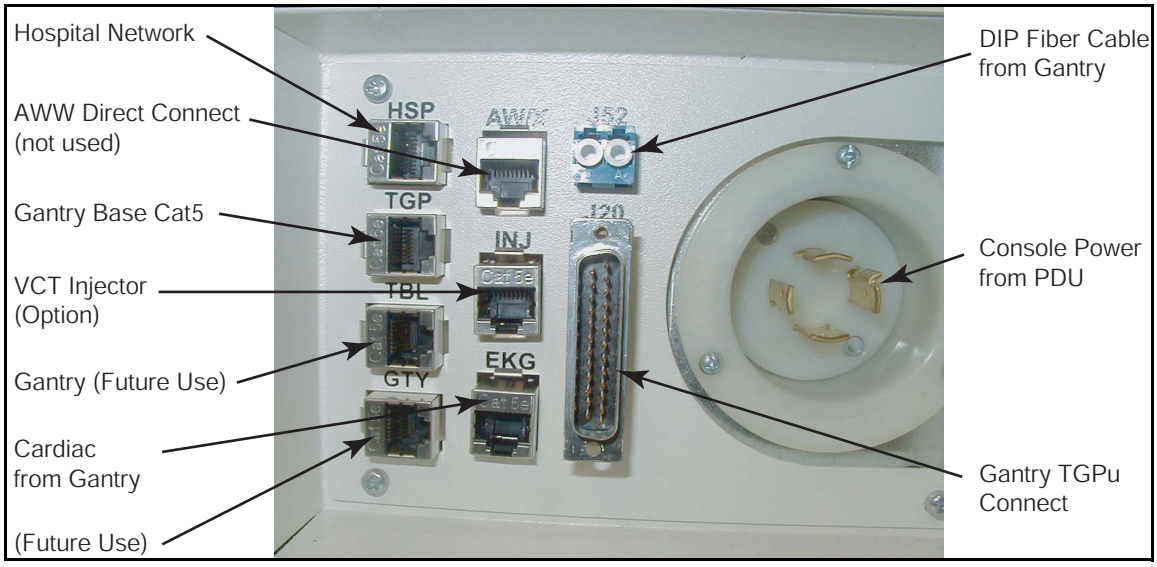
Table 4-11Discovery VCT Broadband Cabling

CAT Number	GE Part Number	Length
K9000WB	2215028-10	65 ft 7 in (20 m)
K9000KP	2215028-5	32 ft 10 in (10 m)
K9000JR	2215028-4	16 ft 5 in (5 m)
K9000WA	2215028-9	9 ft 10 in (3 m)

Note: The hospital can use dial-up as an acceptable option for this product.

- A patch cable should be provided by the customer, and is used to connect the console to a wall box.
- Some customer-site units may require cable ductwork or conduit to route connecting network cables to the workstation, camera and console.
- The run from the hospital switch to the Discovery VCT wall outlet must not exceed 290 ft. (88.3 m). Bandwidth performance is degraded when the length reaches 300 ft. (91.4 m) or greater.

Figure 4-13 Console Rear Bulkhead



8.1 U.S. Process Overview for Networking

The United States network connectivity requirement for this product is broadband. The U.S. process relies on the Installation Specialist to select a Customer Champion and identify an IT contact for the site. Together, these individuals complete a site assessment to gauge what tasks are needed to fulfill the connection. For questions, contact the GE Connectivity team at 800.321.7937, option #3.

8.2 Customer Broadband Responsibilities

Provide the *GE Healthcare* Project Manager of Installation with an accurate site address, telephone number, contact name, and e-mail address for these:

- Customer Champion
  - Coordinates VPN activities between Radiology/Cardiology and the Information Technology (IT) departments
  - Acts as a focal point in assuring site broadband infrastructure meets *GE Healthcare* requirements for connection as determined by a mutual assessment with the *GE Healthcare* Connectivity team.
- IT Contact
  - Completes an equipment assessment with *GE Healthcare* Connectivity team to determine site readiness for broadband
  - Works with the Customer Champion to complete any identified infrastructure changes
  - Provides IP addresses for new Discovery VCT equipment
  - Provides a VPN-compatible appliance that will support the IPSec tunneling protocol and 3DES data encryption
  - To utilize an Internet Service Provider that supports static routing

Section 9.0
Radiation Protection

NOTICE **Scanner-room shielding requirements should be reviewed by a qualified radiological health physicist taking into consideration:**

- **Scatter radiation levels within the scanning room. (See Figure 4-15.)**
- **At 40mm aperture, scan times of typical Discovery VCT patient exams are expected to be two or four times faster than that of LightSpeed Pro16 exams with a 20mm or 10mm aperture, respectively**
- **Equipment placement**
- **Weekly projected workloads (# patient/day technique (kvp*ma))**
- **Materials used for construction of walls, floors, ceiling, doors, and windows**
- **Access to surrounding scan room areas**
- **Equipment in surrounding scan room areas (such as film developer, film storage)**
- **For small and medium filter survey, the 20 cm water phantom should be placed on the phantom headholder inserted into the end of the patient table.**

Figure 4-14 and Figure 4-15 depict measured radiation levels within the scanning room at the indicated distances, while scanning a 16cm CTDI phantom for the Head Scan mode and 32cm CTDI phantom for the Body Scan Mode. The mAs, kV and aperture scaling factors are provided in Table 4-12 and they can be utilized to adjust the exposure levels to the typical usage at the site.

For example: The exposure level for a 120kV, 800 mA, 1sec scan at 50" (25 mm) away from the scan plane is: 10.4 μGy (from Figure 4-15) × 0.71 (from Table 4-12) × 800/100 (from Table 4-12) = 59.2 μGy.

Note: Actual measurements can vary. Expected deviation equals ±15%, except for the 5mA and 1.25mm techniques, where variation may be greater (up to a factor of 2), due to the inherent deviation in small values. The maximum deviation anticipated for tube output equals ±40%.

Table 4-12 Shielding Requirements Scaling

CHANGED PARAMETER	MULTIPLICATION FACTOR
mAs	new mAs/100
80 kV	0.24
100 kV	0.45
120 kV	0.71
140 kV	1.00
1.25mm aperture	0.20
2.5mm aperture	0.22
5mm aperture	0.27
10mm aperture	0.38
20mm aperture	0.59
40mm aperture	1.00

Figure 4-14 Typical Scatter Survey (Small and Medium Filter)

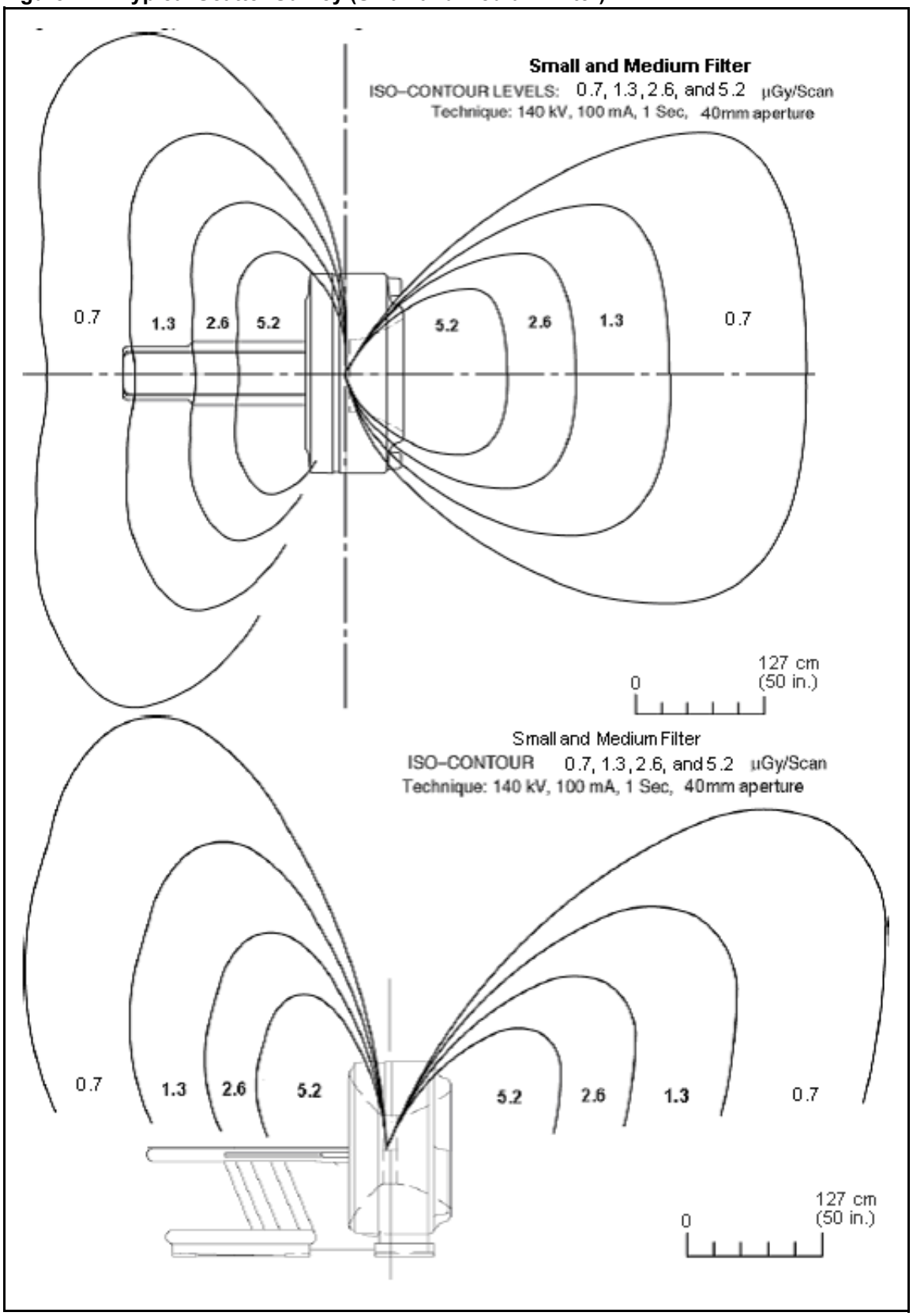
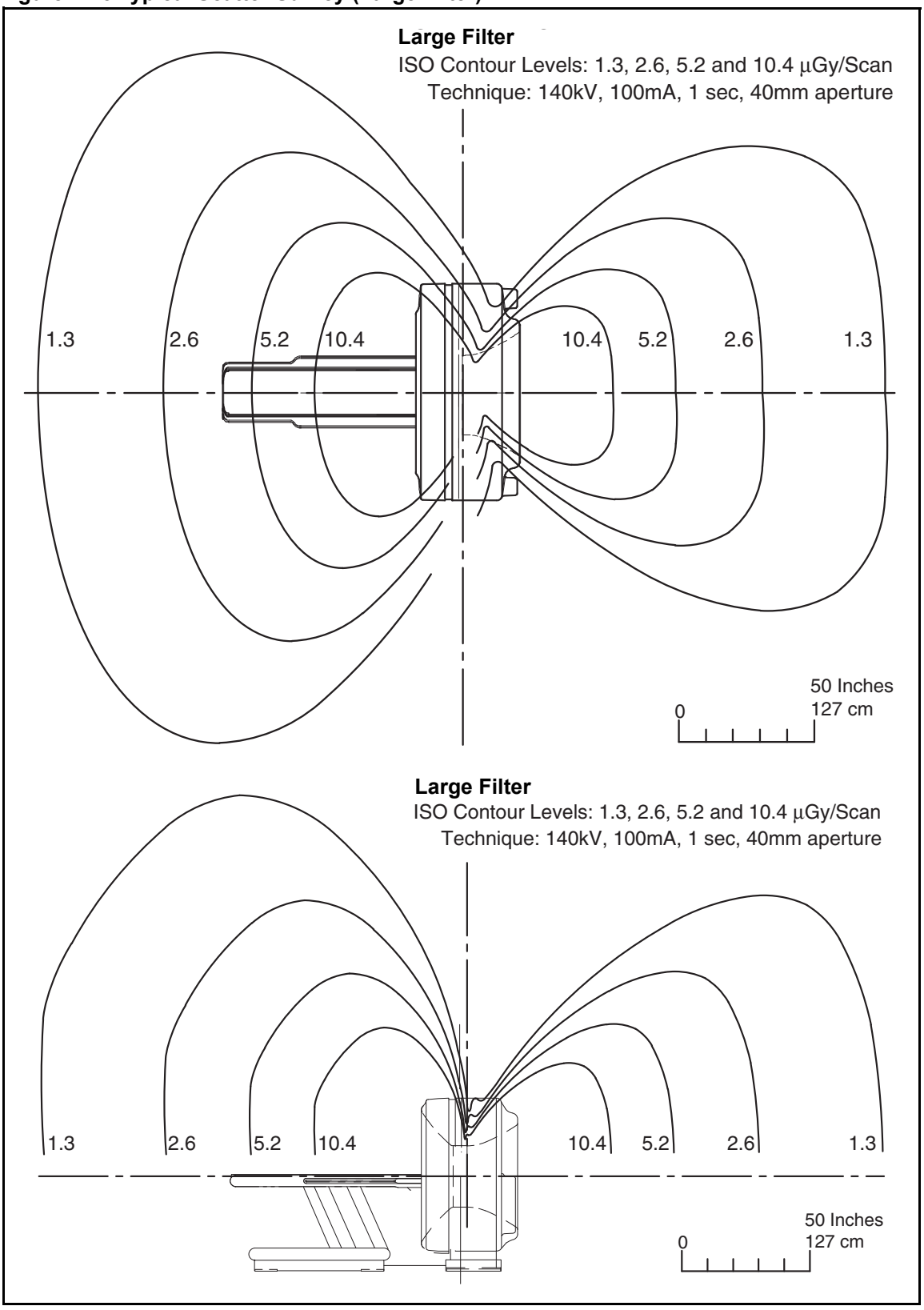


Figure 4-15 Typical Scatter Survey (Large Filter)



9.1 Dose Rate from Radioactive Pin Source

The Discovery VCT system uses one radioactive pin source during calibration and the Daily QA Check. During normal operation, the source pin remains in storage in a shielded container inside the PET trailer. The system automatically withdraws the source from its container before each use, and is automatically returned to the container after each use.

The dose rates described in this document are estimates, based on measurements taken under specific measurement conditions, described in detail for each measurement. Since the measurement conditions vary at every scanner installation (due to differing room geometries, the presence of other equipment or shielding material, etc.), use these measurements as guidelines *only*.

PET images are generated by measuring radiation resulting from electron positron annihilation events within the patient. No external radiation source is necessary to generate this data. The pin radiation source is never used during a patient scan.

The system uses the source pin to:

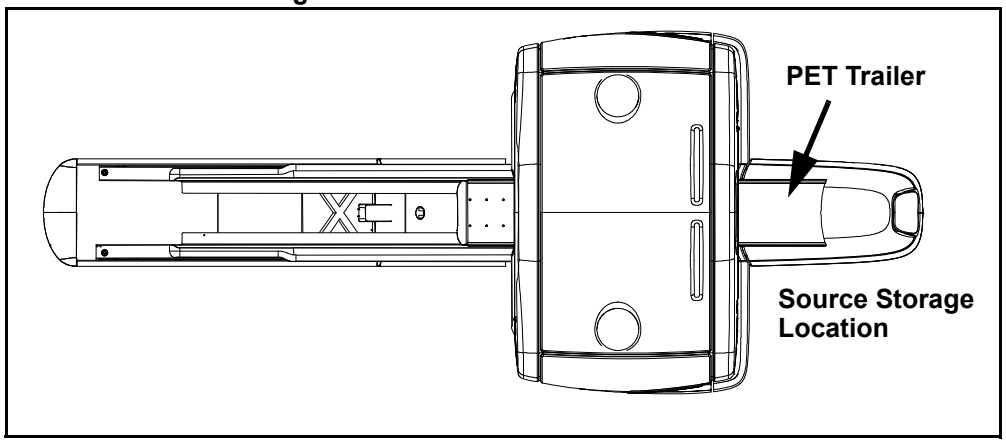
1.) Calibrate the scanner's detectors and electronics.

2.) Assess the relative performance of the scanner's detector channels, so differences in individual detector efficiency can be accommodated during reconstruction.

The PET scanner uses a radioactive source pin that contains Ge^{68}, an isotope with a half-life of 270.8 days. The radioactive source pin is referred to as "low activity pin." The pin has an initial activity level of 55MBg(1.5mCi) ± 2%.

Refer to Figure 4-16. During normal system operation, the radioactive source pin resides in a lead storage container, located inside the PET Trailer, at the rear of the Discovery VCT gantry.

Figure 4-16:Source Pin Storage Location



When the pin is in use, it is located inside the gantry near the wall of the patient port. Depending on the task the pin is performing, it may be held in a fixed location or rotated around the circumference of the patient port at a speed of up to 20 revolutions per minute (one revolution per three seconds). The pin is transferred from the storage container to its position near the patient port, and returned to the storage container after use, by a mechanical system under software control. Radiation indicators are displayed on both the gantry control panels and the operator's keypad when the pin source leaves the storage container.

9.1.1 Dose Rates with Pin Source Stored

When the radioactive source pin is stored in the lead container, and no other sources are present in the scanner room, the maximum dose rates on the Discovery VCT are directly over the source loader. The Discovery VCT uses one pin with an activity level of 55MBg(1.5mCi) ± 2% or less. The exposure rate at the cover is specified to equal 2mR/hr or less.

9.1.2 Dose Rates with Pin Source in Use

The dose rates were measured in the following conditions:

1.) Pin source rotating around the patient port.

2.) Patient table lowered to its lower limit (55 cm above the floor).

3.) All measurements were taken at a height equal the center of the patient port.

The results of these experiments, measured along the central axis of the scanner, are summarized in Table 4-13. (Distances are measured from the frontmost imaging slice; positive distance is in the direction towards the scanner table.)

9.2 Gamma Ray Protection

A number of radioactive substances, of various levels of stability are used by the PET unit of the Discovery VCT system. This material is necessary in imaging procedures. Before the suite is operational, unstable material may be on the premises. It is very important to recognize that clear and significant hazards from ionizing radiation may exist at the site, as it is undergoing preparation. Other equipment may be in place and operational at this time. This may include such equipment as X-ray systems and CT scanners (other than the CT Gantry within the Discovery VCT). Calibration source may be on the site at some time during the preparation process, as well as after the PET imager has been put into operation. A cyclotron may be operational at the site. Definite steps should be taken to insure the safety of workers, patients, and visitors, during all phases of the construction, installation and operation of the facility.

Note: By the time the site is ready to have radioactive material brought in, the licensing process must be complete. The site must be properly licensed before receiving radioactive material.

9.3 Protection of Equipment

It is important that background radiation be kept to a minimum. The coincidence detection used in a PET system allows a moderate amount of external singles events. The Discovery VCT system has been found to have less than 1% deadtime if the external field is below 1 mR/hr from a single source. Because area background can be more general than a single source, a lower limit is appropriate. If the area dose rate is maintained to less than 0.2 mR/hr (due to 511 or lower energy gamma rays) at the covers, detector deadtime should not exceed 1%.

Radioactive sources must be stored in approved shielded containers. It is recommended that any radioactive source not specifically designed to be housed in the gantry's lead storage container be stored in a separate room (hot lab) adjacent to, and accessible from, the Scan Room. This hot lab should be near the cyclotron (if used). Doses should be prepared in the same area.

Consideration should be given to the placement of the gantry in relation to existing X-ray, Magnetic Resonance, or Nuclear diagnostic equipment. Magnetic interference above 1.0 gauss, at the surface of PET components, can adversely affect the image quality. Good shielding techniques must be implemented in order to avoid this type of interference.

Some procedures involve the use of radioactive water. This will result in the patient exhaling radioactive carbon dioxide. This carbon dioxide must be contained in order to avoid adversely affecting the image quality. Some PET procedures require the use of radioactive gases. This too can result in compromising image quality if not properly controlled.

9.4 Protection of Personnel

The escape of radioactive gases, if not properly confined, can cause unnecessary exposure to clinical staff. All sources must be properly stored in appropriate enclosures to provide adequate protection to all in the suite.

9.5 Barriers, Partitions and Shielding

Appropriate barriers such as walls, lead-shielded glass, lead shields etc. must be installed to protect staff from unnecessary exposure to radiation. A qualified radiological health physicist must be consulted in the design of walls and safety barriers to assure proper 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.

9.6 Sources of Radiation

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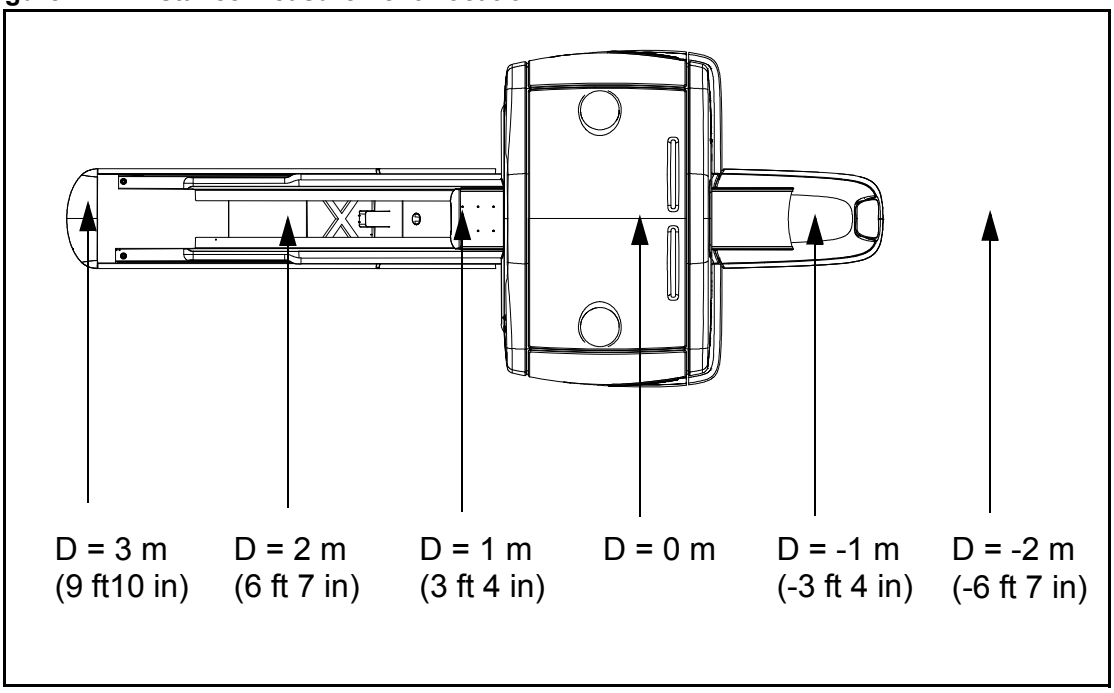
A number of common radio nuclides are used in the Discovery VCT system. These radio nuclides are either produced at the site or brought to the site from an outside source. In either case, these nuclides have relatively short half-life (2 min. to 110 min. maximum) and as such decay to benign levels fairly quickly. Typical positron emitting isotopes include: Carbon-11, Nitrogen-13, Oxygen-15, and Fluorine-18.

Table 4-13 shows the dose rate at various distances. The measurements have been taken at various locations around the equipment. These were measured without the CT gantry. Use the illustration in Figure 4-17 to understand the data in Table 4-13.

Table 4-13 : Dose Rate at Specified Distances

Distances	-2m	-1m	Front Slice	+1m	+2m	+3m
Dose rate per mCi mR/hr/mCi	0.13	0.77	3.20	0.40	0.11	0.04

Figure 4-17:Distance Measurement Location



Chapter 5
Environmental Conditions

The environmental specifications (heating/cooling, temperature and humidity) provided here are strongly recommended. Always consult an HVAC specialist for each site to ascertain any specific needs based on unique conditions and/or situations.

Ratings and duty cycles of Discovery VCT subsystems apply if the site environment meets the standards of this section. Maintain the environmental conditions listed below at all times, including, for example, overnight, weekends and holidays. If air conditioning is not working, shut down the Discovery VCT system. When the system is shut down for major repair, air conditioning may be shut down also.

Section 1.0
Temperature and Humidity Specifications

NOTICE **System operation and image quality may be affected if environmental specifications are exceeded.**

1.1 Temperature (Scan and Control Rooms

)

Recommended ambient scan room temperature range for patient comfort:	68° – 72° F (20° – 22° C)
Allowable ambient scan room temperature range when room is unoccupied:	60° – 75° F (15° – 24° C)
Maximum allowable ambient room temperature:	79º F (26º C)
Minimum allowable ambient room temperature:	64º F (18º C)
Maximum allowable ambient room temperature rate of change:	5º F per hour (3º C per hour)

NOTICE **Potential Equipment Failure**

Do not operate (that is, “Power ON”) gantry or console subsystems with ambient room temperatures exceeding 79° F (26º C). Scan room or control room temperatures in excess of 79° F (26º C) can result in the failure of gantry or console components.

Note: Any cooling equipment cycle control range must be taken into account, such that the maximum and minimum ambient room temperatures shown above are not exceeded during room thermal cycling. For example, if the HVAC is capable of ± 2º C control, then the limits would be 68° F - 75° F (20° – 24° C) to maintain absolute limits.

1.2 Humidity (All Areas)

Maximum allowable non-condensing relative humidity:	60%
Minimum allowable non-condensing relative humidity:	30%
Maximum allowable relative humidity rate of change:	5% RH/hour

Section 2.0
Temperature and Humidity Monitoring

Position the computer subsystems in an area that meets the environmental specifications listed in Section 1.0 Temperature and Humidity Specifications.

First, assess the environment's heat and humidity. If necessary, temporarily install a temperature and humidity recorder close to the designated gantry installation area. Record the readings before installation, and again after installation, to verify the true temperature and humidity conditions for the environment.

Consider the HVAC needs and redundancy. It may be advisable to consider an air conditioner with two compressor units rather than one. A backup (redundant) air conditioner permits Discovery VCT system operation during an extended repair of the primary air conditioner.

Section 3.0
Cooling Requirements

Use Table 5-1 to assist in planning the site's cooling requirements. The gantry generates more than half the total system heat output. For best results, locate a wall air conditioning vent *at floor level* beside and behind the gantry to meet the gantry's cooling needs while maintaining patient comfort levels.

Table 5-1 Cooling Requirements (Worksheet)

SYSTEM COMPONENT (See NOTE 3.)	**BTU/HR**	**WATT**
1.) CT Gantry minimum (See NOTE 1.)	43,000	12,600
2.) Table	700	200
3.) Power Distribution Unit	3400	1000
4.) PET Gantry	600	175
RAPTOR	7000	2100
SHARC	7425	2225
Motion Control	170	50
Recommended Scan Room Subtotal (See notes):	**62,295**	**18,350**
5.) Operator console/computer with three IGs	7210	2117
LCD Monitor, each (x2)	170 (340)	50 (100)
SCSI Tower	425	125
Injector	425	125
UPS	2900	850
Recommended Control Room Subtotal, with 3 IGs	**11,300**	**3,317**
Minimum System Total, with 3 IGs (See NOTE 2.)	**73,595**	**21,667**
Option: Remote Color Monitor (LCD)	170	50
Option: Digital DASM	425	125
Option: TV camera	34	10
Option: TV monitor	300	88
Room Totals **Total of Scanner System** **Total plus any/all selected options (See NOTE 2.)**		

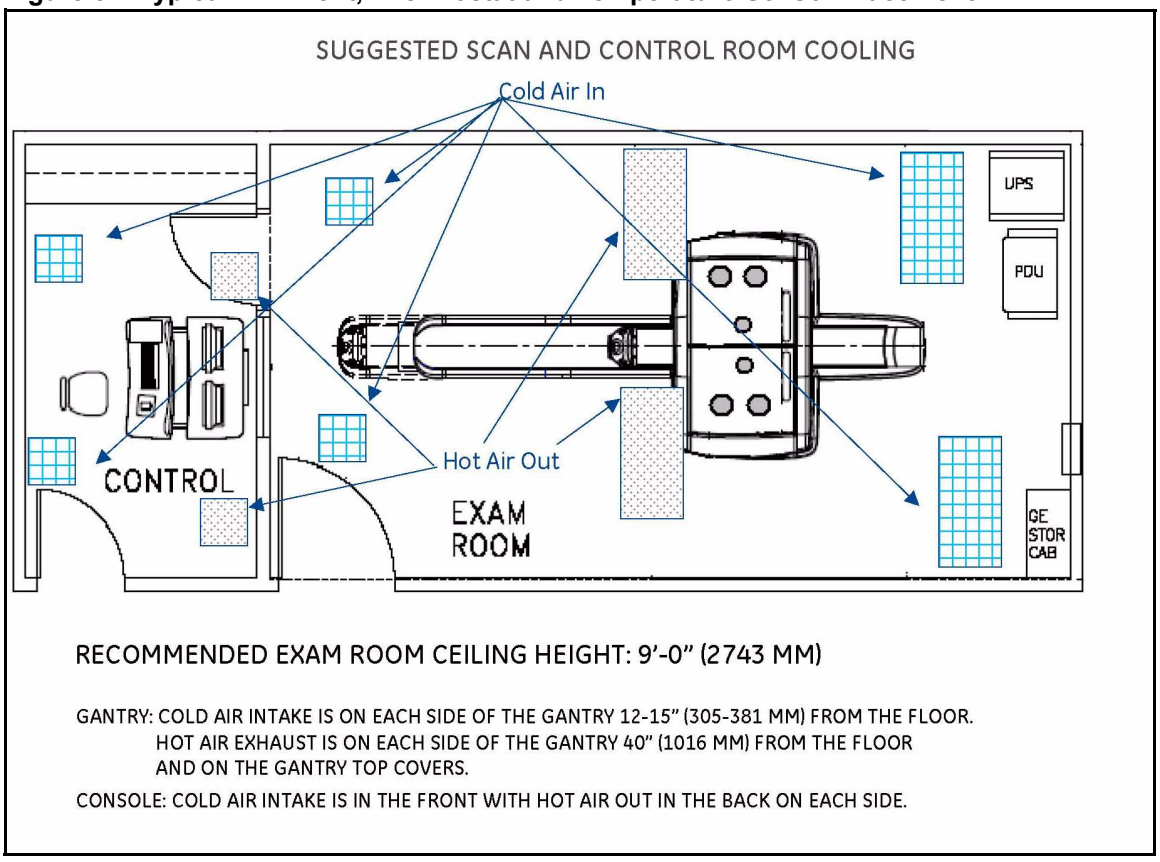
NOTE 1 With 75 scan rotations per patient:
Recommended BTU/hr. provides for up to six patients per hour. It is also needed during calibration of the system.

NOTE 2 Cooling requirements do not include cooling for room lighting, personnel or non-scanner equipment.

NOTE 3 CT gantry cooling requirements vary based on usage time of the CT gantry. Cooling requirements for all other components are continuous.

Section 4.0
HVC Vent, Thermostat and Temperature Sensor Placement

Figure 5-1 Typical HVC Vent, Thermostat and Temperature Sensor Placement



Section 5.0
Altitude

System operating altitude is from mean sea level to 10,000 ft. (3050 meters).

Section 6.0
Electro-Magnetic Interference (EMI)

6.1 Gantry

Locate gantry in ambient static magnetic fields of less than 10^{-4} tesla (1,000 milligauss) to guarantee specified imaging performance. Ambient AC magnetic fields must be below 10^{-6} tesla (10 milligauss) peak.

6.2 Console / Computer Equipment

Locate computer equipment in ambient static magnetic fields of less than 10^{-3} tesla (10,000 milligauss) to guarantee data integrity.

6.3 Magnetic Media

Locate magnetic media in ambient static magnetic fields of less than 10^{-3} tesla (10,000 milligauss).

6.4 PDU

The PDU produces an electromagnetic field that radiates outward from its cabinet in all directions. Do not place sensitive electronics (e.g., console or computer equipment - the UPS is not classified as sensitive electronics) within one meter (1.0m) of the Power Distribution Unit., in any direction (including above or below).

6.5 EMI Reduction

If fields of excessive EMI are known or suspected to be present, consult GE Healthcare Sales & Service for recommendations. Consider the following if you attempt to reduce EMI:

- External field strength decreases rapidly with distance from source of magnetic field.
- External leakage magnetic field of a three-phase transformer is much less than that of a bank of three single phase transformers of equivalent power rating.
- Large electric motors are a source of substantial EMI.
- High-powered radio signals are a source of EMI.

Maintain good screening of cables and cabinets.

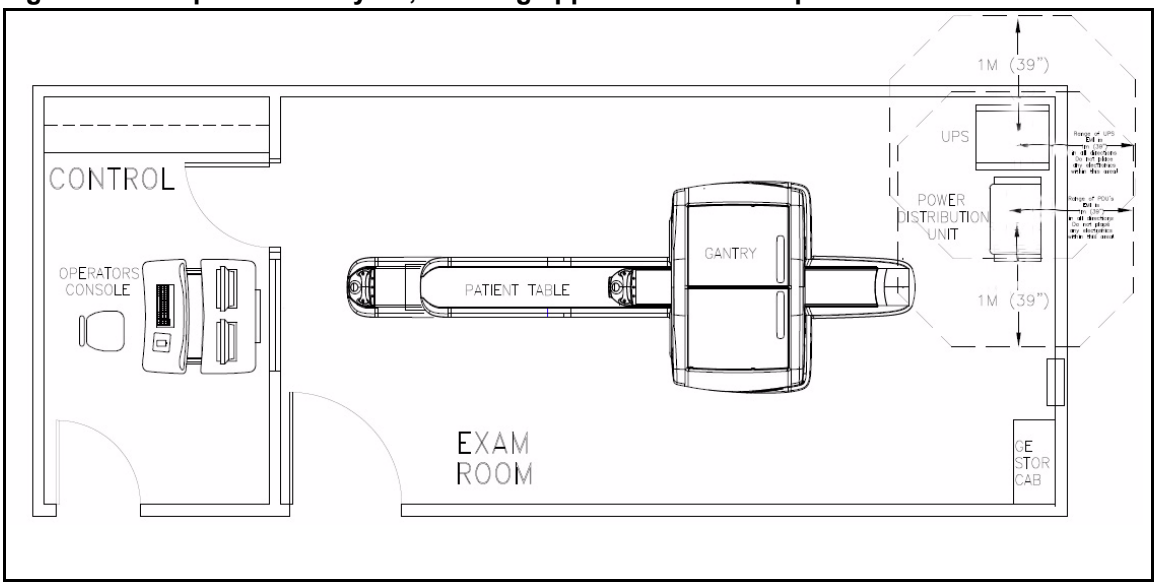
6.6 UPS

The Uninterruptable Power Supply (UPS) provides a consistent power supply to various electrical components of the system. Also, it continues to provide electrical power to components during a site-wide power outage so components can be safely shut down. The UPS should be kept at least one meter (1m) away from sensitive electronics (the PDU does not include sensitive electronics).

For UPS interconnect information, please refer to Section 5.0 on page 131.

6.7 Equipment EMI "Envelopes"

Figure 5-2 Sample Room Layout, showing approximate EMI requirements



Section 7.0
Electro-Magnetic Compatibility (EMC)

7.1 General Scope

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

The Discovery VCT is suitable to be used in the electromagnetic environment, as per the limits and recommendations described in the tables hereafter:

- Emission Compliance level and limits (Table 5-2)
- Immunity Compliance level and recommendations to maintain equipment clinical utility (Table 5-3 and Table 5-4)

Note: This system complies with above-mentioned EMC standard when used with supplied cables. If different cable lengths are needed, contact a qualified GE service representative for advice.

7.2 Electromagnetic Emission

The Discovery VCT is intended for use in the electromagnetic environment specified below. The customer or the user of the Discovery VCT should assure that it is used in such an environment.

Table 5-2 : Electromagnetic Emissions

EMC Emissions Guidance and Declaration for Discovery VCT		
Emissions Test	**Compliance**	**Electromagnetic Environment Guidance**
RF emissions CISPR 11	Group 1	The Discovery VCT 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.
RF emissions CISPR 11	Class A + 12	*Warning:* This equipment is allowed to be installed only in X-ray protected rooms, which provide an attenuation of at least 12 dB for radio disturbances from 30 MHz to 1 GHz.
Harmonic emissions IEC 61000-3-2	Not applicable	When installed in such a shielded location, the Discovery VCT 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	

7.3 Electromagnetic Immunity

The Discovery VCT is intended for use in the electromagnetic environment specified below. The customer or the user of the Discovery VCT should assure that it is used in such an environment.

Table 5-3 : Electromagnetic Immunity

EMC Emissions Guidance and Declaration for Discovery VCT			
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 differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	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 Discovery VCT requires continued operation during power mains interruptions, it is recommended that the Discovery VCT 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.

Table 5-3 : Electromagnetic Immunity

Conducted RF IEC 61000-4-6	3 V_{RMS} 150 kHz to 80 MHz	3 V 150 kHz to 80 MHz	Portable and mobile RF communications equipment should be used no closer to any part of the Discovery VCT, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter. **Recommended Separation Distance:** $d = [\frac{3,5}{3}]\sqrt{P}$ (See Table 5-4.) $d = [\frac{3,5}{3}]\sqrt{P}$ 80 MHz to 800 MHz (See Table 5-4.) $d = [\frac{7}{3}]\sqrt{P}$ 800 MHz to 2,5 GHz (See Table 5-4.) 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 meters (m). 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] Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3 (Alternative method: Full range IEC 61000-4-21 test in lieu of Large, Permanently-Installed Equipment exemption)	3 V/m 150 kHz to 80 MHz	3 V/m 150 kHz to 80 MHz	

[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 Discovery VCT is used exceeds the applicable RF compliance level above, the Discovery VCT should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Discovery VCT.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

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

NOTE: U_T is the AC mains voltage prior to application of the test level.

The Discovery VCT is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Discovery VCT can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Discovery VCT as recommended below, according to the maximum output power of the communications equipment.

Table 5-4 : Recommended Separation Distances

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the Discovery VCT			
Rated Maximum Output Power (P) of Transmitter Watts (W)	**Separation Distance (Meters) by Frequency of Transmitter**		
	150 kHz to 80 MHz $d = [\frac{3,5}{3}]\sqrt{P}$	**80 MHz to 800 MHz** $d = [\frac{3,5}{3}]\sqrt{P}$	**800 MHz to 2.5 GHz** $d = [\frac{7}{3}]\sqrt{P}$
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.

As an example, a 1W mobile phone (800MHz to 2.5GHz carrier frequency) shall be separated by at least 2.3 meters from the Discovery VCT (in order to avoid image interference risks.)

LIMITATIONS MANAGEMENT: Adhering to the distance separation recommended in Table 5-4, between 150KHz and 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.

7.4 External Component Use Limitations

The use of accessories, transducers, and cables other than those specified below or supplied with the system may result in degraded ELECTROMAGNETIC COMPATIBILITY of the Discovery VCT system. For additional compatible accessories, consult the *GE Healthcare* Sales and Service representative.

- UPS (P5052PS)
- Enhanced PET Recon Option (P5091RC)
- Cardiac Gating Option Kit for Discovery VCT (P5064PJ)
- Respiratory Option Kit for Discovery VCT (P5064PH)
- SmartStep (P5050SM, P5050SN)
- Laser Camera Interface (B7700L)
- Gammex RMI Laser Tracking System (E8505LF, E8505LK)

7.5 Installation Requirements and Environment Control

In order to minimize interference risks, the following requirements shall apply.

7.5.1 Cable Shielding and 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.

The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or panels, or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

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

7.5.2 Environment Control

This product complies with the radiated emission as per CISPR11 Group1 Class A + 12 limits. The Discovery VCT 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, and with an X-ray shielded room. In case of use in a domestic environment (e.g., doctors' offices), in order to avoid interferences, it is recommended to use a separate AC power distribution panel and line, with an X-ray shielded room.

This equipment generates, uses, and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications. To provide reasonable protection against such interference, this product complies with the radiated emission as per CISPR11 Group1 Class A + 12 limits. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment is found to cause interference (which may be determined by turning the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):

- Reorient or relocate the affected device(s).
- Increase the separation between the equipment and the affected device.
- Power the equipment from a source different from that of the affected device.
- Consult *GE Healthcare* Sales and Service for further suggestions.

7.5.3 Power Supply Distribution for Accessories and Subsystems

All components, accessories, subsystems and systems that are electrically connected to the Discovery VCT must have all AC power supplied by the same power distribution panel and line.

7.5.4 Stacked Components and Equipment

The components/sub-systems of the Discovery VCT should not be used adjacent to, or stacked with, other equipment; if adjacent or stacked use is necessary, observe the Discovery VCT system to verify normal operation in the configuration in which it will be used.

7.5.5 Low Frequency Magnetic Field

To minimize the risk of interference from low-frequency magnetic field sources, any such sources (such as CRT monitors) must be installed at least 1 meter from the Discovery VCT gantry.

7.5.6 Static Magnetic Field Limits

In order to avoid interference on the Discovery VCT system, static field limits from the surrounding environment are specified:

- Less than 1 gauss in examination room, and in the control room.
- Less than 3 gauss in the equipment/technical room.

7.5.7 Electrostatic Discharge Environment and Recommendations

In order to reduce electrostatic discharge interference, install a charge dissipative floor material to avoid electrostatic charge buildup. The dissipative material shall be connected to the system ground reference, if applicable. The relative humidity shall be at least 30%.

Chapter 6
Floor Loading and Weights

Section 1.0
Floor Loads

The Discovery VCT system has a total floor load of approximately 13,162 lbs (5970 kg). About 11,014 lbs (4996 kg), including patient (450 lb [204 kg]), is concentrated in the gantries and patient table.

Table 6-1 shows Discovery VCT components with size and weight, floor loading and normal mounting requirements.

Table 6-1 : Discovery VCT System Floor Loads

Item	Net Weight lb (kg)	Overall W X D inch (mm)	Weight/Area lb/sq. ft. (kg/m^2)	Load Pattern in. (mm)	Normal Method Of Mounting in. (mm) (GE-Supplied[1])
CT Gantry	4079 (1850)	89.25 x 39.65 (2267 x 1007)	296 (1448)	CT effective load area is 27.6 x 79.25 (700 x 2013) with four round pads, each 2.5 (63.5) in contact with the floor.	1/2 in. (12.7mm) diameter x 10 in. (254mm) long per P/N 2106573-2 at four leveling pads into concrete floor.
PET Gantry	4631 (2101)	41.5 x 64.5 (1050 x 1635)	1266 (6180)	While in the imaging position, the effective PET load area is 19.2 x 24 (480 x 708) with 7 pads each 2.5 (63.5) as well as 2 pads that do not get anchored (support only)	Hilti Kwik-Bolt II 1/2 in. (12.7mm) diameter by 8 in. (203mm) long per P/N 2106573 at seven leveling pads into concrete floor.
Patient Table	2304 (1045) Includes 450 (204) Patient	25.6 x 135.8 (650 x 3450)	197 (963)	Rectangular base 21.7 x 84.0 (550 x 2134) with 6 round pads, each 2.5 (63.5) in contact with the floor	Hilti Kwik-Bolt II 1/2 in. (12.7mm) diameter per 8 in. (203mm) long per P/N 2106573 at 4 leveling pads into concrete floor

Notes:

1.) Use the GE-supplied mounting hardware ONLY IF anchoring the system to 5" (127mm) concrete floors.
2.) Seismic angle brackets are included and shipped with the PDU.

Item	Net Weight lb (kg)	Overall W X D inch (mm)	Weight/Area lb/sq. ft. (kg/m^2)	Load Pattern in. (mm)	Normal Method Of Mounting in. (mm) (GE-Supplied[1])
Power Distribution Unit (PDU)	800 (363)	27.6 x 21.6 (700 x 550)	187 (913)	Four Casters support area of 28 x 22 (711 x 559).	Casters are for positioning and service. Set on floor. May be anchored to floor with angle brackets in seismic zones.
Operator Console with HP and without monitors Monitor - LCD (ea.)	503 (228) 22 (10)	49 x 48.3 (1238 x 1228)	83 (405)	Four Casters or Leveling Feet support area of 46 x 19 (1168 x 483).	Casters are for positioning. Set on floor. Console may be anchored to floor using angle brackets[3].
Universal Power Supply (UPS)	801 (363)	22 x 37 (559 x 940)	169 (825)	Rectangular base 22 x 31 (559 x 787) with six castors, each in contact with the floor.	Casters are for positioning and service. Set on floor. Adjust the six leveling pads on the floor.

Notes:

1.) Use the GE-supplied mounting hardware ONLY IF anchoring the system to 5" (127mm) concrete floors.

2.) Seismic angle brackets are included and shipped with the PDU.

Section 2.0
Mounting and Seismic Information

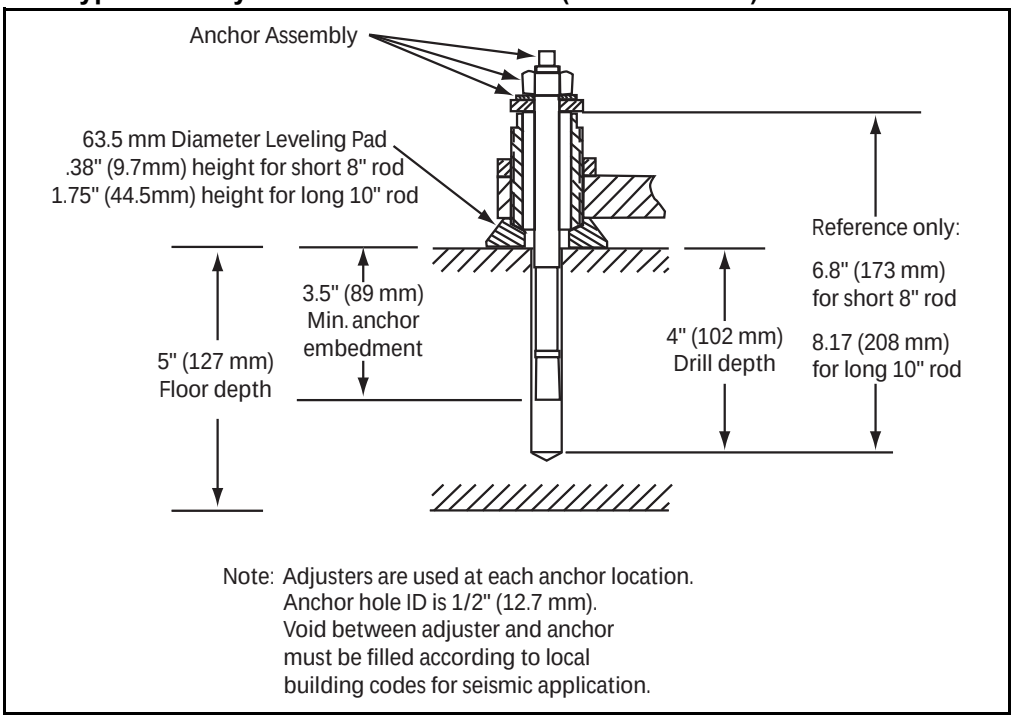
Standard mounting meets seismic requirements. See Table 6-2 below and Figure 6-1. However, customer is responsible for seismic mounting. Refer to all applicable codes for the specific area.

2.1 Mounting Requirements - Major Components

Table 6-2 : Mounting Requirements - Major Components

Mounting Requirements	CT Gantry	PET Table	PET Gantry
Minimum Floor Thickness	5" (127 mm)	5" (127 mm)	5" (127 mm)
Recommended Drilling Depth	4" (102 mm)	4" (102 mm)	4" (102 mm)
Average Anchor Embedment	3-3/4" (95 mm)	3-3/4" (95 mm)	3-3/4" (95 mm)
Minimum Anchor Embedment	3-1/2" (89 mm)	3-1/2" (89 mm)	3-1/2" (89 mm)
Available Alternate Anchor Locations	Yes	Yes	Yes
Anchor Size Shipped	10“ x ½” (254 mm x 13 mm)	8” x ½” (203 mm x 13 mm)	8” x ½” (203 mm x 13 mm)
Alternate Anchoring Methods	Yes See Floor Anchors on page 58.	Yes See Floor Anchors on page 58.	Yes See Floor Anchors on page 58.
Floor Levelness Requirement	0.125 (3 mm) over 10 ft (3048 mm)	0.125 (3 mm) over 10 ft (3048 mm)	0.125 (3 mm) over 10 ft (3048 mm)

Figure 6-1 Typical Gantry and Table Floor Anchor (Slab on Grade)



2.2 Seismic and Center-of-Gravity Information

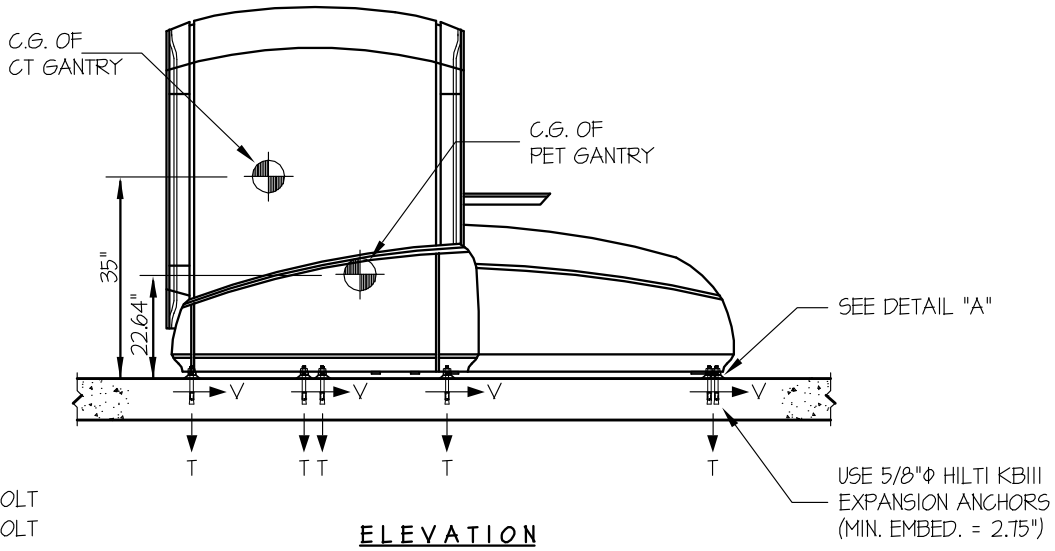
The following pages show center-of-gravity information for system components:

- Gantry: Figure 6-2 through Figure 6-7
- Gantry Leveler/Adjuster Locations: Figure 6-8 and Figure 6-9
- Table: Figure 6-11
- Power Distribution Unit: Figure 6-14
- Operator's Console/Computer: Figure 6-15

Floor mounting hole locations for components that do not have templates are also in this section.

Figure 6-2 Seismic Anchorage: CT/PET Gantry, Slab on Grade, Side View

Anchoring shown for illustration purposes only. Your site will require detailed structural drawings showing appropriate anchoring.



CT GANTRY
T_{MAX} = 794 LBS/BOLT
V_{MAX} = 551 LBS/BOLT

PET GANTRY
T_{MAX} = 1071 LBS/BOLT
V_{MAX} = 663 LBS/BOLT

Figure 6-3 Seismic Anchorage: CT Gantry, Slab on Grade, Top View

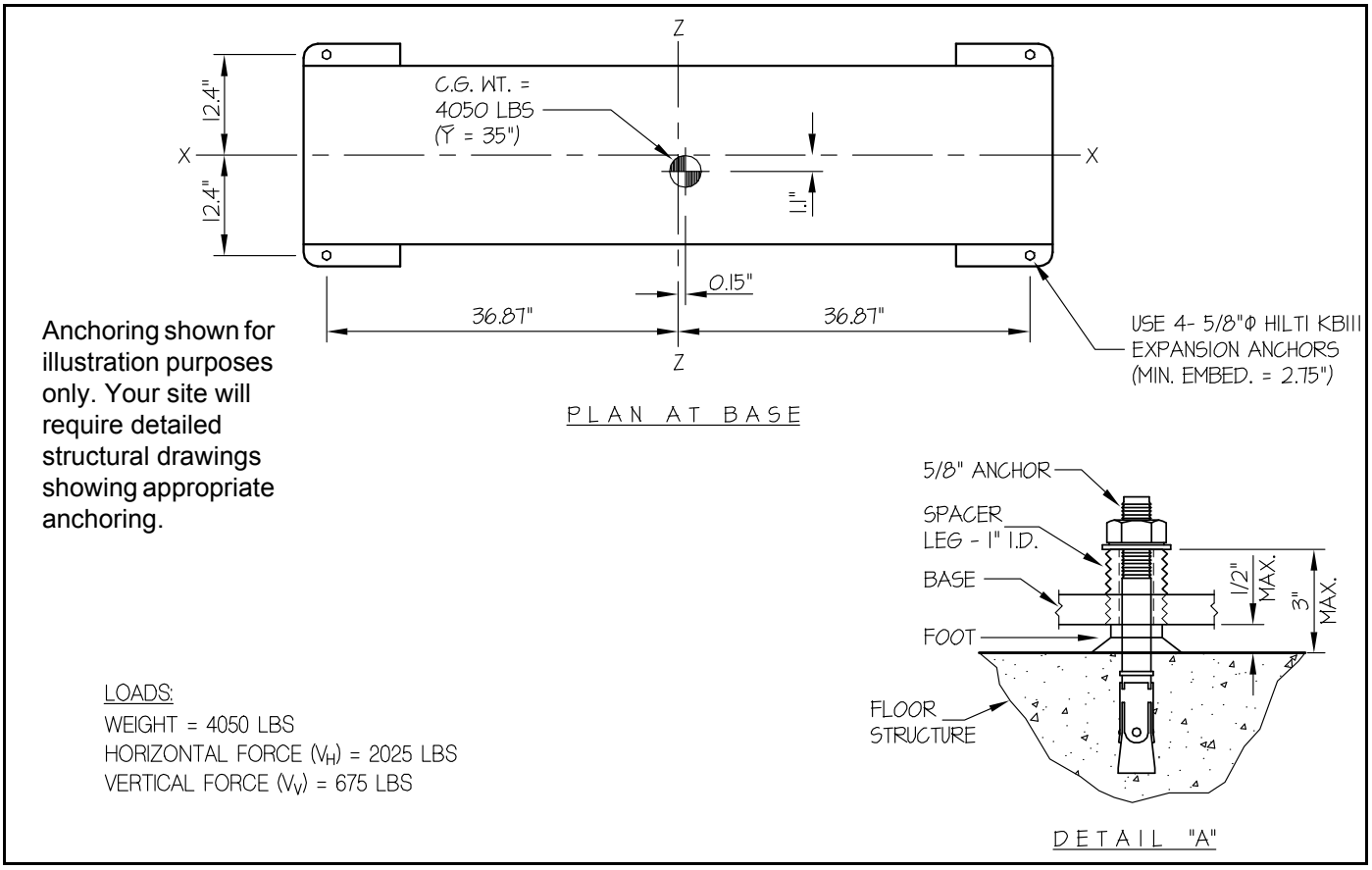


Figure 6-4 Seismic Anchorage: PET Gantry, Slab on Grade, Top View

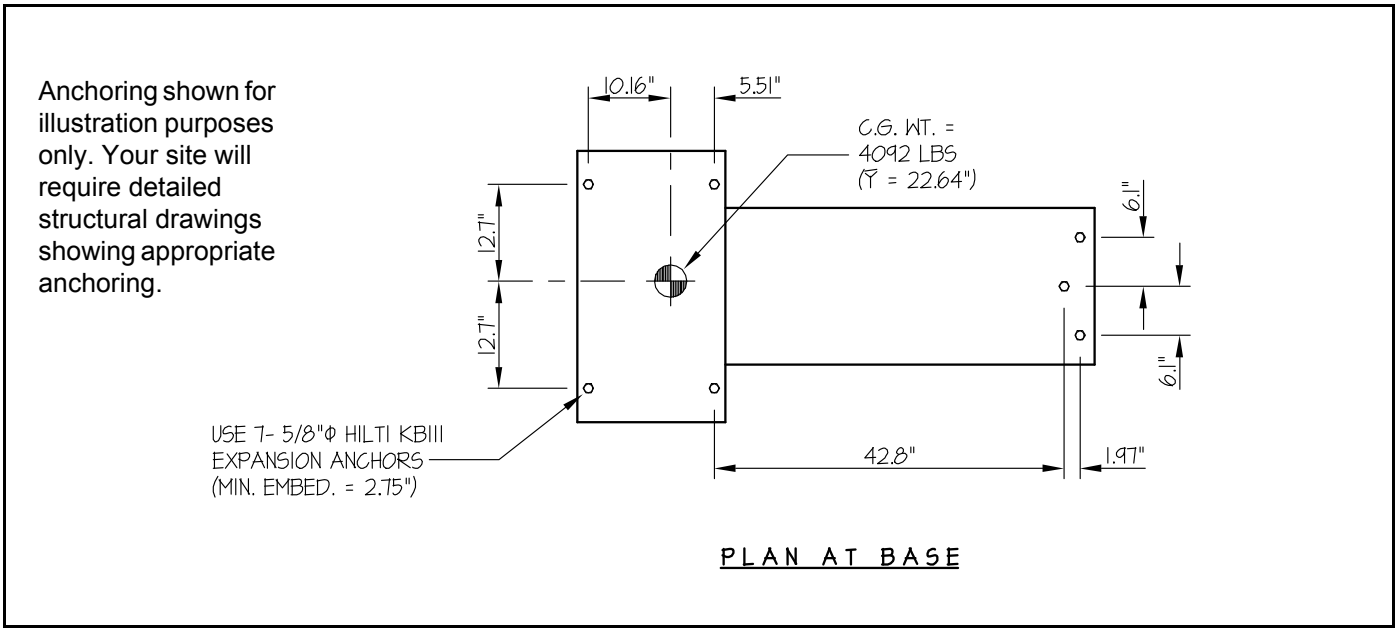


Figure 6-5 Seismic Anchorage: CT/PET Gantry, Upper Floor, Side View

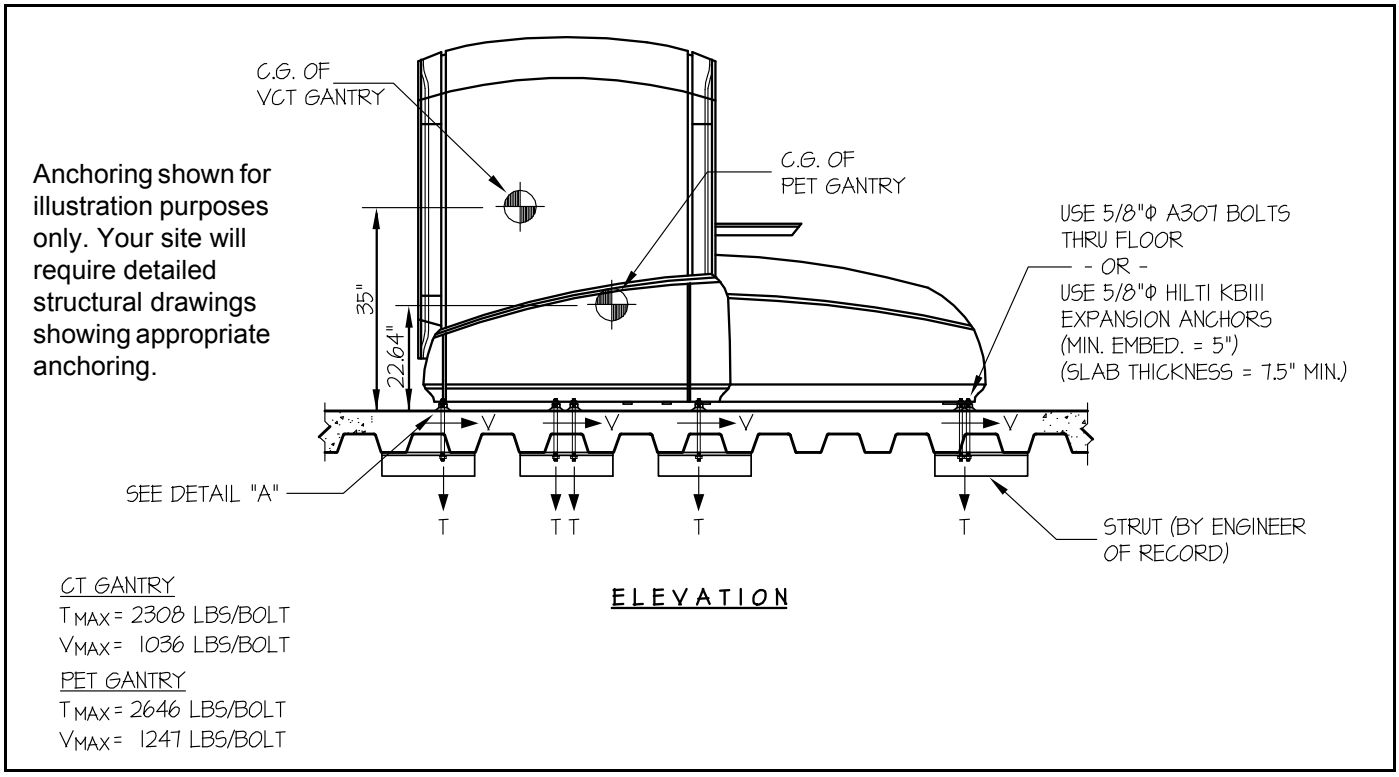


Figure 6-6 Seismic Anchorage: CT Gantry, Upper Floor, Top View

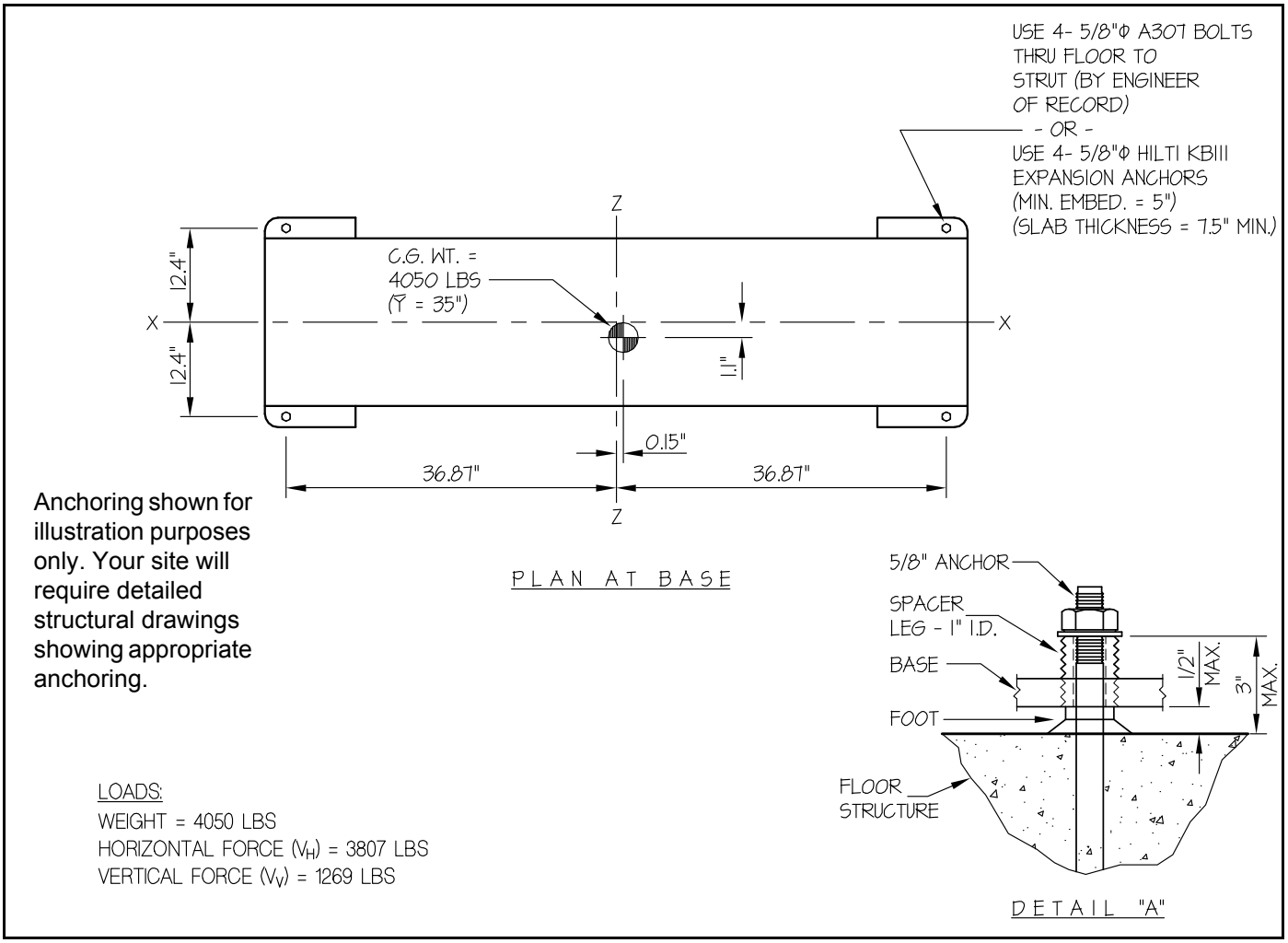


Figure 6-7 Seismic Anchorage: PET Gantry, Upper Floor, Top View

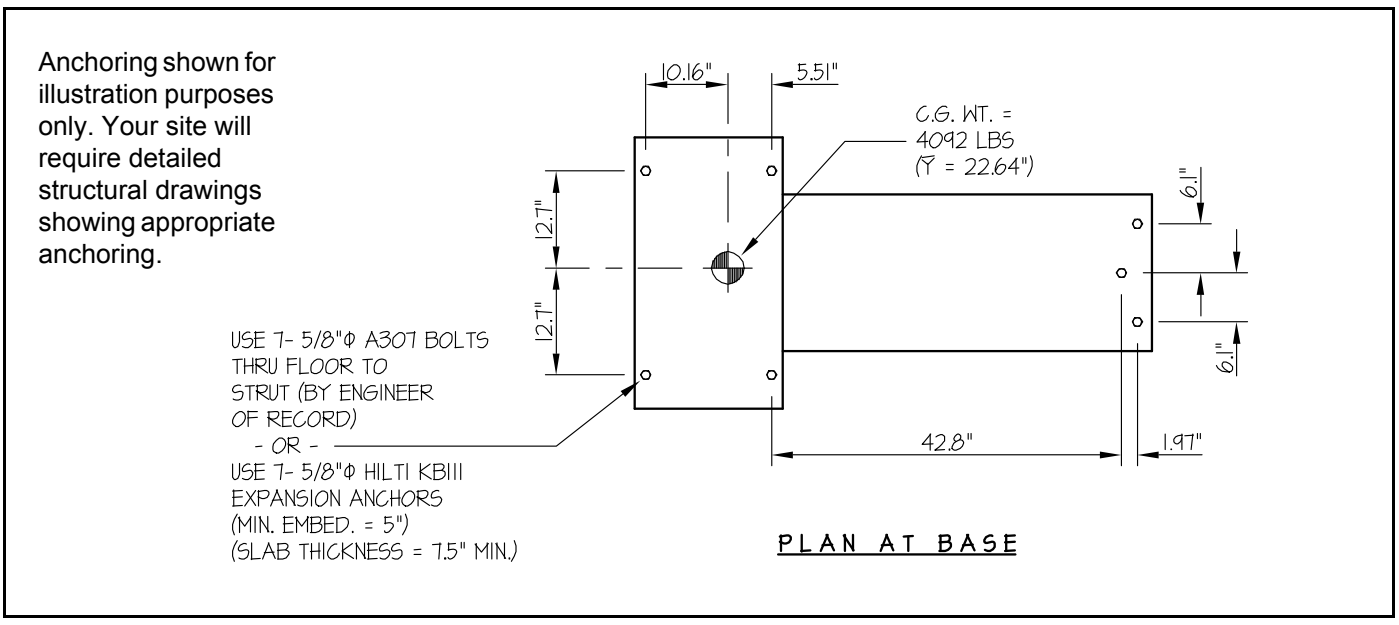
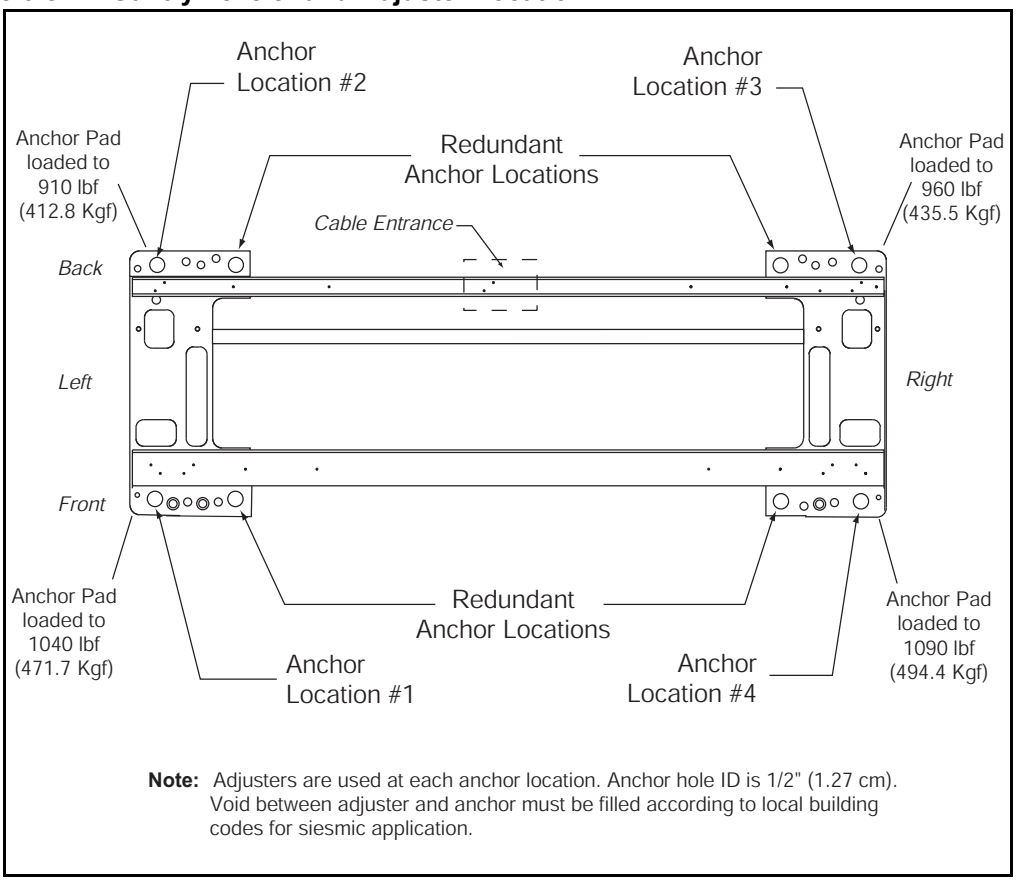


Figure 6-8 CT Gantry Leveler and Adjuster Location



Note: Adjusters are used at each anchor location. Anchor hole ID is 1/2" (1.27 cm). Void between adjuster and anchor must be filled according to local building codes for siesmic application.

Figure 6-9 PET Gantry Leveler and Adjuster Location

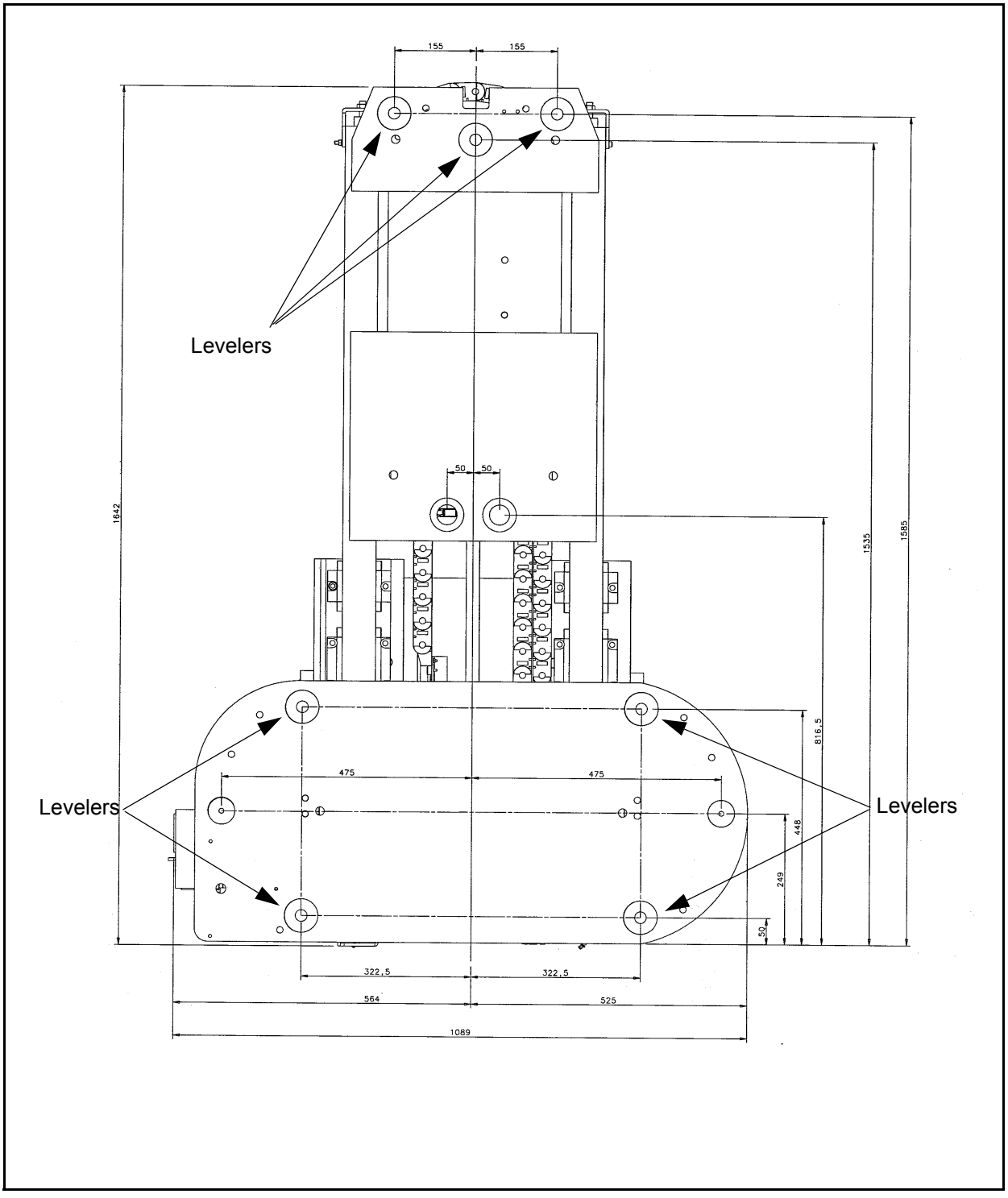


Figure 6-10 Seismic Anchorage: Patient Table, Slab on Grade, Side View

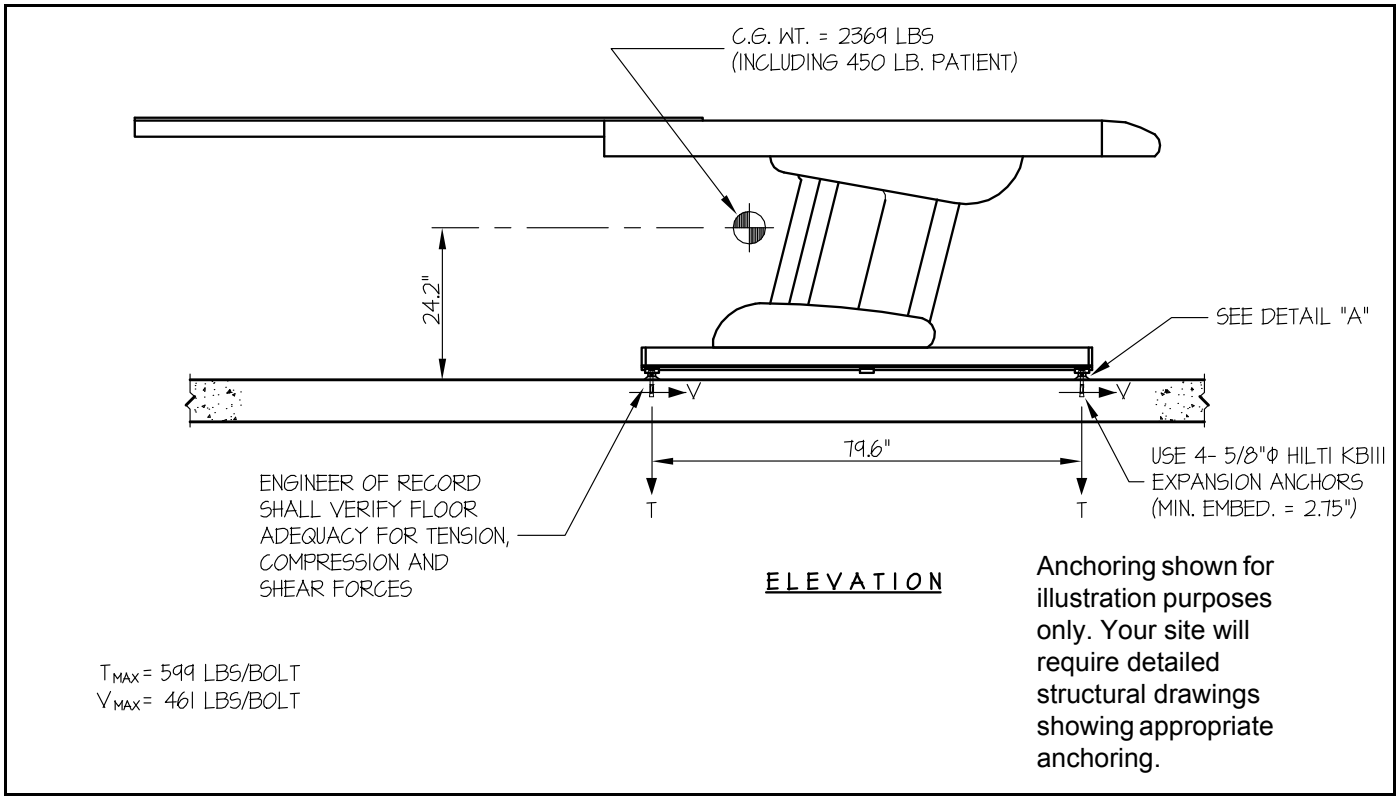


Figure 6-11 Seismic Anchorage: Patient Table, Slab on Grade, Top View

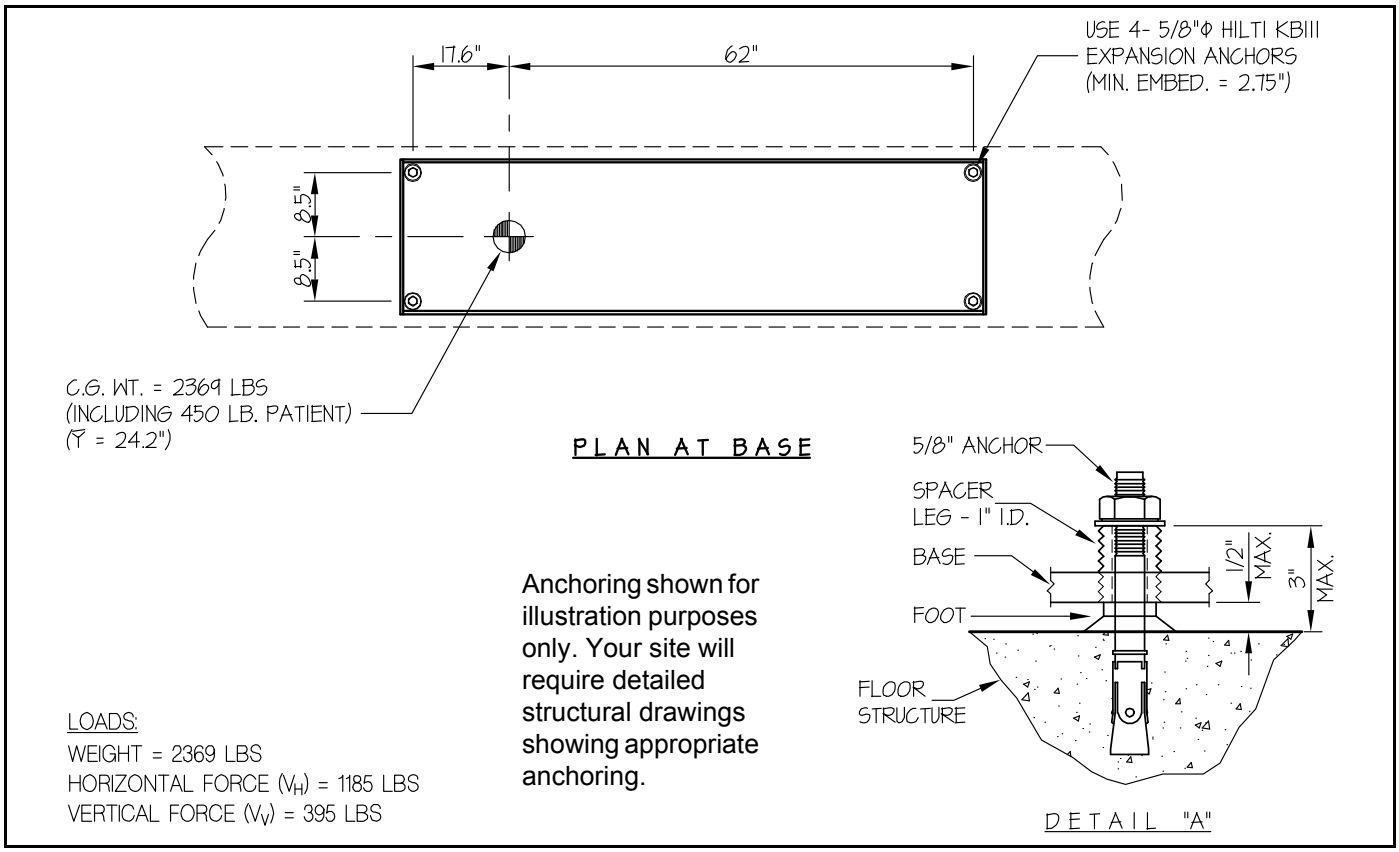


Figure 6-12 Seismic Anchorage: Patient Table, Upper Floor, Side View

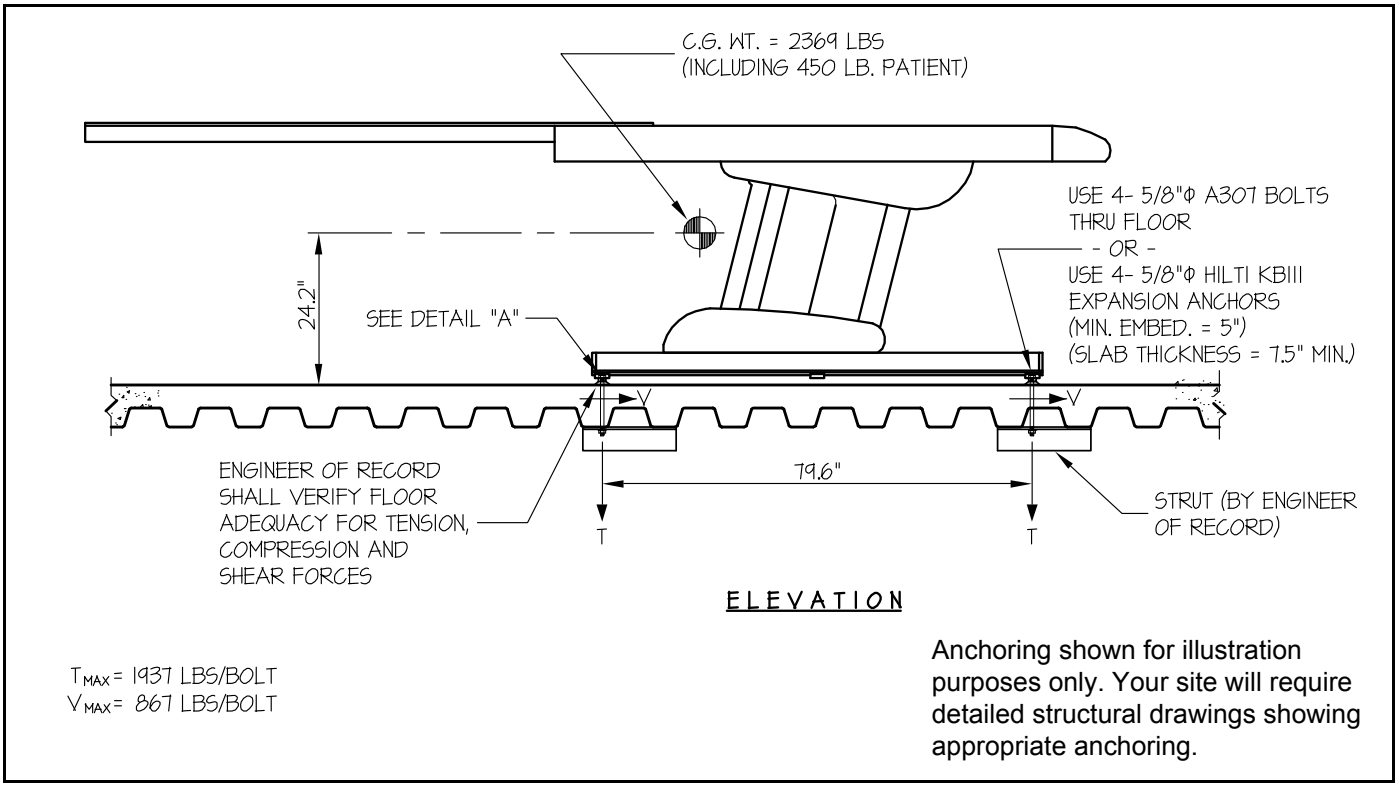


Figure 6-13 Seismic Anchorage: Patient Table, Upper Floor, Top View

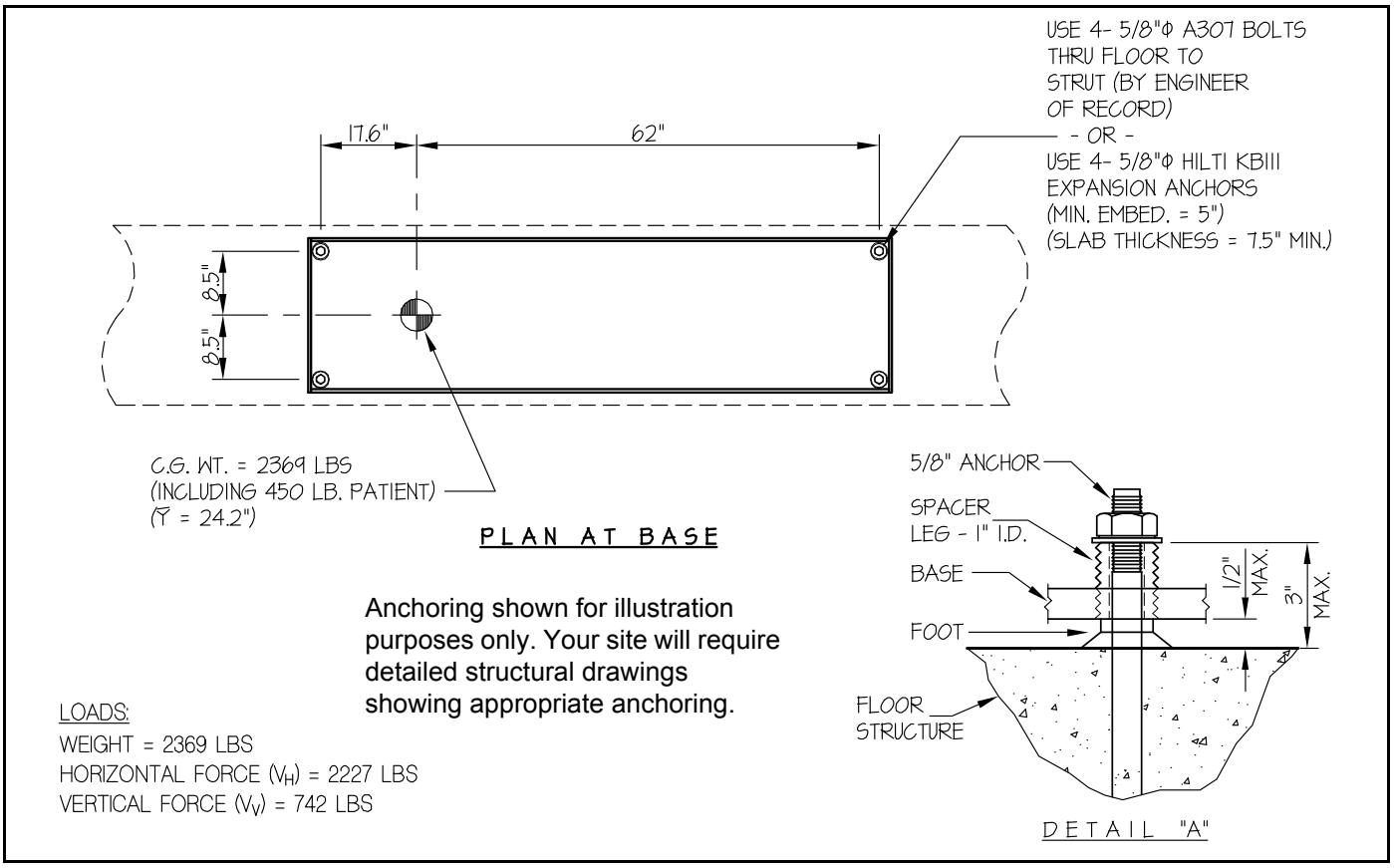


Figure 6-14 Power Distribution Unit (PDU)

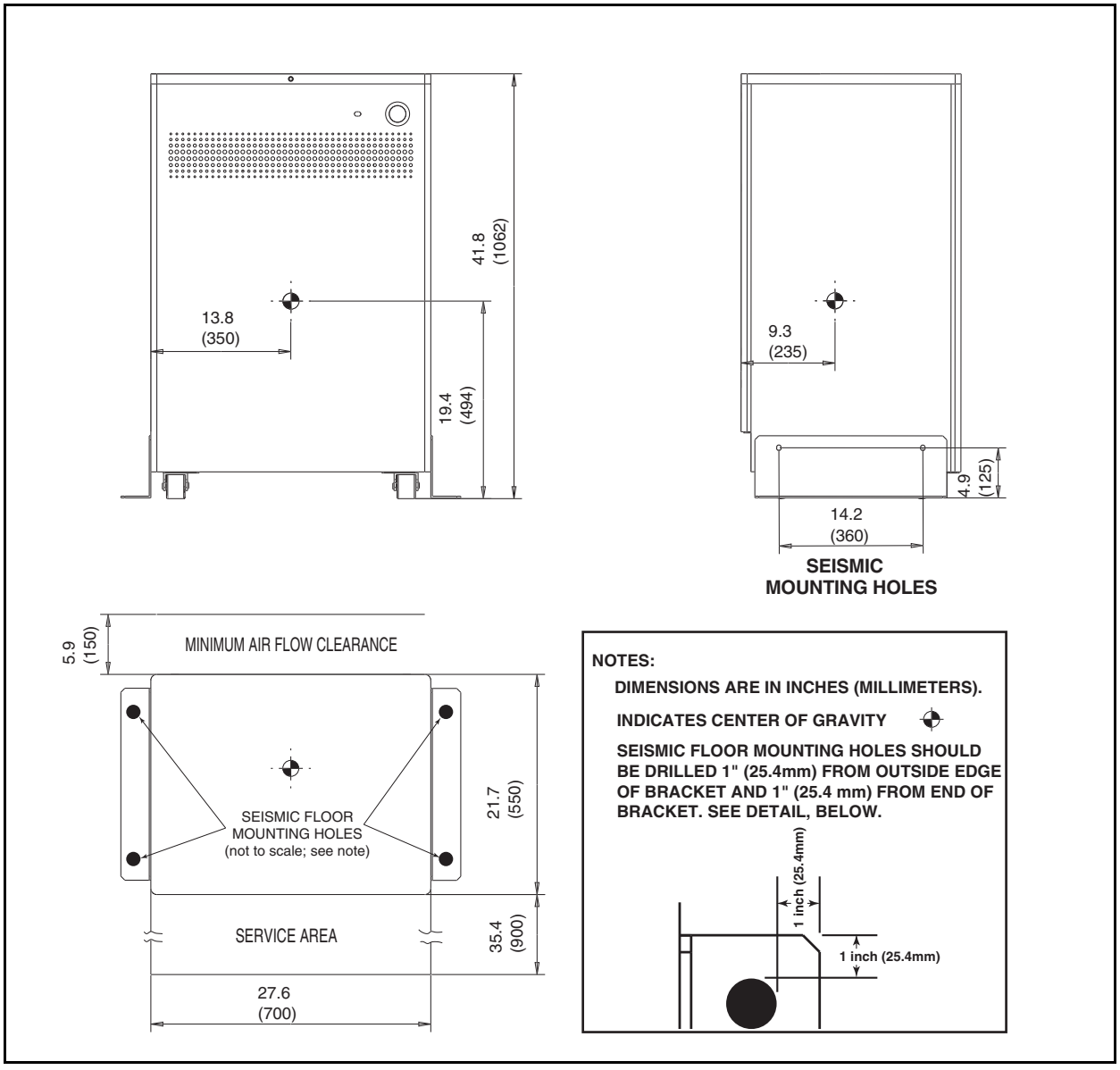
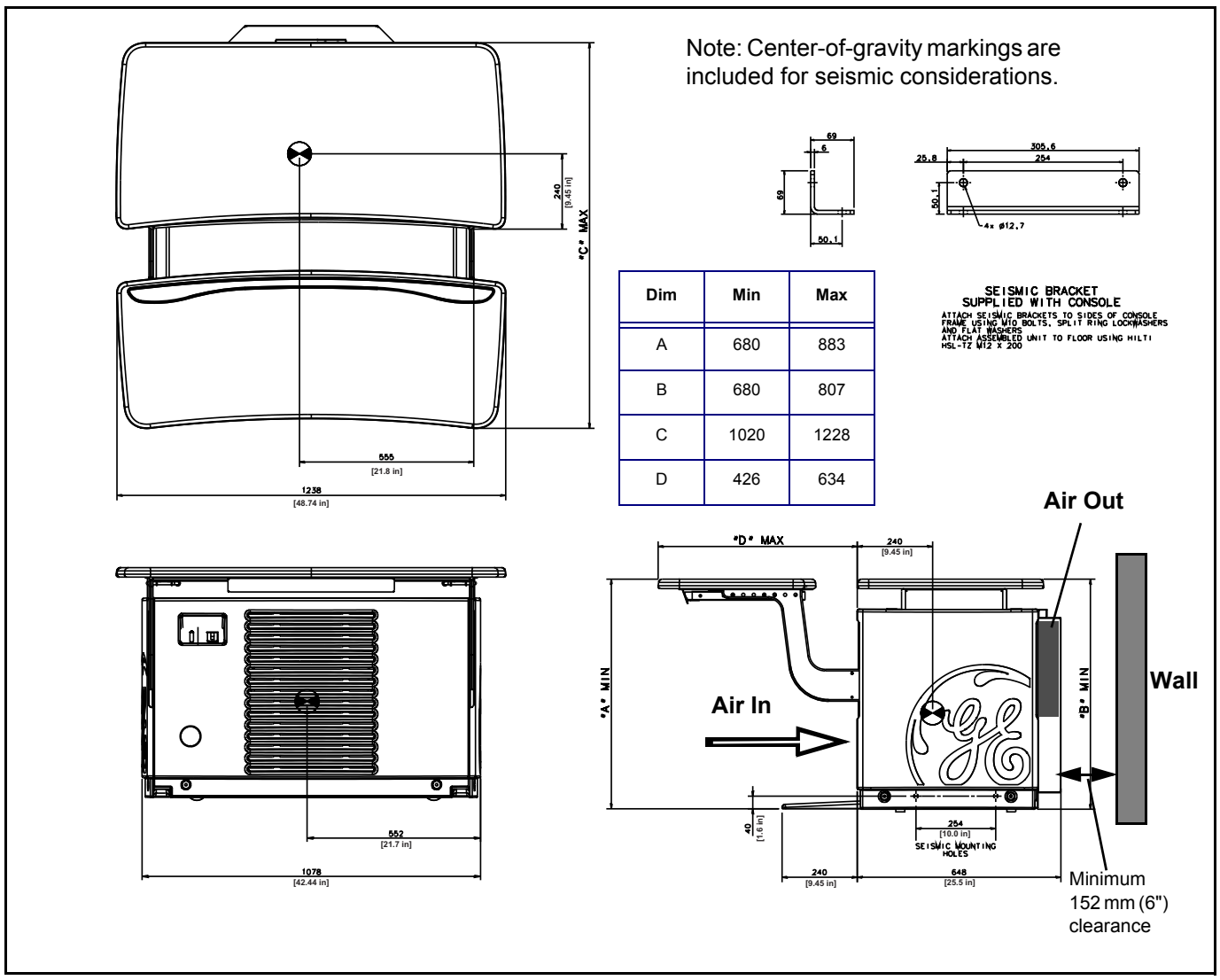


Figure 6-15 Operator Console Dimensions



Dim	Min	Max
A	680	883
B	680	807
C	1020	1228
D	426	634

Figure 6-16 CT Gantry/Table Mounting Dimensions - Composite

Some graphics in this manual are designed to be viewed in electronic format and may not be readable in the printed format. To view the graphic, properly open the manual in its electronic format and use the zoom feature of Adobe Acrobat Reader™.

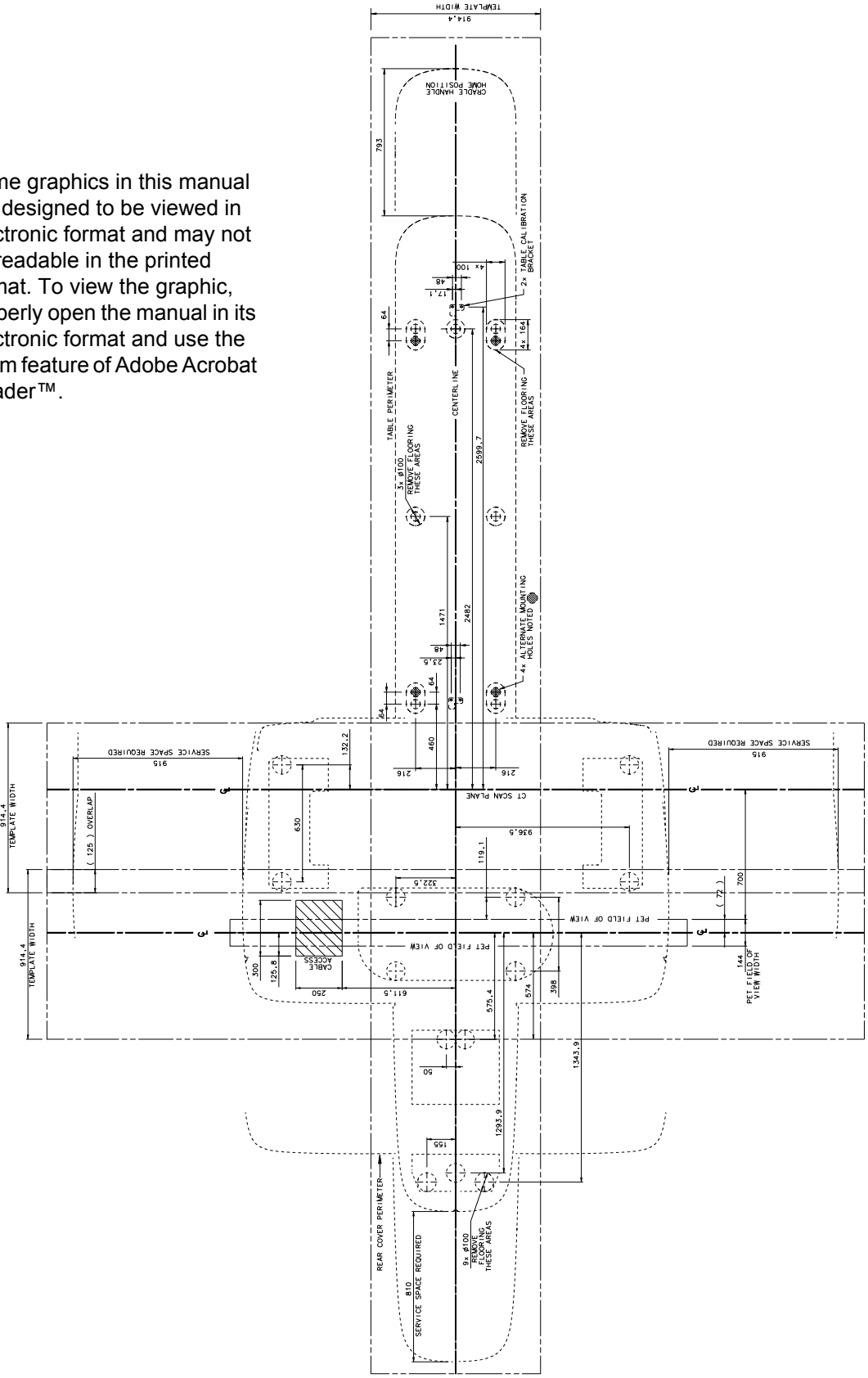


Figure 6-17 CT Gantry/Table Mounting Dimensions - PET Gantry

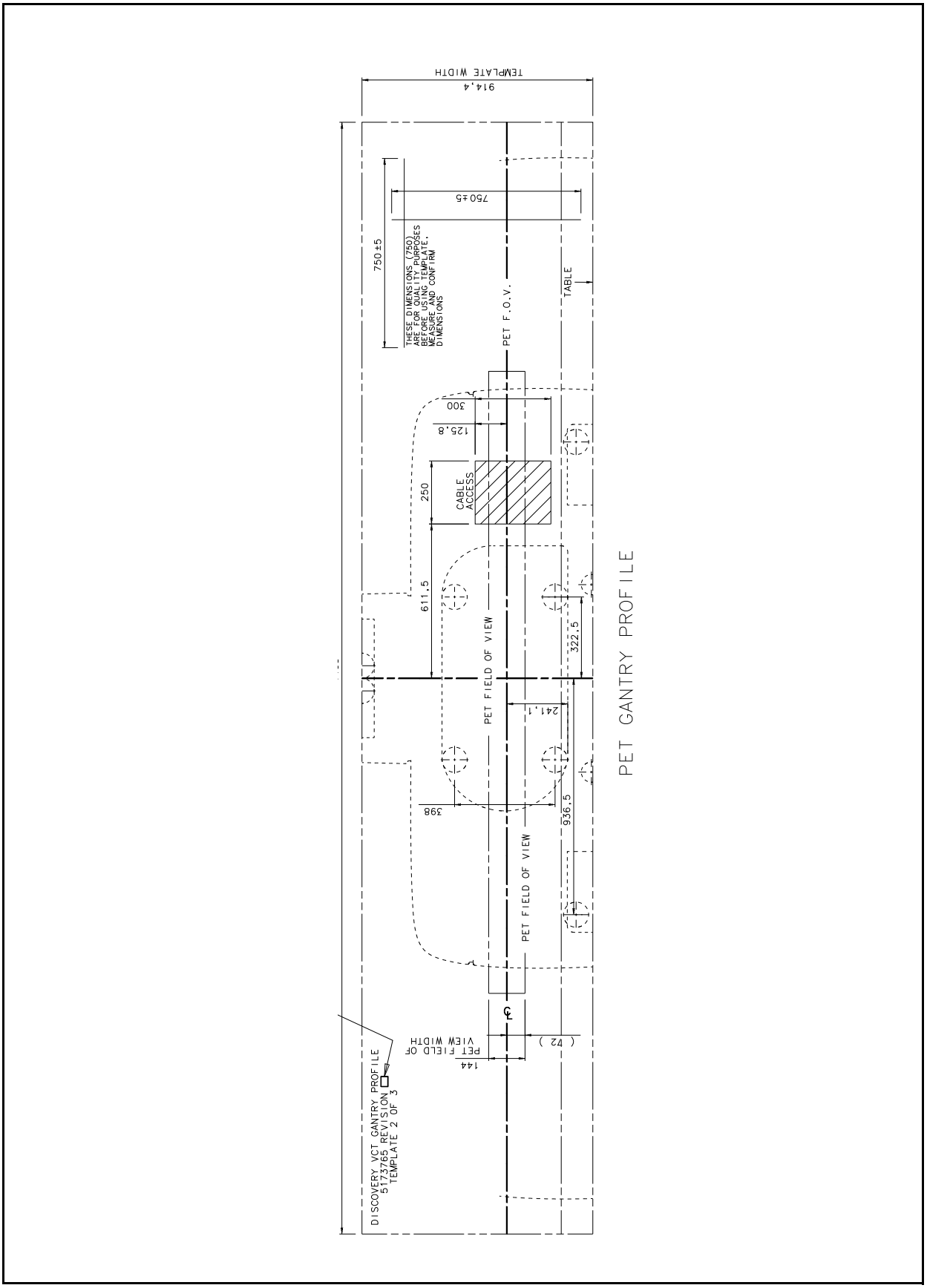


Figure 6-18 CT Gantry/Table Mounting Dimensions - CT Gantry

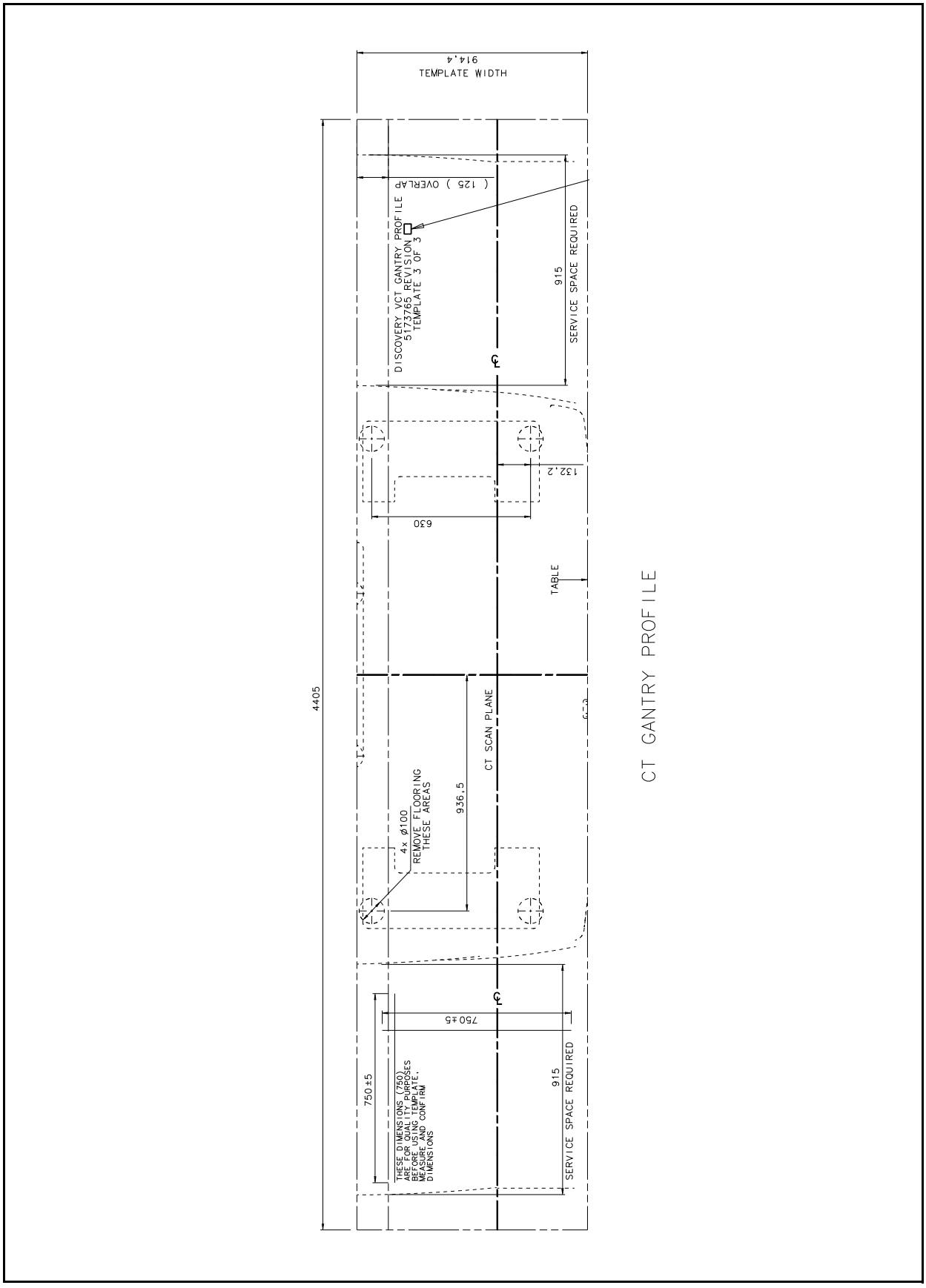
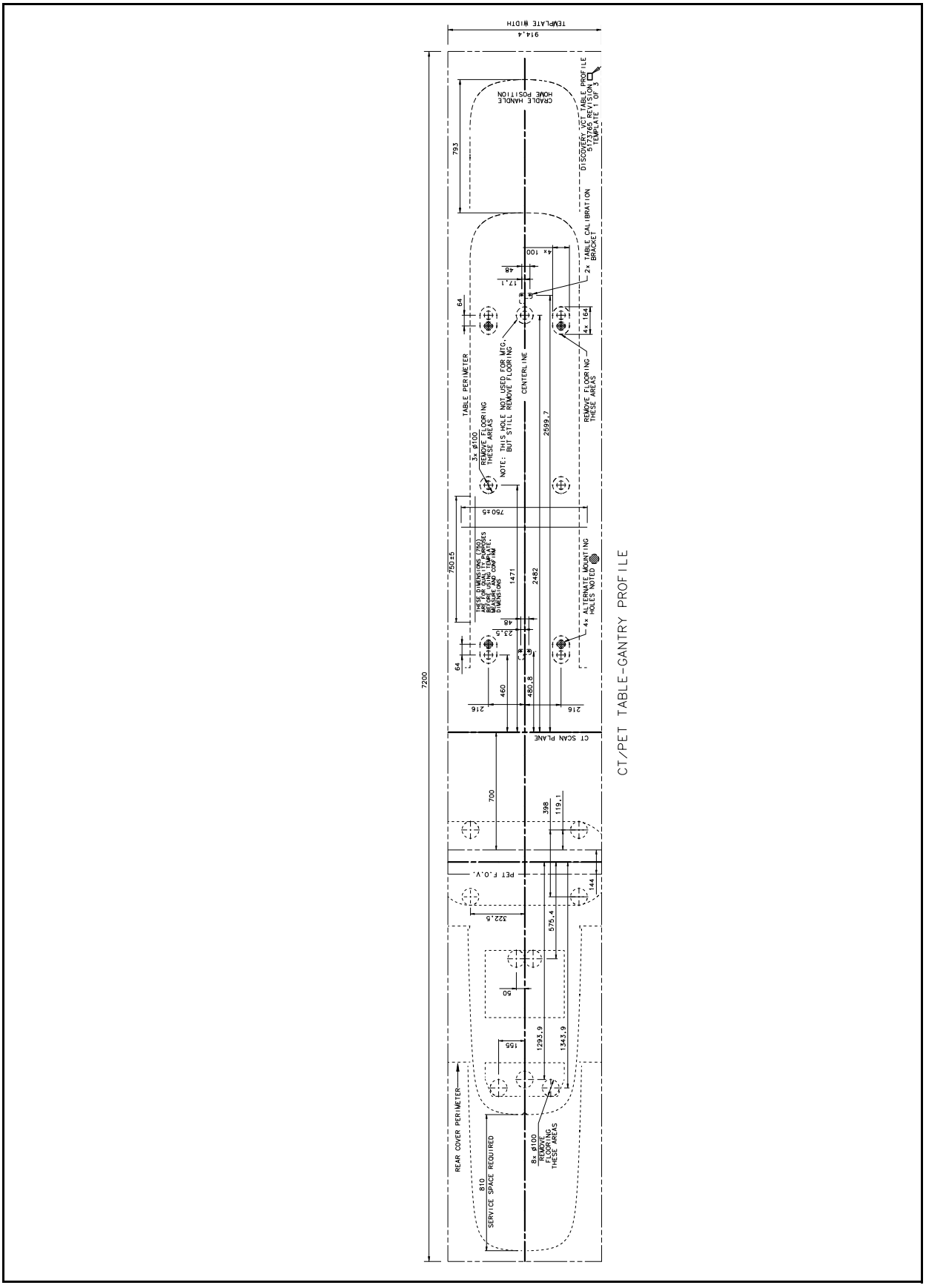


Figure 6-19 CT Gantry/Table Mounting Dimensions - CT/PET Table-Gantry Profile



Chapter 7
Delivery Information

WARNING **SOME ASSEMBLIES ARE TOP-HEAVY. BE CAREFUL NOT TO TIP.**

NEITHER THE CT OR PET GANTRY NOR THE TABLE CAN BE LIFTED WITHOUT WRITTEN PERMISSION.

DO NOT LIFT EITHER GANTRY OR THE TABLE, EITHER USING A LIFT TRUCK UNDER THE GANTRY FRAME OR WITH STRAPS ON THE GANTRY DOLLIES. DO NOT LIFT WITH A LIFT TRUCK UNLESS YOU ARE LIFTING THE TABLE AND GANTRY ON A SHIPPING SKID. THE TABLE AND GANTRY SHOULD BE SECURELY FASTENED TO THE SHIPPING SKID BEFORE LIFTING.

THE DELIVERY TRUCK SHOULD HAVE EITHER AN AIR RIDE OR SHOCK-SMOOTHING SUSPENSION.

Section 1.0
Van Delivery (U.S. Domestic)

The scanner system is packed for van shipment with minimum tear-down of components. It consists of approximately 20 shipping containers which include dollies, skids and boxes without skids.

Note: The information in Table 7-2 is *approximate*.

Note: Height measurements are taken at shipping height, which is not the lowest level of the dollies.

Table 7-1 : Estimated Van Delivery Sizes and Weights

Item	Length IN (MM)	Width IN (MM)	Height IN (MM)	Weight LB (KG)	Liftable	Riggers to Move	Dust-Free Package
CT Gantry	114 (2896)	51 (1295)	77 (1955)	4260 (1932)	Yes	Yes	No
PET Source Ring and Trailer with Dollies	96 (2438)	44 (1118)	55.5 (1410)	1340 (608)	Yes	Yes	No
PET Image Ring with Dollies	110 (2794)	44 (1118)	74 (1880)	3205 (1454)	Yes	Yes	No
PET Base and Retractor Assembly with Dollies	96 (2438)	41.5 (1054)	39 (990)	1495 (678)	Yes	Yes	No
Table (with accessories)	161 (4089)	34 (864)	55.5 (1410)	2856 (1295)	Yes	Yes	No
Power Distribution Unit	30 (762)	23 (584)	43 (1092)	910 (413)	Yes	Yes	No
Skid with Console	54 (1372)	46 (1168)	43 (1092)	560 (254)	Yes	Yes	No
Skid with Console components	40 (1016)	40 (1016)	33 (838)	120 (54)	Yes	Yes	No

Section 2.0
Crated Deliveries (International)

The Discovery VCT system components, including the operator console chair, are packed for air shipment in 6 packages. Total weight of the basic system is 11,869 lbs (5384 kg). It is shipped in wooden crates.

Note: The information in Table 7-2 is *estimated*, due to lack of experiential shipping information as of the release date of this document.

Table 7-2 : Estimated Crated Delivery Sizes and Weights

Crate #	Length IN (CM)	Width IN (CM)	Height IN (CM)	Weight LB (KG)
1	57.5 (145.5)	97.75 (248)	87 (221.5)	4533 (2056)
2	38.5 (97.5)	103 (262)	80 (203)	1481 (672)
3	37 (94)	40.5 (103)	60 (158)	953 (432)
4	57.5 (146)	63 (159.5)	51 (130)	992 (450)
5	52.75 (134)	53 (134.5)	62 (157.5)	656 (298)
6	53 (134.5)	53 (134.5)	68.5 (174)	3254 (1476)

Section 3.0
Delivery/Shipping Considerations

The Discovery VCT system is not designed to tolerate excessive mishandling, including dropping, shock, vibration, tipping or hoisting.

Arrange for Dock-to-Dock shipment to minimize the chances of damage during delivery. Other delivery methods are acceptable, provided the system is not dropped or mishandled. For example, the system may be transferred from the delivery van to the hospital by a flat-bed roll-back truck, or by rolling the subsystems on their dollies across SMOOTH sidewalks or other paved surfaces. Be sure the flat-bed roll-back truck is properly sized for the load to be carried.

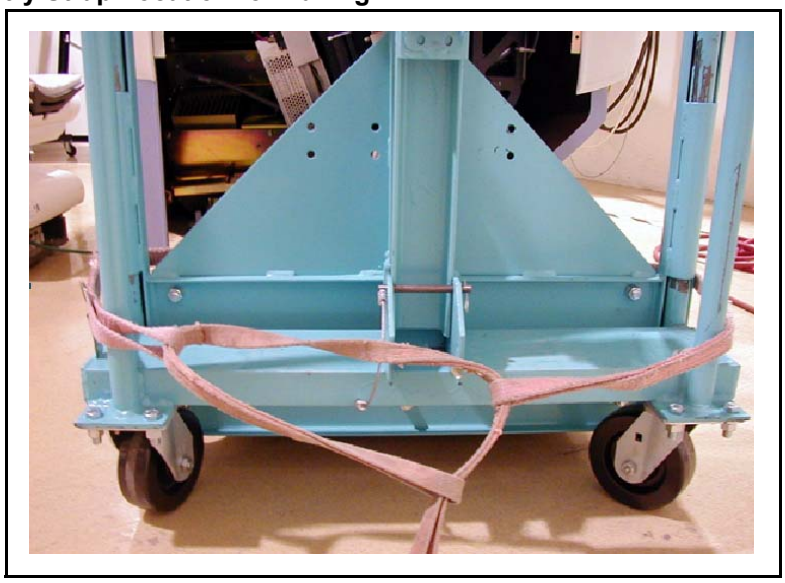
Refer to Figure 7-1. When moving the Gantry off a flat-bed truck, attach the straps to the lowest possible point on the dolly. Use the crank to lower the Gantry at the slowest reasonable rate.

Note: The Gantry, Console, Table and PDU must NEVER be dropped. A drop from a height greater than one half inch (½" or 13 mm) may induce structural damage to the frame or other major components. Damage resulting from a drop, such as a bent frame, or misalignment, may not be obvious until late in the system installation.

Note: If using a fork lift or a fork truck for moving the system, be sure the system is securely mounted to a shipping skid.

Note: If transferring the system across any sloped surface, always use riggers and a roll-back truck.

Figure 7-1 Gantry Strap Location for Pulling



The Discovery VCT System—including the Gantry components, Operator Console, Patient Table and PDU—is not designed to tolerate any excessive shock or vibration that may occur during unloading. For example, rolling the console across a “washboard” style ramp may vibrate components, causing loosened or broken connections, etc. Damage resulting from shock or vibration to the monitors, DVD-ROM, hard-drives or system computers, may not be evident until late in the installation, during the system tests.

All system components must remain upright at all times, and must not be tipped. Do not tip or hoist the Gantry components. Move the Gantry components by rolling them on their shipping dollies. During transit through hallways, doorways, elevators, etc., do not tip or lift the Gantry components.

Section 4.0
Site Environmental Considerations

4.1 Dust/Dirt Contamination

The Discovery VCT systems (consisting of: Console, PDU, Table and Gantry) are highly susceptible to airborne contaminants, especially concrete and drywall dust. Due to the possibility of contamination, these systems should NEVER be installed in a construction site. Any site with unfinished floors, walls or ceilings is considered a construction site, and is not suitable for system installation.

4.2 Chemical Contamination

Wet film processors must never be installed in the same room as the scanner, due to the possibility of chemical contamination of Discovery VCT components. Such chemicals can contribute to increased equipment failures, increased system downtime, and decreased reliability. Film processor equipment installation must meet the manufacturer’s requirements (e.g., ventilation specifications) and all applicable national and local codes. Also, consideration should be given to the location of this equipment and chemical fumes relative to human contact as it relates to locating this equipment and chemicals in the control room.

Section 5.0
Storage Requirements

5.1 Short-Term Storage (Less Than 6 Months)

Note: If the Discovery VCT system is to be stored before installation, it must be stored in a temperature and humidity controlled warehouse. Protection from weather, dirt and dust is critical.

Meeting these requirements prevents rust and corrosion from forming on bearing surfaces due to condensation.

- Storage temperature should not exceed 40º to +80º F (4º to +27º C).
- Maintain relative humidity (non-condensing) between 20% and 60%.
- Maximum relative humidity rate of change is 5%/hr.
- The maximum temperature rate of change is 5º F/hr. (3º C/hr.)
- Air pressure should be between 700hPa and 1060hPa.

⚠ **NOTICE** **Between delivery is considered short-term storage.**
Van storage must meet the same specifications as above.

5.2 Long-Term Storage (6 Months Or More)

Note: If the Discovery VCT system is to be stored before installation, it must be stored in a temperature and humidity controlled warehouse. Protection from weather, dirt and dust is critical.

Meeting these requirements prevents rust and corrosion from forming on bearing surfaces due to condensation.

- **Storage temperature should not exceed 40º to +80º F (4º to +27º C).**
- **Maintain relative humidity (non-condensing) between 20% and 60%.**

Figure 7-2 Package Symbols (Storage)

Section 6.0
Extreme Temperature Transportation and Deliveries

Extreme temperatures should be avoided during system transportation and delivery.

Extreme temperatures are defined as below 0º F (-18º C) or above 120º F (49º C) without humidity control.

Section 7.0
System Transportation

When transporting the Discovery VCT system, ensure that the system is not exposed for an extended period of time to temperatures or humidity outside the following specifications:

- Temperature: 0º to +120º F (-18º to +49º C)
- Humidity: 0% to 80%

NOTICE **Component freezing will occur if the system is exposed to temperatures below 0º F (-18º C) for a period longer than two days.**

In particular, do not allow the detector ring to freeze.

Allow a minimum of 12 hours for the system to adjust to ambient room temperature prior to installation.

Section 8.0
Gantry/Table Considerations

The following Discovery VCT Gantry components ship on individual sets of dollies:

- The CT Gantry: Figure 7-3
- The PET Base and Retractor Assembly: Figure 7-4
- The PET Image Ring: Figure 7-5
- The PET Trailer: Figure 7-6

Figure 7-3 CT Gantry with Shipping Dollies and Side Rails

The CT Gantry ships with the front and rear covers attached to its front and rear cover brackets. During installation, the rear cover is transferred to the PET Gantry, and the rear cover brackets are removed from the CT Gantry. The assembly is mounted between two dollies. Refer to Figure 7-3. Two side rails are bolted to the dollies to stabilize dollies and protect gantry. The dolly elevating casters lift the gantry off its base and roll it into position.

Refer to Table 7-3. The minimum hallway and door size for the CT Gantry with covers and dollies attached, but side rails removed, is 42 inches (1067 mm).

Table 7-3 : CT Gantry and Dollies Dimensions, with and without Side Rails

Configuration	Length IN (MM)	Width IN (MM)	Height IN (MM)	Weight lb (kg)
Dollies On, Side Rails On	114 (2896)	51 (1295)	77 (1955)	4260 (1932)
Dollies On, Side Rails Removed	114 (2896)	42 (1067)	77 (1955)	4220 (1914)

The PET Gantry consists of:

- PET Base and Retractor Assembly (Figure 7-4)
- PET Image Ring (Figure 7-5)
- PET Trailer/Retractor (Figure 7-6)

Refer to Figure 7-4. The PET Base dollies have a center stabilizing frame to protect the exposed components.

Table 7-4 : PET Gantry Dimensions with Dollies

Configuration	Length in (mm)	Width in (mm)	Height in (mm)	Weight lb (kg)
PET Base and Retractor Assembly with Dollies	96 (2438)	41.5 (1054)	39 (990)	1495 (698)
PET Image Ring with Dollies	110 (2794)	44 (1118)	74 (1880)	3205 (1454)
PET Source Ring and Trailer with Dollies	96 (2438)	44 (1118)	55.5 (1410)	1340 (608)

Figure 7-4 PET Base and Retractor Assembly, with Shipping Dollies

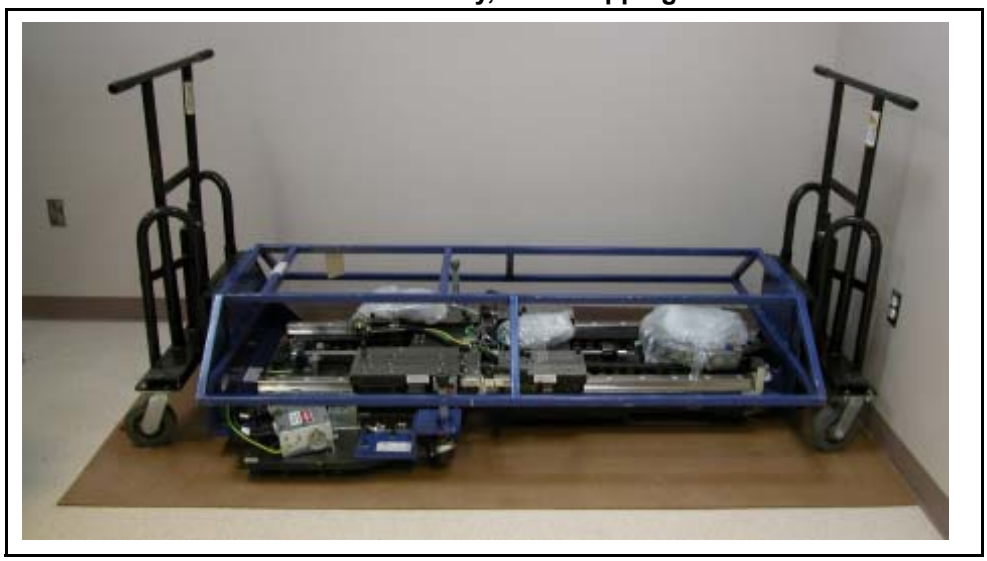


Figure 7-5 PET Gantry Image Ring, with Shipping Dollies and Side Rails

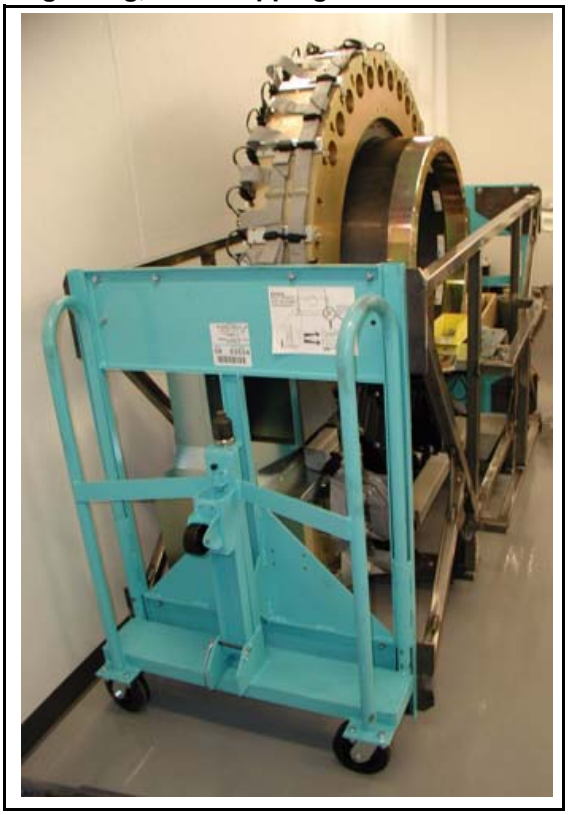
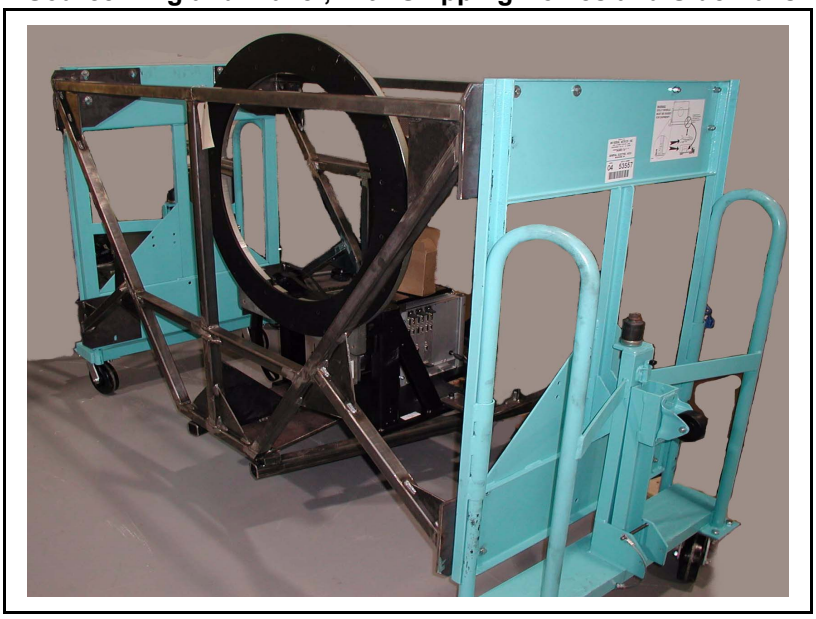


Figure 7-6 PET Source Ring and Trailer, with Shipping Dollies and Side Rails



The patient table consists of a patient table mounted to a secondary base. The patient table travels along this secondary base to reach the CT and PET gantry scan locations. Once the entire patient table moves into the CT or PET position, the cradle positions the patient within the corresponding scan field of view.

Refer to Figure 7-7. The secondary base covers ship separately. The dimensions in Table 7-5 do not include shipping crates or packaging materials.

Refer to Figure 7-7. The Discovery VCT patient table ships to domestic (North American) installations on a set of dollies with stabilizing side rails.

Refer to Figure 7-7 and Figure 7-8. Red caster towers ship attached to the ends of the dollies. They are used for fitting the Table in an elevator and for final positioning of the Table in front of the Gantry.

Figure 7-7 Patient Table with Shipping Dollies

Figure 7-8 Patient Table on Red Caster Towers

Note: The patient table ships to international sites in a crate. The installation team uncrates the table and attaches the dollies at the site.

Table 7-5 Table Dimensions with Dollies :

Configuration	Length in (mm)	Width in (mm)	Shipping Height in (mm)	Weight lb (kg)
Blue Dollies On Red Castors Attached	161 (4089)	34 (864)	55.5 (1410) nominal	2856 (1295)
Red Castors On Blue Dollies Removed	149 (3785)	34 (864)	55.5 (1410) nominal	2736 (1241)

8.1 Door Openings

Clear door openings for moving equipment into building must be 44 in. X 82 in. (1118 mm X 2083 mm) minimum, if there is an 8 ft. (2439 mm) corridor width.

8.2 Elevator Requirements

Remember to take the size and capacity of any elevators into consideration when plotting the delivery route through the facility to the installation site. It may be necessary to partially disassemble a dolly in order to fit one of the components into an elevator. For best results, arrange for the use of a surgical elevator, if available.

Contact a representative of the elevator manufacturer if a component weight exceeds the elevator's capacity.

NOTICE **For alternative lifting arrangements and instructions, contact** *GE Healthcare* **Installation Support Services.**

8.3 Dollies

Typically, the Table, and Gantry components ship on dollies to domestic installations. The Console ships on a pallet. The installation team has the responsibility to arrange for removal of the dollies from the installation site.

8.3.1 United States Only Installations

When finished with the dollies, use the shipping document located in Box #1 to return the dollies to (UMI) GE Healthcare in Milwaukee, Wisconsin, USA.

8.3.2 International Installations

The following dolly sets can be purchased for international shipments, for use at the customer site. After the system has been removed from the crates, dollies shipped with international shipments remain in the destination country, for local use. Do NOT return any dollies used during installations that take place outside the Americas.

The International PET-CT Shipping Dolly set, catalog number, P5064ZZ, consists of the following subsystem dolly kits:

- PET Base dolly: P/N 2372734
- PET Trailer dolly: P/N 2372735
- PET Image Ring dolly: P/N 2372736
- CT Gantry dollies: P/N 2282714
- Table dollies: P/N 5170489

NOTICE **If this is a CT-to-Discovery VCT upgrade and will take place outside the Americas, order the International CT-to-DST Upgrade dolly kit, catalog number P5050ZY.**

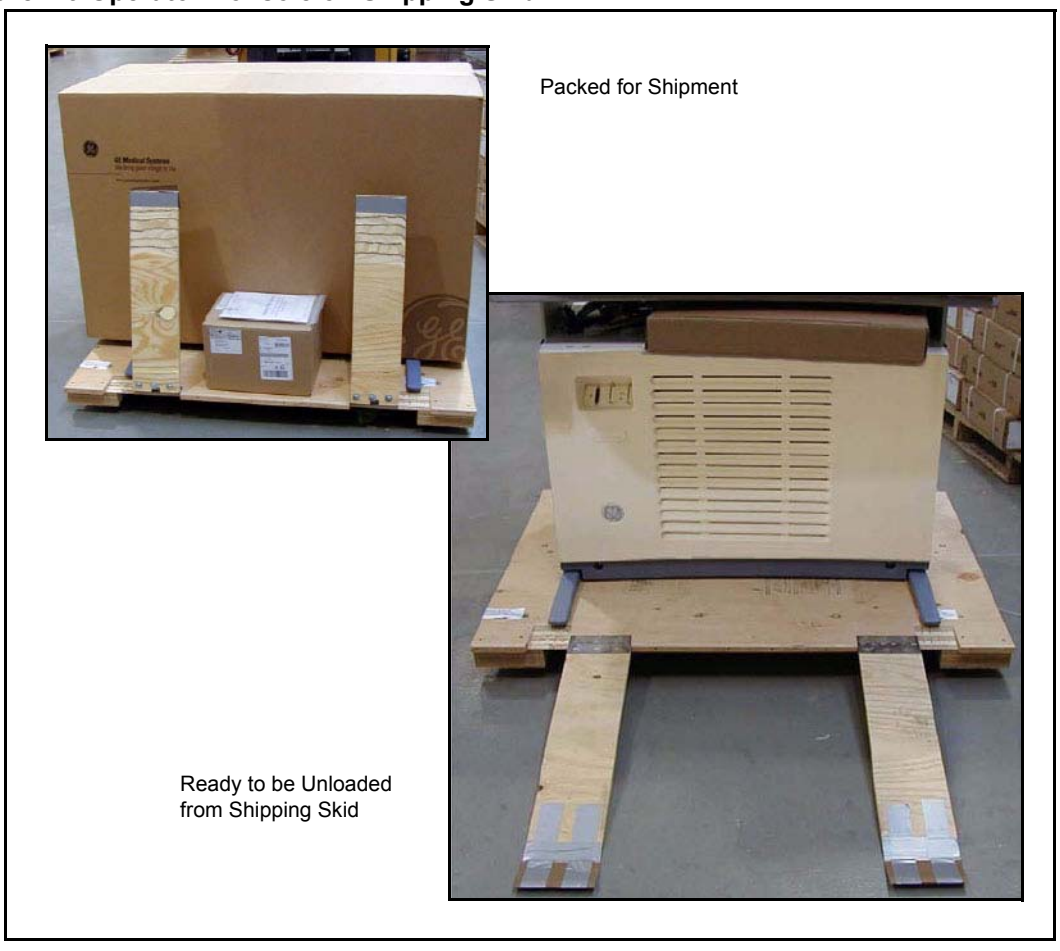
Section 9.0
Operator Console Considerations

- The console is shipped on a skid equipped with ramps for unloading.
- Do not remove the console from the shipping skid until it is in the equipment room.
- The keyboard table is shipped with the console, but not installed.

Table 7-6 : Discovery VCT Console Shipping Dimensions

Configuration	Length in (mm)	Width in (mm)	Height in (mm)	Weight lb (kg)
Skid with Operator's Console	54 (1372)	46 (1168)	43 (1092)	560 (254)
Skid with Console components	40 (1016)	40 (1016)	33 (838)	120 (54)

Figure 7-9 Operator Console on Shipping Skid



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Chapter 8
Power Requirements

Section 1.0
Introduction

The Power Distribution Unit (PDU) supplied with the Discovery VCT systems transforms and distributes power to all system components. The PDU is the only power entry point required to operate the system.

Power wiring between the facility main distribution panel and the PDU should be kept as short as possible. This minimizes voltage regulation effects.

When routing the power wiring all three phase wires and ground must be run in the same conduit or raceway duct. Power wires should be routed separately from system control and signal cables, using a separate conduit or trough in raceway duct.

Carefully consider advantages and disadvantages of conduits, floor ducts and surface raceways for running cables. Make cable passageways large enough to install any cable with all other cables already installed.

When routing power cables, all three phase wires and ground must be run in the same conduit or raceway duct-work. Power cables should be routed separately from system control cables (for example, use a separate trough in duct).

Section 2.0
System Input Power

2.1 Facility Source

The Discovery VCT scanner is designed to operate on a three-phase, four-wire delta or wye power source. Although a solidly grounded wye source is preferred, an impedance grounded wye source may be used. The neutral wire does not need to be run to the system, i.e., four-wire connection.

If the only power source available is a delta configuration the customer must provide a wye connected grounding transformer or autotransformer at the source. Corner or mid-phase grounded delta sources are NOT recommended.

Power to the system should be supplied by a dedicated feeder from the nearest Main Distribution Panel (MDP). A protective disconnect device must be provided in the power line supplying the PDU in accordance with National Electric Code and applicable local codes.

Note: Lockout/tagout provision required

The disconnect device must be located within 35 feet (10.67 m) of the PDU, visible to PDU service personnel, and must have provision for lockout / tagout. It is identified as "A1" in the interconnection schematic diagrams.

Since the disconnect is not included with the system catalog, it is possible to arrange to have this item delivered during the site construction phase.

Table 8-1 Discovery A1 Disconnect Panels

Region	Power Requirements	Voltage
PN E4502AE	125A	440, 460, or 480
PN E4502AF	150A	380, 400, or 420

The rating of the disconnect device depends on the nominal line voltage. It must provide over-current protection and have a low voltage release, with multi-point remote control capability.

2.2 Main Disconnect Control

Customer-supplied emergency off buttons must be connected to the main disconnect controller (A1) in order to disable the power to all Discovery VCT system equipment in emergency situations. They should be mounted in the control room near the operator console. Emergency off buttons are to be clearly labeled “Emergency Off” and visible to personnel in the PET-CT room. It is important that the button be labeled “off” and not “stop” since there exists an “Emergency Stop” button in the Discovery VCT system that disables output power to the system equipment in the patient area of the PET-CT system.

The main disconnect control must be lockable for power Lockout/Tagout requirements to meet GE Healthcare Service and/or OSHA requirements.

If installed in the United States, the main disconnect control must be approved by UL (or another nationally-recognized testing organization listed and labeled in accordance with 1999 National Electrical Code (NEC) Article 110-2).

If installed in a country other than the United States, the main disconnect control must be approved by the local regulatory organization. If the local regulatory organization code does not include the requirement for providing a lockout/tagout feature at the main disconnect (A1 panel) a document or placard signed by the regulatory agency must be placed near the main disconnect instructing any service/maintenance personnel who to contact, or clearly instructing the service/maintenance personnel on how to completely shut down incoming power to the PDU to safely service this device. The main disconnect (A1 panel) and components therein can only be serviced by a qualified electrician. GE personnel are not responsible for servicing the main disconnect (A1 panel) or parts within it.

2.3 Configuration

The Discovery VCT systems are designed to operate on three-phase, **four-wire** wye power. A ground referenced wye source produces the lowest leakage currents and is preferred. However, the neutral wire does not need to be run to the system, i.e., four-wire connection. (A dummy terminal is provided for “parking” the neutral wire in the event a five-wire service is already installed at the site.)

2.4 PDU Rating

The Discovery VCT system operates on three-phase power that meets the following specifications.

Voltage	380 to 480 VAC
Capacity	150 kVA
Frequency	50 or 60 Hz +/- 3 Hz

- Maximum power demand = 150 kVA @ 0.85 PF at a selected technique of 140 kV, 715 mA.
- Average (continuous) power demand at maximum duty cycle = 25 kVA.

Note: The absolute range of line voltage at the input to the PDU must remain within one of the ranges shown in Table 8-2 at all times.

WARNING **TO PREVENT POWER LOSS TO OTHER LOADS IN CASE OF AN UNEXPECTED CT OR PET SYSTEM FAULT, THE POWER FEEDER MUST HAVE OVERCURRENT PROTECTION SUCH THAT THE DOWNSTREAM OVERCURRENT PROTECTION DEVICES (e.g. GE A1 PANEL) CLEAR THE FAULT BEFORE ANY UP-STREAM OVERCURRENT PROTECTION DEVICE OPENS.**

2.5 Regulation

The size of the facility transformer and feeder wires determine load regulation presented to the system. Total load regulation as measured at the PDU input terminals must not exceed 6%.

2.6 Phase Imbalance

The difference between the highest line-to-line voltage and lowest line-to-line voltage must not exceed 2% of the lowest line-to-line voltage.

2.7 Sags, Surges & Transients

Sags and surges of the power line must not exceed the absolute range limits shown in Table 8-2.

Limit maximum transient voltage to 1500V peak.

2.8 Grounding

Metal conduit, raceway or the armor of armored cable used to power the system should be bonded to the PDU cabinet. However, in addition to such mechanical grounding, a dedicated 1/0 (55 sq. mm) or larger insulated copper ground wire must be run with the phase wires from the main distribution panel to the PDU. **The shield or armor of armored cable is not sufficient for this purpose.** The ground wire should be bonded to intermediate distribution panels through which it passes in accordance with local codes. The resistance between the PDU ground and the facility earth ground must not exceed 0.5 ohm. In addition, the total resistance between the PDU ground and earth must not exceed 2 ohms.

Section 3.0
Power Distribution System

A dedicated feeder run from the facility main isolation transformer is recommended to power the Discovery VCT scanner. If the scanner must be powered from an existing distribution transformer and secondary feeder, such as the equipment distribution panel of an X-ray department, installation with other X-ray equipment that uses rapid film changers should be avoided. These changers use a large number of high powered, closely spaced exposures, which may coincide with the CT scan and produce image artifacts.

WARNING **IF THE POWER FEED FOR THE A1/PDB PANEL IS NOT ON A DEDICATED POWER TRANSFORMER, ANY DEVICE THAT SHARES POWER FROM THAT TRANSFORMER MAY BE IMPACTED BY INADVERTENT POWER INTERUPTION CAUSED BY AN A1/PDB POWER PANEL FAULT. CONVERSLY, THE OPERATION OF OTHER DEVICES SHARING THE POWER TRANSFORMER MAY ALSO IMPACT THE OPERATION OF THE CT/PET SCANNER.**

If a dedicated distribution transformer is provided for the scanner, the minimum recommended transformer size is 225 kVA, rated 2.4% regulation at unity power factor. For this configuration, the minimum recommended feeder size and overcurrent protection device based on line voltage is shown in Table 8-1 in the “Feeder Length (MDP to A1)” section.

In all cases, qualified personnel must verify that the transformer and feeder, at point of take-off, plus the run to the Discovery VCT scanner meet all the requirements stated in this document.

SYSTEM CHARACTERISTICS:

- Maximum power demand = 150kVA @ 0.85 PF: at a selected technique of 140 kV, 715 mA.
- Continuous (average) power demand at maximum duty cycle = 25kVA.
- Maximum allowable total source regulation is 6%.
- Minimum recommended transformer size: 225 kVA, with 2.4% rated regulation at unity power factor. Resultant maximum allowable feeder regulation is 3.4%.

The nominal line voltage must fall within one of the ranges listed in Table 8-2.

Table 8-2 Facility Power Requirements

Nominal Line Voltage (VAC)	380	400	420	440	460	480
Voltage Range (VAC) +/- 10 %	342-418	360-440	378-462	396-484	414-506	432-528
Continuous Line Current (A)	38	36	34	33	31	30
Momentary Line Current (A)	228	217	206	197	188	180
Maximum Line Current (A)	253	241	229	219	209	200
Minimum Recommended Circuit Protection Rating	150	150	150	125	125	125
Feeder Length (MDP to A1)						
0 - 200 ft (0 - 61 m)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)
200 - 250 ft (61 - 76 m)	2/0 (70)	2/0 (70)	1/0 (55)	1/0 (55)	1 (45)	1 (45)
250 - 300 ft (76 - 91 m)	3/0 (85)	3/0 (85)	2/0 (70)	2/0 (70)	1/0 (55)	1/0 (55)
300 - 350 ft (91 - 107 m)	4/0 (100)	3/0 (85)	3/0 (85)	2/0 (70)	2/0 (70)	1/0 (55)
350 - 400 ft (107 - 122 m)	250 (125)	4/0 (100)	3/0 (85)	3/0 (85)	3/0 (85)	2/0 (70)
Sub-Feeder Length (A1 to PDU)	Minimum sub-feeder wire size, AWG or MCM (Sq. mm)					
32 ft (9.7536 m)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)

Notes:

1.) The feeder table above is based on the use of copper wire, rated 75C and run in steel conduit. Ampacity is determined in accordance with the National Electric Code (NFPA 70), Table 310-16 (2002).

2.) The minimum feeder size is determined by the ampacity of the circuit protection device listed above, except where a larger size is necessary to meet total source regulation limits.

3.) A 1/0 (55 sq. mm) ground wire is recommended in all cases.

If the Discovery VCT system must be powered from an existing distribution transformer and secondary feeder, such as the equipment distribution panel of an X-ray department, installation with other X-Ray equipment which use rapid film changers should be avoided. These changers use a large number of high powered, closely spaced exposures which may coincide with a PET-CT scan and produce image artifacts.

In all cases, a qualified electrician must verify that the transformer and feeder, at point of take-off, plus the run to Discovery VCT meets all the requirements.

Section 4.0
Uninterruptable Power Supplies (UPS)

An Uninterruptable Power Supply (UPS) is recommended for any area or site with known power issues. Consult the local power provider for power quality data in the area. UPS is standard equipment on all mobile units. Filter and surge protectors are not needed with Discovery VCT systems.

For use with Discovery VCT systems, the following are recommended:

- PowerWare 9330G-14B UPS (catalog number P5052PS)
- A1 disconnect panel (E4502AE, 125 amp, or E4502AF, 150 amp).

Section 5.0
Power Audit

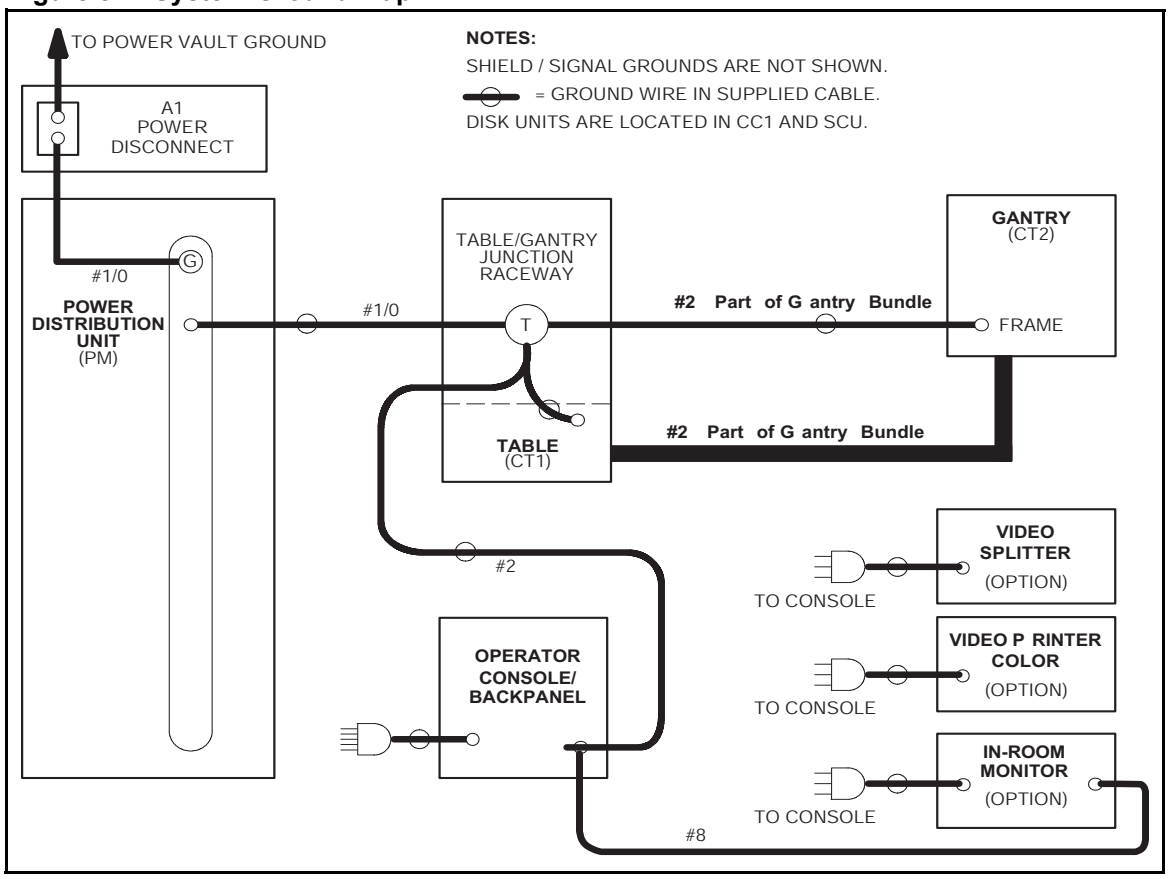
A site power audit is strongly recommended for the Discovery VCT family of products. This site power audit can be arranged with the GE Power Quality team, or through a sales representative.

Section 6.0
Ground System

The Discovery VCT uses an equal potential grounding system. The strongly recommended ground system is shown in Figure 8-1. There are three primary grounding points:

- A system power ground point located in the PDU PM (Power Module).
- A reference ground point located between gantry and table base. All exposed metal surfaces in patient vicinity are grounded to the reference ground point
- A patient ground point located at the front of the table base.

Figure 8-1: System Ground Map



Chapter 9
Interconnection Information

Section 1.0
Introduction

Table 9-1 shows component designators for supplied equipment, options and wall power outlets.

Table 9-2 and Table 9-3 list details for connection to Discovery VCT equipment, using long-length (standard) and short-length (optional) cables respectively. Details are valid for the following types of runs as appropriate:

- Flush-floor duct
- Computer floor
- Through-wall bushing
- Junction box
- Through-floor duct
- Wall duct
- Conduit

The need for additional junction boxes is minimized by use of either a cable raceway system or a raised computer floor. The Discovery VCT uses prefabricated cables with large plugs. Therefore, conduit or pipe is not recommended for cable runs.

Table 9-4 lists contractor- or customer-installed wiring and supplied cables. The actual length of each run is less than the length of supplied cables to allow for routing inside equipment. Cable diameters and sizes of connectors are provided to aid in sizing conduit and access plates.

Table 9-5 details components other than cabling which are to be supplied by the contractor or customer.

Figure 9-1 shows an interconnection diagram for the Discovery VCT system. Figure 9-2 shows interconnection runs for a 50/60 Hz system.

Section 2.0
Component Designators

The designators in this table are used in the cabling tables on the pages that follow and in Figure 9-2, “Cable Interconnect Runs,” on page 129.

Table 9-1 : Component Designators

Designator	Applies To	Source
A1	Primary power disconnect	**Contractor-supplied**
CT1	Patient table	System
CTPT CT2 PT1	Gantry - CT - PET	System
OC	Operator's console/computer	System
PDU	Power distribution unit	System
SEO	System emergency off	**Contractor-supplied**
WL	“X-Ray on” warning light	**Contractor-supplied**

Section 3.0
Interconnect Runs, Wiring and Cables

3.1 GE Healthcare-Supplied Cables

3.1.1 Long-Length Cables (Standard) - PN 2281840-6 (CT) & PN 5174715 (PET)

Table 9-2 : Connections to Runs 1, 2, 3 and 4 (Standard, supplied by GE Healthcare)

Run #	Length, Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flammability Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
1	63(55)	19.3 (16.76)	2371450	Ground - PDU to CT1	1284	VW-1 (FT-1)	600	0	105	15.5 (0.608)	1	1/0	15.8 (0.62) Dia
	63 (55)	19.3 (16.76)	2343529	HVDC - PDU to CT2	2587	FT-4	600	± 350 VDC	90	19.0 (0.751)	2	(2)4 (1)8	22 (0.87) Dia
	60 (55)	18.5 (16.76)	2343528	Power - PDU to CT2	2587	FT-4	600	208Y/120	90	13.8 (0.542)	5	8	56.4 (2.22) Dia
	62.5 (55)	19.0 (16.76)	2343530	HVAC - PDU to CT2	Flexible Motor Supply Cable	FT-4	600	440Y/254	90	15.3 (0.604)	4	12	11.2 (0.44) Dia
	60 (55)	18.5 (16.76)	5124157-3	Power - PDU to PT1	2587	FT-4	600	208Y/120	90	13.8 (0.542)	5	8	56.4 (2.22) Dia
2	80 (75)	24.5 (22.86)	5121809	Power - PDU to OC	2587	FT-4	600	208Y/120	90	12.3 (0.483)	4	10	56.4 (2.22) Dia
	83 (75)	25.5 (22.86)	2371450-3	Ground - Raceway to OC	1283	VW-1 (FT-1)	600	0	105	11.9 (0.467)	1	2	12.2 (0.48) Dia
3	63 (55)	19.3 (16.76)	5120646	Signal - PDU to Gantry MSUB	UL	FT-4	300	<30VDC	80	13.3 (0.525)	37	22	20 x 75 (0.78 x 2.95) 20 x 51 (0.79 x 2.01)

Run #	Length, Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flammability Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
4	86.6 (75)	26.4 (22.86)	5120645	Signal - Console to Gantry MSUB (CT2)	UL	FT-4	300	<30VDC	80	11.2 (0.440)	25	22	17 x 58 (0.68 x 2.30) 19 x 51 (0.75 x 2.01)
	86.3 (75)	26.3 (22.86)	2373436-2	Signal - LAN Console to CT2	UL (RG-22 3/U)	FT-4	1900	<30VDC		5.9 (0.234)	1	19	15 (0.59) Dia
	80 (75)	24.3 (22.86)	5125259	Fiber Optic - Console to CT2			NA	NA			1	NA	10 (0.39) Dia
	82 (75)	25.0 (22.86)	2346122-2	Signal - LAN Console to PT1	CAT 5	FT-4	1900	<30VDC		5.9 (0.234)	1	19	15 (0.59) Dia
	86.6 (75)	26.4 (22.86)	2373436-4	Signal - LAN Cardiac Interface Panel to Console	UL (RG-22 3/U)	FT-4	1900	<30VDC		5.9 (0.234)	1	19	15 (0.59) Dia
	100 (25)	30.8 (7.62)	5199717	Signal - Cable - Gantry to RPM unit	UL	FT-4	300	<15VDC		5.9 (0.234)	4	22	15 (0.59) Dia

3.1.2 Short-Length Cables (Optional) - PN 2281840-7 (CT) & PN 5174715 (PET)

Table 9-3 : Connections to Runs 1, 2, 3 and 4 (Optional, can be ordered from GE Healthcare)

Run #	Length, Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flammability Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
1	43 (35)	13.2 (10.67)	2371450-2	Ground - PDU to CT1	1284	VW-1 (FT-1)	600	0	105	15.5 (0.608)	1	1/0	15.8 (0.62) Dia
	28 (20)	8.5 (6.1)	2343529-2	HVDC - PDU to CT2	2587	FT-4	600	± 350 VDC	90	19.0 (0.751)	3	(2)4 1(8)	22 (0.87) Dia
	28 (20)	8.5 (6.1)	2343528-2	Power - PDU to CT2	2587	FT-4	600	208Y/120	90	13.8 (0.542)	5	8	56.4 (2.22) Dia
	28 (20)	8.5 (6.1)	2343530-2	HVAC - PDU to CT2	Flexible Motor Supply Cable	FT-4	600	440Y/254	90	15.3 (0.604)	4	14	11.2 (0.44) Dia
	28 (20)	8.5 (6.1)	5124157-3	Power - PDU to PT1	2587	FT-4	600	208Y/120	90	13.8 (0.542)	5	8	56.4 (2.22) Dia
2	65 (60)	19.8 (18.3)	5121809-2	Power - PDU to OC	2587	FT-4	600	208Y/120	90	12.3 (0.483)	4	10	56.4 (2.22) Dia
	71 (60)	21.7 (18.3)	2371450-4	Ground - Raceway to OC	1283	VW-1 (FT-1)	600	0	105	11.9 (0.467)	1	2	12.2 (0.48) Dia
3	32.5 (20)	9.9 (6.1)	5120646-2	Signal - PDU to Gantry MSUB	UL	FT-4	300	<30VDC	80	13.3 (0.525)	37	22	20 x 75 (0.78 x 2.95) 20 x 51 (0.79 x 2.01)

Run #	Length, Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flammability Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
4	71 (60)	21.7 (18.3)	5120645-2	Signal - Console to Gantry MSUB (CT2)	UL	FT-4	300	<30VDC	80	11.2 (0.440)	25	22	17 x 58 (0.68 x 2.30) 19 x 51 (0.75 x 2.01)
	68 (60)	20.7 (18.3)	2373436-3	Signal - LAN Console to CT2	UL (RG-223/U)	FT-4	1900	<30VDC		5.9 (0.234)	1	19	15 (0.59) Dia
	68 (60)	20.3 (18.3)	5125259-2	Fiber Optic - Console to CT2			NA	NA			1	NA	10 (0.39) Dia
	55 (50)	16.9 (15.24)	2346122-2	Signal - LAN Console to PT1	CAT 5	FT-4	1900	<30VDC		5.9 (0.234)	1	19	15 (0.59) Dia
	86.6 (75)	26.4 (22.86)	2373436-6	Signal - LAN Cardiac Interface Panel to Console	UL (RG-223/U)	FT-4	1900	<30VDC		5.9 (0.234)	1	19	15 (0.59) Dia
	100 (25)	30.8 (7.62)	5199717	Signal - Cable - Gantry to RPM unit	UL	FT-4	300	<15VDC		5.9 (0.234)	4	22	15 (0.59) Dia

3.2 Contractor/Customer-Supplied Cables

Table 9-4 : Connections to Runs 5, 6, 7, 8 and 9 (Supplied by Contractor or Customer)

Run #	Customer Installed Wiring		Description	Wire & Cable Pigtails ft. (m)	
	Qty	Size AWG (mm^2)		From	To
RUN NO. 5 FROM PRIMARY POWER SOURCE TO FACILITY DISCONNECT (POWER SOURCE - A1) Maximum Run Length *					
5	3	*	POWER	3 (1)	3(1)
	1	1/0 (50)	GROUND	3 (1)	3 (1)
RUN NO. 6 FROM FACILITY DISCONNECT TO POWER MODULE (A1 - PDU) / POWER DISTRIBUTION UNIT (PDU) Maximum Run Length *					
6	3	*	POWER	3 (1)	3(1)
	1	1/0 (50)	GROUND	3 (1)	3 (1)
RUN NO. 7 FROM FACILITY DISCONNECT TO SYSTEM EMERGENCY OFF (A1 - SEO)					
7	2	**	POWER	6 (2)	6 (2)
	1	**	GROUND	6 (2)	6 (2)
RUN NO. 8 POWER MODULE TO WARNING LIGHT CONTROL (PDU - WL)					
8	2	**	WARNING LIGHT 24 VOLT CONTROL A3J2-1,2,3,4	3 (1)	3 (1)
RUN NO. 9 POWER MODULE TO SCAN ROOM DOOR INTERLOCK (PDU - DOOR SWITCH)					
9	2	**	SCAN ROOM DOOR INTER LOCK A3J6-1,2	3 (1)	3 (1)
	*	Refer to Table 8-2, “Facility Power Requirements” on page 117 for AWG (mm^2) wire sizes			
	**	Wire sizes determined by local code and contractor			

Figure 9-1 System Interconnect Diagram 5191799SCH Rev. 1

Note: For details, refer to Discovery VCT Block Diagrams and Schematics, PN 5183195-100.

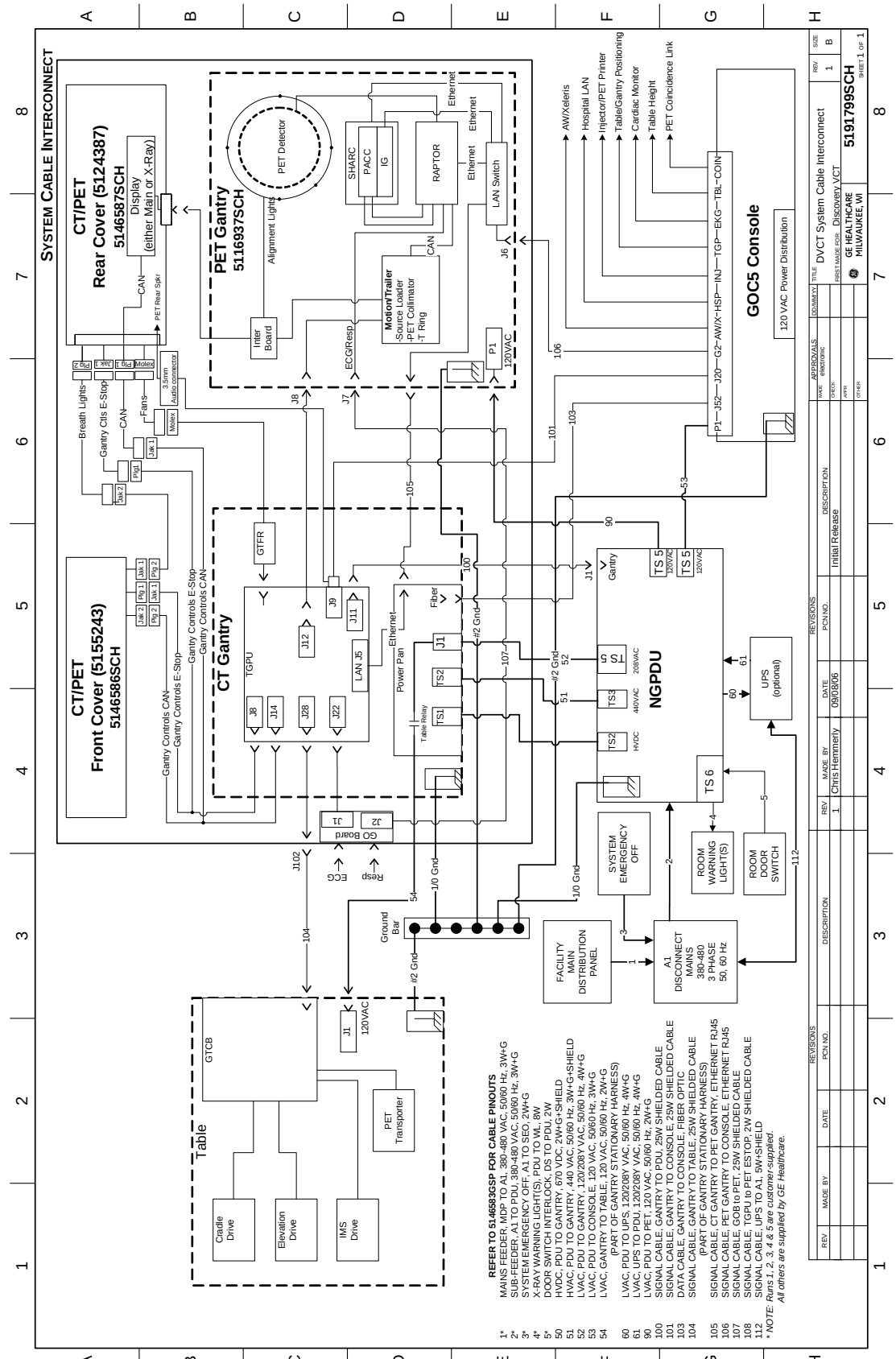
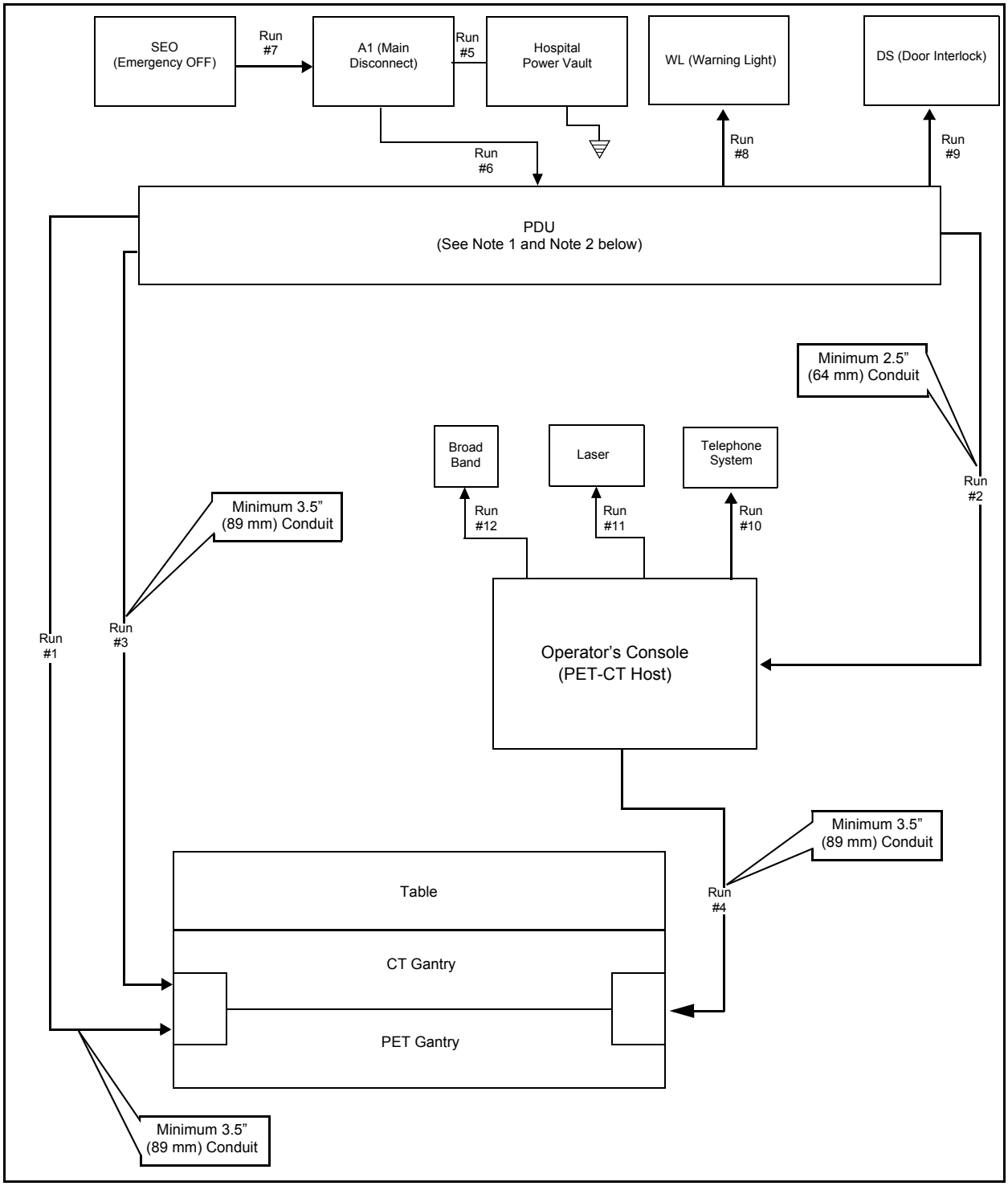


Figure 9-2 Cable Interconnect Runs



Note 1 In order to avoid any violation of each National Regulation (NEC in USA, CCC in China, etc.), use of the compliant cable/wire is recommended. For the China market, the China end-user shall purchase the power supply cable that has the CCC mark.

Note 2 Refer to Table 9-2, Table 9-3, Table 9-4 and Table 9-5 for details about the various runs and components depicted in this diagram. Run/component numbers shown here are listed in the left column of each table.

Section 4.0
Contractor-Supplied Components

Table 9-5 : Contractor-Supplied Components Other than Cables

Run #	Ref.	Associated Equipment	Material/Labor Supplied By Customer Contractor	USA Vendor / Cat No. GE Catalog
	A1 (125 or 150 amp)	Main Disconnect Control (MDC)	480VAC, On/Off Control, Surface or Flush Mount, mandatory LOTO-capable	Main Disconnect Control, 480VAC, Surface Mount with Flush Mount Kit included, two remote Push Button Switches. • Catalog No. E4502AE: 125 amp • Catalog No. E4502AF: 150 amp
10	ITL	In-suite Broadband/ Telephone Lines	**Broadband:** To take maximum advantage of the GE Service remote diagnostic and services capabilities, a network connection (CAT 5) with internet access is required.	
11		Laser Camera	For direct connect via digital DASM (an option for non-standard cameras)	
		System Components	Reference the system installation drawings supplied by the local area GE Healthcare Installation Support team.	

Section 5.0
UPS Interconnect

Figure 9-3 Typical PowerWare UPS

Figure 9-4 Typical UPS Interconnect

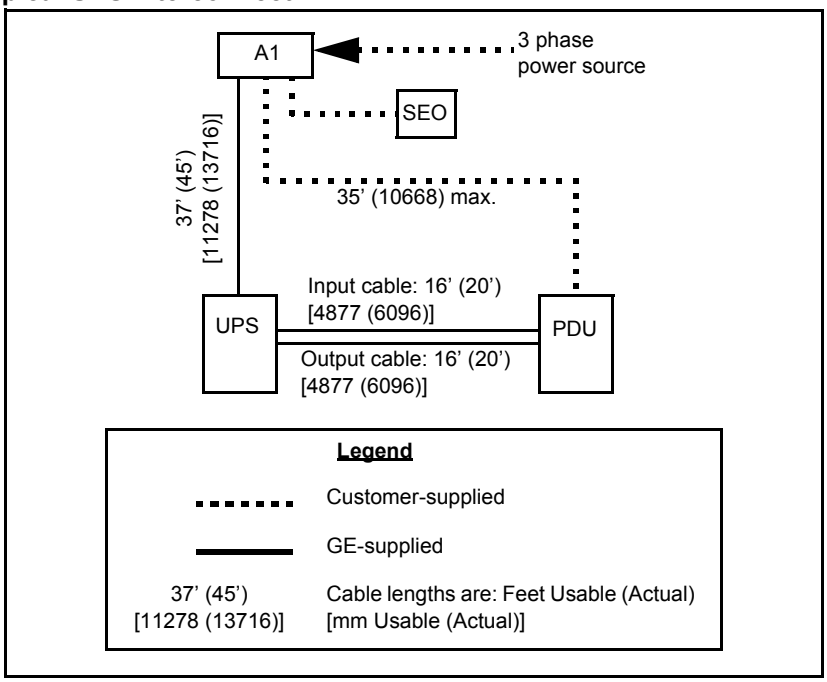


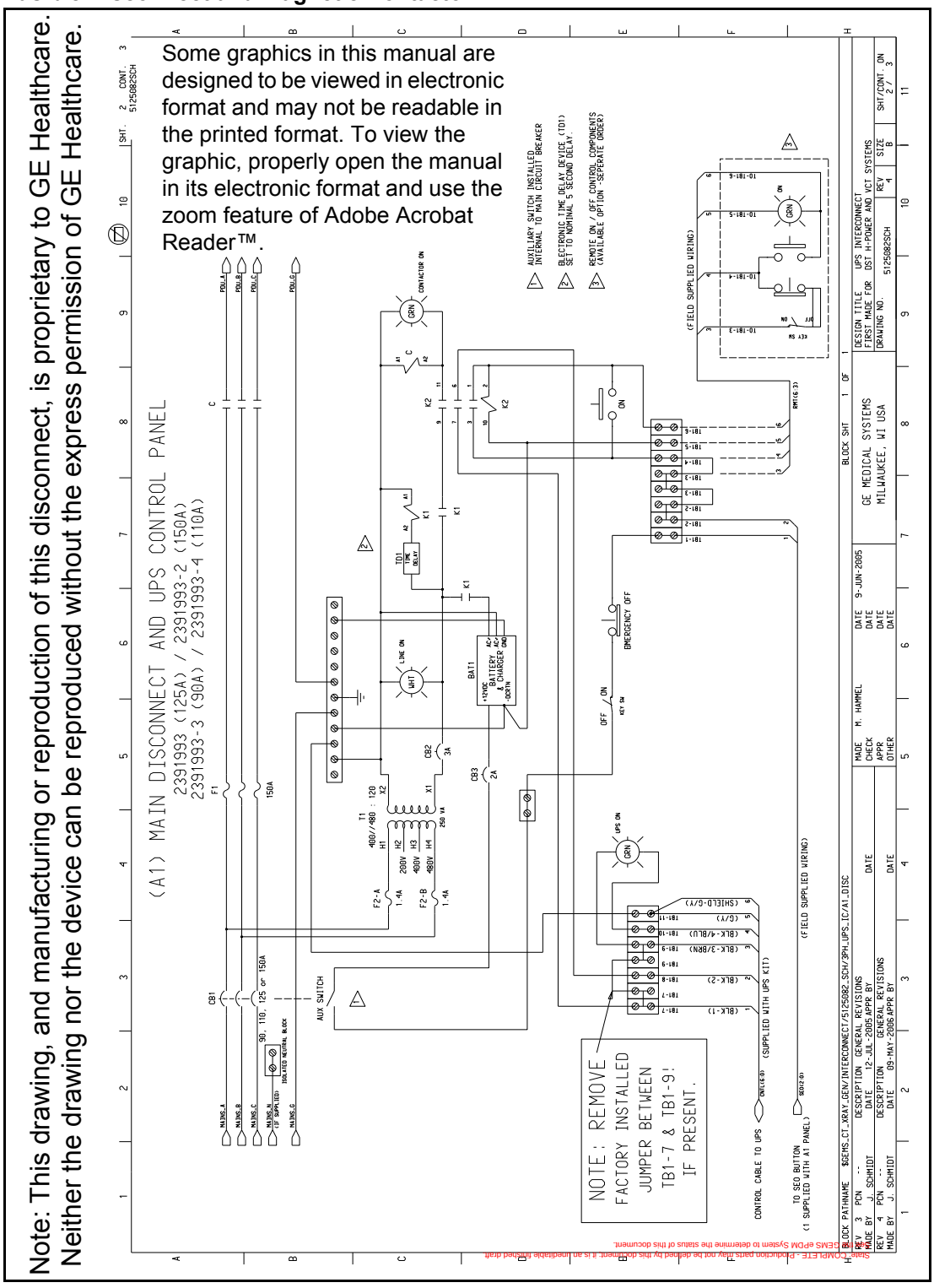
Table 9-6 : PowerWare UPS Part Number

UPS	
Part Number	**Description**
B7864PP	Powerware 9330G-14B Partial Uninterruptible Power Supply for Discovery VCT System (Requires GE A1 disconnect.)

Section 6.0
Typical Customer-Supplied Wiring

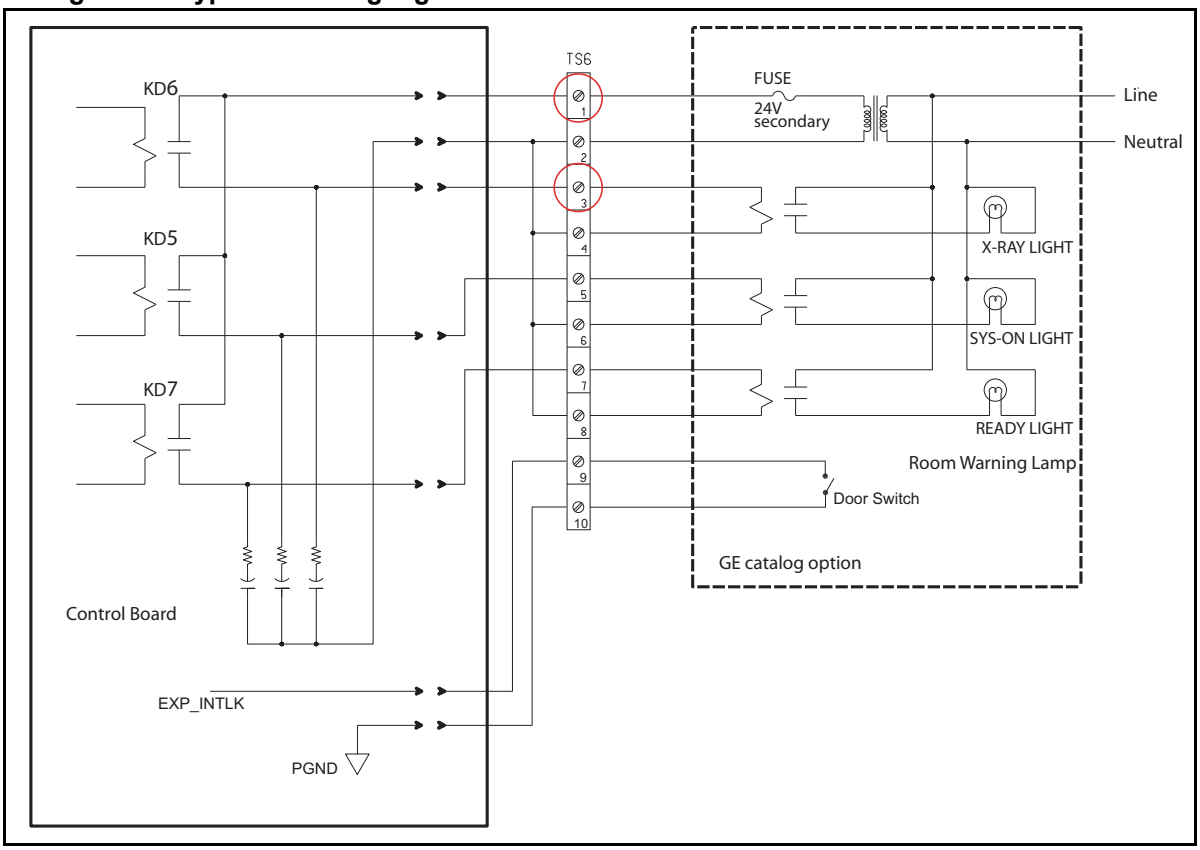
6.1 Primary Power Disconnect

Figure 9-5 Primary Power Disconnect (A1) – With UPS Control Panel – Fusible Disconnect and Magnetic Contactor



6.2 Scan Room Warning Light & Door Interlock

Figure 9-6 Typical Warning Light & Door Interlock Connections



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