

GE Healthcare

Optima™ PET/CT 560

Discovery™ PET/CT 600

Discovery™ PET/CT 600 with Explorer Technology Option

Discovery™ PET/CT 690 Elite

Discovery™ PET/CT 690 VCT

Discovery™ PET/CT Elite

Pre-Installation Manual



The information in this manual does NOT apply to non-fixed (mobile) installations.



# IMPORTANT PRECAUTIONS

## LANGUAGE

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| <b>ПРЕДУПРЕЖДЕНИЕ</b><br>(BG) | Това упътване за работа е налично само на английски език. <ul style="list-style-type: none"><li>Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.</li><li>Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.</li><li>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.</li></ul>   |
| <b>警告</b><br>(ZH-CN)          | 本维修手册仅提供英文版本。 <ul style="list-style-type: none"><li>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。</li><li>未详细阅读和完全理解本维修手册之前，不得进行维修。</li><li>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。</li></ul>   |
| <b>警告</b><br>(ZH-HK)          | 本服務手冊僅提供英文版本。 <ul style="list-style-type: none"><li>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。</li><li>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。</li><li>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、機械性或其他危險。</li></ul>   |
| <b>警告</b><br>(ZH-TW)          | 本維修手冊僅有英文版。 <ul style="list-style-type: none"><li>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。</li><li>請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。</li><li>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。</li></ul>  |
| <b>UPOZORENJE</b><br>(HR)     | Ovaj servisni priručnik dostupan je na engleskom jeziku. <ul style="list-style-type: none"><li>Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod.</li><li>Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik.</li><li>Zanemarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.</li></ul>   |
| <b>VÝSTRAHA</b><br>(CS)       | Tento provozní návod existuje pouze v anglickém jazyce. <ul style="list-style-type: none"><li>V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka.</li><li>Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah.</li><li>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.</li></ul> |

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| <b>ADVARSEL</b><br>(DA)     | <p>Denne servicemanual findes kun på engelsk.</p> <ul style="list-style-type: none"><li>• Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse.</li><li>• Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual.</li><li>• Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.</li></ul>  |
| <b>WAARSCHUWING</b><br>(NL) | <p>Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar.</p> <ul style="list-style-type: none"><li>• Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan.</li><li>• Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is.</li><li>• 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.</li></ul>                               |
| <b>WARNING</b><br>(EN)      | <p>This service manual is available in English only.</p> <ul style="list-style-type: none"><li>• If a customer's service provider requires a language other than english, it is the customer's responsibility to provide translation services.</li><li>• Do not attempt to service the equipment unless this service manual has been consulted and is understood.</li><li>• Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.</li></ul>  |
| <b>HOIATUS</b><br>(ET)      | <p>See teenindusjuhend on saadaval ainult inglise keeles</p> <ul style="list-style-type: none"><li>• Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest.</li><li>• Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist.</li><li>• Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.</li></ul>   |
| <b>VAROITUS</b><br>(FI)     | <p>Tämä huolto-ohje on saatavilla vain englanniksi.</p> <ul style="list-style-type: none"><li>• Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla.</li><li>• Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen.</li><li>• Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.</li></ul>                                   |
| <b>ATTENTION</b><br>(FR)    | <p>Ce manuel d'installation et de maintenance est disponible uniquement en anglais.</p> <ul style="list-style-type: none"><li>• 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.</li><li>• Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris.</li><li>• 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.</li></ul> |

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| <b>WARNUNG</b><br>(DE)        | <p>Diese Serviceanleitung existiert nur in englischer Sprache.</p> <ul style="list-style-type: none"> <li>Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen.</li> <li>Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben.</li> <li>Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.</li> </ul>  |
| <b>ΠΡΟΕΙΔΟΠΟΙΗΣΗ</b><br>(EL)  | <p>Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά.</p> <ul style="list-style-type: none"> <li>Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης.</li> <li>Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις.</li> <li>Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.</li> </ul>                     |
| <b>FIGYELMEZTETÉS</b><br>(HU) | <p>Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.</p> <ul style="list-style-type: none"> <li>Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése.</li> <li>Ne próbálja elkezdni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték.</li> <li>Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.</li> </ul>   |
| <b>AÐVÖRUN</b><br>(IS)        | <p>Þessi þjónustuhandbók er aðeins fáanleg á ensku.</p> <ul style="list-style-type: none"> <li>Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálþjónustu.</li> <li>Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin.</li> <li>Brot á sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.</li> </ul>  |
| <b>AVVERTENZA</b><br>(IT)     | <p>Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.</p> <ul style="list-style-type: none"> <li>Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione.</li> <li>Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto.</li> <li>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.</li> </ul> |
| <b>警告</b><br>(JA)             | <p>このサービスマニュアルには英語版しかありません。</p> <ul style="list-style-type: none"> <li>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。</li> <li>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。</li> <li>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。</li> </ul>   |

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| <b>경고</b><br>(KO)          | <p>본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다 .</p> <ul style="list-style-type: none"> <li>• 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우 , 번역 서비스를 제공하는 것은 고객의 책임입니다 .</li> <li>• 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오 .</li> <li>• 본 경고 사항에 유의하지 않으면 전기 쇼크 , 기계적 위험 , 또는 기타 위험으로 인해 서비스 제공자 , 사용자 또는 환자에게 부상을 입힐 수 있습니다 .</li> </ul>   |
| <b>BRDINJUMS</b><br>(LV)   | <p>Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.</p> <ul style="list-style-type: none"> <li>• Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu.</li> <li>• Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas.</li> <li>• Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.</li> </ul>   |
| <b>ĮSPĖJIMAS</b><br>(LT)   | <p>Šis eksploatavimo vadovas yra tik anglų kalba.</p> <ul style="list-style-type: none"> <li>• Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas.</li> <li>• Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploatavimo vadovo.</li> <li>• Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.</li> </ul>   |
| <b>ADVARSEL</b><br>(NO)    | <p>Denne servicehåndboken finnes bare på engelsk.</p> <ul style="list-style-type: none"> <li>• Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse.</li> <li>• Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått.</li> <li>• Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.</li> </ul>  |
| <b>OSTRZEŻENIE</b><br>(PL) | <p>Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.</p> <ul style="list-style-type: none"> <li>• Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta.</li> <li>• Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go.</li> <li>• Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.</li> </ul> |
| <b>ATENÇÃO</b><br>(PT-BR)  | <p>Este manual de assistência técnica encontra-se disponível unicamente em inglês.</p> <ul style="list-style-type: none"> <li>• Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução.</li> <li>• Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.</li> <li>• A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.</li> </ul>                              |

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| <b>ATENÇÃO</b><br>(PT-PT)  | <p>Este manual de assistência técnica só se encontra disponível em inglês.</p> <ul style="list-style-type: none"><li>• Se qualquer outro serviço de assistência técnica solicitar este manual noutra língua, é da responsabilidade do cliente fornecer os serviços de tradução.</li><li>• Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.</li><li>• 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.</li></ul>  |
| <b>ATENȚIE</b><br>(RO)     | <p>Acest manual de service este disponibil doar în limba engleză.</p> <ul style="list-style-type: none"><li>• Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere.</li><li>• Nu încercați să reparați echipamentul decât ulterior consultării și înțelegerii acestui manual de service.</li><li>• Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.</li></ul>   |
| <b>ОСТОРОЖНО!</b><br>(RU)  | <p>Данное руководство по техническому обслуживанию представлено только на английском языке.</p> <ul style="list-style-type: none"><li>• Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод.</li><li>• Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения.</li><li>• Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.</li></ul> |
| <b>UPOZORENJE</b><br>(SR)  | <p>Ovo servisno uputstvo je dostupno samo na engleskom jeziku.</p> <ul style="list-style-type: none"><li>• Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge.</li><li>• Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo.</li><li>• Zanemarivanje ovog upozorenja može dovesti do povređivanja servisa, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.</li></ul>  |
| <b>UPOZORNENIE</b><br>(SK) | <p>Tento návod na obsluhu je k dispozícii len v angličtine.</p> <ul style="list-style-type: none"><li>• Ak zákazník poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka.</li><li>• Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obsluhu a neporozumiete mu.</li><li>• Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.</li></ul>  |



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| <b>ATENCION</b><br>(ES)  | <p>Este manual de servicio sólo existe en inglés.</p> <ul style="list-style-type: none"><li>• 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.</li><li>• No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio.</li><li>• 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.</li></ul> |
| <b>VARNING</b><br>(SV)   | <p>Den här servicehandboken finns bara tillgänglig på engelska. .</p> <ul style="list-style-type: none"><li>• Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster.</li><li>• Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken.</li><li>• 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.</li></ul>         |
| <b>OPOZORILO</b><br>(SL) | <p>Ta servisni priročnik je na voljo samo v angleškem jeziku.</p> <ul style="list-style-type: none"><li>• Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod.</li><li>• Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli.</li><li>• Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.</li></ul>   |
| <b>DIKKAT</b><br>(TR)    | <p>Bu servis kılavuzunun sadece ingilizcesi mevcuttur.</p> <ul style="list-style-type: none"><li>• Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer.</li><li>• Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz.</li><li>• Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.</li></ul>   |



## **DAMAGE IN TRANSPORTATION**

You should closely examine all packages at time of delivery. If you notice any damage, have the notation "Damage in Shipment" written on all copies of the freight or express bill before delivery is accepted or "signed for" by any General Electric representative or hospital receiving agent. Whether noted or concealed, you MUST report damage to the carrier immediately upon discovery and within 14 days after receipt, and you must hold the contents and containers for inspection by the carrier. A transportation company will not pay a claim for damage if you do not request an inspection 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, will gladly 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, 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.

### **OMISSIONS & ERRORS**

Customers: please contact the GE Healthcare Sales or Service representatives.

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

# Revision History

| Revision | Date          | Reason for change  |
|----------|---------------|--|
| 12       | 26 Mar 2013   | HCSDM00179998: Chapter 5: Removed VCQ phantom from Table 5-1 and 5-2. Chapter 8: Weight corrected in Table 8-2 and 8-3 for Table and PDU. Chapter 14: Corrected Table 14-2 cable length for Run # 56.  |
| 11       | 11 Oct 2012   | HCSDM00162658: Chapter 1: Updated Table 1-3. Chapter 4: Updated Sec. 1.1 (added NFPA 99), Table 4-5 (Left-right space) and Table 4-6 (table sides and table foot additional conditions). Chapter 5: Updated Fig 5-1 and Sec. 2.1 first bullet. Chapter 6 Sec. 2: Changed wording from "minimum" to "recommended minimum". Chapter 8 Table 8-2: Corrected weight and dimensions for PET Gantry; weight for Table and PDU. Updated Fig 8-7. Chapter 14: Updated Table 14-2 and 14-3 (usable lengths, additional cables). Chapter 15: Updated Fig 15-1. Chapter 16 Sec. 2.3: Updated lifting Notice.<br>HCSDM00096594: Chapter 11: Updated Sec. 1 Notice for 20 cm water phantom.   |
| 10       | 7 Mar 2012    | HCSDM00108535: Chapter 8: Fixed Fig 8-4 to show missing VCT width dimension. Chapter 13: Removed "(75kVA)" from Sec. 2.1.2 ratings. Chapter 14: Corrected Table 18-2 Run 203 long length for cable 5313941.  |
| 9        | 23 June 2011  | HCSDM00077389: Updated product references for additional product names (Discovery 600 with Explorer Technology Option and Discovery Elite). Chapter 13 section 2.1.2: Added Voltage range 380-480VAC. Chapter 14: Removed redundant Tables 14-1 and 14-2 (Long-length cables). Added Pcats to new Table 14-1 (formerly Table 14-3).  |
| 8        | 12 April 2011 | Added Optima 560 product name to content where needed. Chapter 4: Updated Fig 4-1. Chapter 5: Removed Fig 5-1 Note reference and changed title. Chapter 7 Table 7-1: Changed "PET-CT Gantry (overall)" to "without Trailer" dimensions. Corrected TIO Operator Console dimensions; added TIO Freedom Workspace Table. Added horizontal dimensions to Fig 7-2. Renamed existing "TIO Operator Console" Figure to "TIO Freedom Workspace Table" (Fig 7-8); added missing TIO Operator Console (Fig 7-7). Chapter 8: Corrected Sec. 2 minimum ceiling height. Table 8-2 now covers only Discovery 690 VCT; Table 8-3 now covers Optima 560, D600, and D690 Elite. Added Note to to Sec. 5.0. Chapter 9: Updated Table 9-3 numbers for CT Gantry, subtotals, and totals. Chapter 13: Reorganized content (Sec. 1 - D690 VCT; Sec. 2 - Optima 560, D600, and D690 Elite). Chapter 15: Updated Table 15-1 (Optima 560, D600/D690 Elite CT Gantry numbers).<br><br>HCSDM00048883: Chapter 6: Updated room size Figures. Chapter 8: Updated Table 8-2, PET Gantry load area metric values. Chapter 11: Updated Sec. 1.1 source pin value for 690 Elite. Chapter 15: Updated Sec. 11.0. |
| 7        | 20 Sept 2010  | Chapter 5: Added Sec 3.1 "Gantry Service Clearance".<br>Chapter 11: Changes per FCTge57544.  |
| 6        | 27 April 2010 | New Language updates; Chapt.14 Sec 3.0 Tables 14-2 & 14-3 Cable updates,<br><br>PHA Updates: Chapt.1 Table 1-4 added mounting plates reference. Chapt. 15 table 15-1.<br><br>Dayton Updates: Updated Front Cover. Chapt.4 Table 4-1 added GOC6.5 and added Table 4-1 & 4-3. Chapt.5 Sec. 3.3 added GOC6.5 and Sect. 3.4 and added Spatial res Phantom to tables 5-1 & 5-2. Chapt. 6 added Table 6-2, Added Fig's 6-1thru 6-6. Chapt. 7 Table 7-1 & Fig 7-1, Sec. 2.9 & Figure 7-8 added GOC6.5 and added Fig 7-9. Chapt.8 Table 8-2 added GOC6.5 & TIO and added Fig 8-13. Chapt.9 Table 9-3 added TIO console & updated BTU/Watt for CT Gantry. Chapt.15 Table 15-2 added BS Gantry weight, Table 15-6 added TIO console, updated Sec 3.2 & 3.2.1 w/ref to dollies that come with system.   |

| Revision | Date         | Reason for change   |
|----------|--------------|---|
| 5        | 16 Nov 2009  | CR13255445: Updated Table 15-1 and 15-3 PET Gantry dimensions.  |
| 4        | 15 Oct 2009  | FCTge51303 Removed reference to Seismic Mounting Kit R4390JC  |
| 3        | 10 Sept 2009 | New Language updates. Chapter 1: Added Surface Penetration Permit to check list. Chapter 3: Added section 4.1.2. Chapter 7: Updated Fig. 7-1. Chapter 9: Updated Table 9-3. Chapter 13: Added warnings. Chapter 14: Updated Table 14-1. Chapter 15: Updated Table 15-3.   |
| 2        | 6 Mar 2009   | Updated Language Warnings, Chapter 8, Section 6 Siesmic Mounting and Chapter 11, Section 1.1 Radioactive Source Pin Information. Added Power & Ground Wire Torque Value tables to Chapter 14. Changed the PARC ground wire size. Chapter 7: Gantry measurement; add D600 A1 Disconnect (90A). Chapter 8: Removed Hilti bolt statements from siesmic mounting illustrations. Changes per SPR46090. |
| 1        | 6 Aug 2008   | Initial Release   |

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# **Chapter 1**

## **Introduction**

---

This direction contains the physical and electrical data necessary for planning and preparing a site for scanner installation. The responsibility of arranging and paying for this work rests solely with the purchaser.

### **Section 1.0 What is Pre-Installation?**

Pre-installation is any site preparation required prior to the installation of the scanner. This manual states all the pre-installation siting and regulatory requirements. The Pre-Installation Kit may not answer all of your questions. Contact your GE Healthcare Project Manager of Installation (PMI) for answers.

Similarly, prior to any construction or approval, General Electric Headquarters Architectural Planning must review all site plans, preliminary concepts, and final working drawings. Contact your PMI for complete information regarding your site-specific room layout.

### **Section 2.0 What is Pre-Installation Work?**

Pre-Installation work includes:

- any site renovation.
- any alterations or modifications to products not specifically included in the sales contract.
- installation of electrical conduit, junction boxes, ducts, outlets, and line safety switches.
- installation of AWG stranded copper interconnection wiring, conforming to the following requirements:
  - The electrical contractor shall ring out and tag all wires at both ends.
  - Wires shall be continuous and without splices.
  - Ground wires shall conform to product requirements.
  - Use color-coded wires whenever possible, to enable easier identification.
  - All work shall conform to IBC (International Building Code) and local building and safety codes.

**Note:** GE Healthcare neither provides nor installs the wires, conduits, junction boxes, or ducts illustrated in this publication unless specifically mentioned.

## Section 3.0 Pre-Installation Tools

A list of primary customer tools for successfully completing the pre-installation process for the system appears below.

### 3.1 Customer Tools

- > PRE-INSTALLATION MANUAL - Provided in CD-ROM format.
- > PRE-INSTALLATION CHECKLIST - Included in [Section 4.0 on page 3](#) of this manual as well as on the Service CD.
- > REGULATORY AND SERVICE CLEARANCE INFORMATION - Included in the Pre-Installation Manual.
- > SITE PRINT - Supplied by your PMI or sales rep. Must show actual room size, location of all equipment in the finished room, all service and operating clearances, and meet all regulatory requirements.

#### 3.1.1 Pre-Installation Manual Guide

[Table 1-1](#) below shows the location in this Pre-Installation Manual of the information necessary for fulfilling each the corresponding pre-installation requirements.

| Installation Site Requirement Information                              |   |
|--|---|
| <a href="#">Installation Types</a> , on page 7                         | <a href="#">System Siting Requirements</a> , on page 11           |
| <a href="#">Room Sizes</a> , on page 33                                | <a href="#">Structural and Mounting Requirements</a> , on page 51 |
| <a href="#">Regulatory Requirements</a> , on page 17                   | <a href="#">Service Clearance Requirements</a> , on page 25       |
| <a href="#">Radiation Protection Requirements</a> , on page 85         | <a href="#">Network Requirements</a> , on page 95                 |
| <a href="#">Environmental Requirements</a> , on page 71                | <a href="#">Power Requirements</a> , on page 97                   |
| <a href="#">Delivery and Storage Requirements</a> , on page 119        | <a href="#">Handling Requirements</a> , on page 131               |
| Contractors must complete ALL WORK before the scheduled delivery date. |   |

**Table 1-1 Locations of Site Requirement Information in this Manual**



## Section 4.0 Customer Pre-Installation Tasks

### Required Information for Site

*Complete before the scheduled delivery date.*

**Hospital Name** as it appears on the system screens:

\_\_\_\_\_

**Network ID numbers / IP addresses** Camera: \_\_\_\_\_ PACS:

\_\_\_\_\_ AW: \_\_\_\_\_

Other - Specify type & ID: \_\_\_\_\_

Other - Specify type & ID: \_\_\_\_\_

**Camera setup information:** \_\_\_\_\_

\_\_\_\_\_

**AW Direct Connect address:** \_\_\_\_\_

**Do you want HIPAA enabled?** No \_\_\_ Yes \_\_\_

**Do you want automatic downloads enabled?** No \_\_\_ Yes \_\_\_

| GE  | Cust  | Dates   |
|---|---|---|
| Y N   | Y N   |   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Have the facilities department, contractor and GE verified the project schedule?        |
|   | <input type="checkbox"/> <input type="checkbox"/> | Will the committed site-ready date be met?  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Does the completion date for any/all construction meet or precede the delivery date?    |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Is the Power & Ground Survey complete? Date: _____                                      |
|   |   | Hospital contact: _____   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is the site-ready visit scheduled? Date: _____  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is the delivery date scheduled? Date: _____   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is the installation date scheduled? Date: _____   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Is the installation timing determined? A: Weekdays___ B: Weekend___ C: Quick Install___ |
|   |   | If B or C, have all sub-contractors been notified? No ___ Yes ___                       |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Does the delivery and/or installation date require adjustment?                          |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is the first-use date scheduled? Date: _____  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Applications/training dates scheduled? On-site training date: _____                     |
|   |   | Healthcare Institute training date: _____   |

**Table 1-2 Schedule Date Commitments**

| GE  | CUST  | General / Site Requirements   |
|---|---|---|
| Y N   | Y N   | <i>Must be completed five (5) weeks before scheduled delivery date.</i>   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Were final drawings approved and distributed to the contractors?  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Are final drawings signed off to approve equipment layout and orientation?  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Do the actual room dimensions match those on the final drawings?  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Has VQC Phantom been ordered by customer?   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is RAM license valid?   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is Radiation Safety Officer ready to receive Pin Source and VQC Phantom?  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Has the radiologist health physician reviewed and approved the room layout and shielding requirements?  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Have any additional requirements or questions about the installation been discussed with GE?<br>List: _____<br>_____<br>_____<br>_____  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Is there a person assigned to review and verify that all installation requirements are met?<br>Name: _____  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Have the specific site requirements been discussed with the contractors?<br>Refer to the GE final drawings specifications. (See <a href="#">Table 1-1</a> .)  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Has the responsibility of cabling, installing and interfacing any accessories not on the order been discussed?  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Are all third-party vendors identified, notified and scheduled?<br>(Examples: Netcom, Medrad, etc.)   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Have all regulatory requirements been met per <a href="#">Regulatory Requirements</a> , on page 17?   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Will existing network, broadband and camera cable drops reach new locations and will they meet the requirements and function with the PET/CT system?<br>If not, what are the requirements?<br>List: _____<br>_____<br>_____ |

**Table 1-3 Site Planning**

| GE  | Cust  | Equipment  |
|---|---|--|
| Y N   | Y N   | <i>Must be completed five (5) weeks before scheduled delivery date.</i>  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Has the order been reviewed for completeness and compatibility with existing equipment?  |
|   |   | Typical equipment:<br>Remote monitors ____ AW relocation ____ Cardiac option ____ Injectors ____   |
|   | <input type="checkbox"/> <input type="checkbox"/> | Have arrangements been discussed and planned for the installation of any mounting plates or bracketry in support of any accessory or option that accompany this order. |
| <input type="checkbox"/> <input type="checkbox"/> |   | Are interfaces to existing and/or new accessories ordered and planned for accordingly?   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Have the following peripheral locations been included in the site drawings?<br>EKG monitor ____ Injector control ____ Laser camera ____ UPS ____ Second monitor ____   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Will GE Healthcare provide additional services per contract negotiations?  |
| <input type="checkbox"/> <input type="checkbox"/> |   | Are correct length cables on order? No ____ Yes ____   |

**Table 1-4 Equipment Compatibility**

| GE  | Cust  | Network Installation and Setup  |
|---|---|---|
| Y N   | Y N   | <i>Must be completed five (5) weeks before scheduled delivery date.</i>   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Have IP addresses and host names been obtained? No ____ Yes ____  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Will a network camera be used? No ____ Yes ____   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <b>Mandatory:</b> Is the network installed, are network jacks installed and is the entire network tested?<br>No ____ Yes ____       |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <b>Mandatory:</b> Is the broadband VPN installed/setup? No ____ Yes ____  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <b>Mandatory:</b> Are network software options ordered? ____ HIS RIS option ____<br>DICOM print ____ AW ____                        |
|   | <input type="checkbox"/> <input type="checkbox"/> | <b>Optional:</b> Has modem option ordered? No ____ Yes ____ (Requires a site escalation)  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <b>Optional:</b> Is the PET/CT system service telephone line identified and installed for InSite?<br>(Electrical, mechanical, etc.) |

**Table 1-5 Network Connections**

| GE  | Cust  | Other   |
|---|---|---|
| Y N   | Y N   | <i>Must be completed before the scheduled delivery date.</i>  |
|   | <input type="checkbox"/> <input type="checkbox"/> | Arrangements made in the schedule to allow adequate time for remodeling, if required (such as wall, floor, or ceiling repair work, painting, other cosmetic finishes) |
|   | <input type="checkbox"/> <input type="checkbox"/> | Have arrangements been made to clean the floor <i>after</i> equipment removal and <i>prior</i> to the installation of the new equipment? No ____ Yes ____             |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Is de-installation of existing equipment required? No ____ Yes ____ Removal date _____  |

**Table 1-6 Miscellaneous Tasks**

| GE  | Cust  | Other  |
|---|---|--|
| Y N   | Y N   | <i>Must be completed before the scheduled delivery date.</i>   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Is there a trade-in of existing equipment? No__ Yes__ GoldSeal _____   |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Delivery route identified and verified with the proper hospital personnel? No__ Yes__<br>Elevators and doors checked for size and weight constraints? No__ Yes__     |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Have appropriate arrangements been made with traffic for delivery? No__ Yes__  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Will acceptance/performance testing or bio-medical testing be required?<br>No__ Yes__ Date: _____  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Are trash and/or recycling bins available for the removal of papers, boxes, etc. during the<br>installation? No__ Yes__  |
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Has the GEHC Surface Penetration Permit been completed before equipment delivery? (A copy<br>of this form must be sent to GEHC as defined in the permit.) No__ Yes__ |

**Table 1-6 Miscellaneous Tasks(Continued)**

# Chapter 2

## Installation Types

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### Section 1.0 Determining Your Installation Type

#### 1.1 How to Determine the Best Installation Type for Your Site

Discuss installation options with your PMI to determine which of the installation types listed below best fits your site and schedule.

#### 1.2 Typical Installations

Typical installations represent installations at established sites with finished, dust-free, occupancy-ready scan suites ranging from suggested to minimum room sizes, and NO ongoing construction on-site. This installation type still allows customers flexibility for room upgrades and site improvements, although these upgrades and improvements may require additional planning to reach completion prior to system delivery, especially when involving the following:

- Seismic approval
- Floor structural improvements
- HVAC improvements
- Electrical improvements
- Review of scan room shielding requirements by a qualified radiological health physicist.

As with any installation, the final site design for a typical installation must meet all service and regulatory requirements detailed in this manual.

#### 1.3 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.

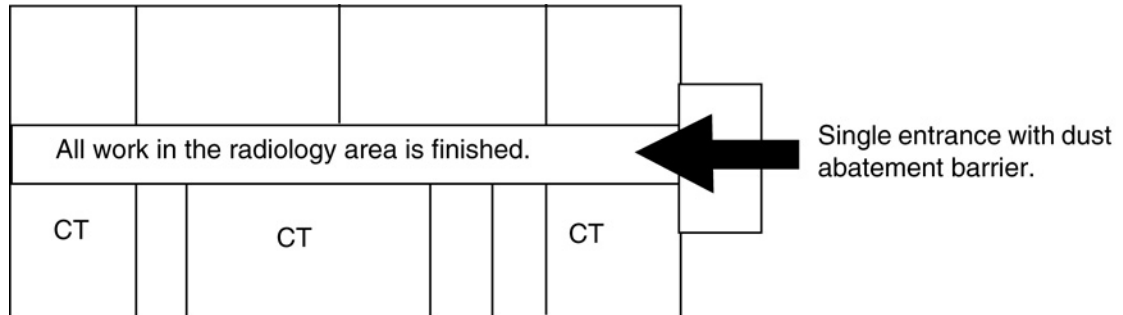
##### 1.3.1 Full Construction Site with Completed Radiology Area

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 2-1](#)).

- 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.



**Figure 2-1 Full construction site with completed radiology area**

### 1.3.2 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 PET/CT 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.

#### 1.3.2.1 Vertical Lifting

If delivery requires vertical lifting, the PMI will add the necessary identifier to the order.

#### 1.3.2.2 Horizontal Lifting

If delivery requires horizontal lifting, the PMI will add the necessary identifier to the order.

## 1.4 Relocatable Building Installations

A relocatable building consists of a building made in a factory and delivered to the site of its permanent location. Relocatable buildings qualify as fixed sites and must satisfy all of the requirements of a fixed site.

## 1.5 Upgrade Installations

Upgrade installations consist of installations that occur after the installation of another system, where a change in the customer's needs requires the installation of additional equipment at the same site. For an upgrade installation to proceed, the customer's room size must be large enough to accommodate the new product, without violating the regulatory and service requirements of the new product. When planning for an upgrade installation, bear in mind that the siting requirements of the new equipment may exceed those of your existing system. Requirements often necessitating additional consideration include:

- Floor thickness
- Room shielding
- Additional electrical capacity

- Increased cooling capacity
- Scan room shielding requirements

As with any installation, the final site design for an upgrade installation must meet all service and regulatory requirements detailed in this manual.

## 1.6 Quick Installations

Quick Installations involve sites requiring minimum room improvements. These installations typically consist of a weekend de-installation and room prep completion, with a next-business-day delivery and installation.

### 1.6.1 Requirements

A site must meet a number of requirements to qualify for a Quick Installation, including:

- Existing electrical disconnect device, wire size and grounds must meet all requirements referenced in [Chapter 3, Section 2.1.2 on Page 11](#).
- Existing structural specifications met, including floor thickness and all requirements referenced in [Chapter 3, Section 2.1.3 on Page 12](#).
- Existing HVAC capacity and regulation must meet all requirements referenced in [Chapter 3, Section 2.1.5 on Page 12](#).
- Existing PET suite must meet all regulatory and minimum size requirements referenced in [Chapter 3, Section 2.1.7 on Page 12](#).
- Existing facility must accommodate delivery and meet all delivery requirements referenced in [Chapter 3, Section 2.1.1 on Page 11](#).
- Existing facility must meet all scan room shielding requirements referenced in [Chapter 11](#).

Consult your Project Manager of Installation for information about any additional requirements.

### 1.6.2 Restrictions

The following restrictions govern Quick Installations:

- Quick Installs require a new room print that accurately reflects the rooms targeted for upgrade.
- You CANNOT re-use existing floor anchors from a different type system.
- New floor anchors must be a minimum of 10.16 cm (4 in.) from any existing floor penetrations.
- Rooms not meeting the minimum requirements for the final product must undergo an upgrade/enlargement prior to installation.

## 1.7 Two-Step (Temporary) Installations

Two-Step installations refer to the practice of temporarily installing one system in a site with the intention of upgrading the site to another system at a later date. The following restrictions apply to two-step installations:

- Two-Step installations require that the room meet the minimum room requirements for the upgraded or final project.
- All upgrade installations, including Two-Step installations, must comply with ALL siting requirements necessary for the upgraded or final system. This includes the recommended room size as well as all electrical, structural and HVAC requirements.
- Two-Step and other upgrade installations may qualify as *Quick Installs*; however, all requirements referenced in [Chapter 3, Section 1.0](#) and [Chapter 3, Section 2.0](#) still apply to these installations.
- Responsibility for verifying compliance with all requirements rests with the customer.



- Rooms not meeting minimum requirements for the final product must undergo sufficient upgrading/enlargement.

**Note:** Temporary installations shall include all systems installed at a site for a period ranging from two weeks to six months.

# **Chapter 3**

## **System Siting Requirements**

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### **Section 1.0 System Siting Requirements**

The requirements listed in this manual apply to all fixed-site customer installations, including installations within relocatable buildings. These requirements represent the MINIMUM that a site must meet for ANY installation of a new or replacement system to begin. All parties should review these requirements to ensure that the site:

- Meets all service requirements.
- Meets all regulatory requirements.
- Meets all minimum structural, flooring and vibration requirements.
- Meets minimum HVAC requirements.
- Meets minimum electrical requirements.
- Meets all network requirements.
- Meets radiation protection requirements.
- Undergoes a review of operational clearances.
- Includes all finished doors, floors, windows, ceilings and walls, with all plumbing and cabinets already installed.
- Does not have ANY continuing construction in the scan room OR neighboring suite areas.
- Conforms to the final GE Healthcare site print, which must be kept ON-SITE and must show all items intended for the finished room.

**Note:** Each site will receive a Quick Start Kit from its PMI. Use the Pre-Install Checklist in the Pre-Installation Manual included with this kit to confirm that the site meets all of the requirements listed above. GE recommends completing all work needed to meet these requirements at least THREE days PRIOR to the start of installation.

### **Section 2.0 Meeting System Siting Requirements**

#### **2.1 Preparing the Site for a New or Replacement System**

This section provides a breakdown of customer tasks crucial for insuring proper site preparation, regardless of whether planning for a replacement system at an existing site or designing a new scan room for a first system.

##### **2.1.1 Delivery**

- Determine room dimensions and verify that doorways can adequately accommodate the system.
- Verify the existence of an accessible, dust-free, non-construction-zone route to the scan suite that can accommodate delivery.

##### **2.1.2 Electrical**

- Install junction boxes of correct size with covers at locations shown in the installation plan.

- Install appropriate conduits and duct work for system cables. If the suite will house additional components, determine the necessary considerations and complete the connections.
- Install power supply of correct voltage output and adequate KVA rating.
- Install local disconnects, including proper over-current protection. This includes the A1 main disconnect with Lock-out and tag-out (LOTO) installation.

### **2.1.3 Structural**

- Install steelwork or other suitable support work for mounting equipment from walls or ceilings.
- Review structural requirements, including floor vibration, floor levelness, floor thickness and any seismic considerations, if applicable.
- Complete all suite and room renovations and modifications prior to delivery.

### **2.1.4 Radiation Protection**

A qualified radiological health physicist should verify that the scan room's radiation shielding will provide adequate radiation protection for the planned system.

### **2.1.5 Environmental**

Review HVAC requirements including system environmental controls and patient comfort needs.

### **2.1.6 Options**

The laser camera should be on-site at the time of system installation.

### **2.1.7 Clearances**

- Review operational clearances to verify whether daily use items fit (e.g. beds and carts).
- Consider clearances for emergency medical equipment.
- Ensure that all storage cabinets and sinks appear on the site print in their proper locations.
- Confirm that adequate space exists in the scan suite for delivery and installation of all replacement parts following installation of the system.

### **2.1.8 Contractors**

To confirm the site meets all requirements, you may need to employ these and other contractors:

- Structural Engineer and/or Architect
- HVAC Contractor
- Electrical Contractor
- Qualified Radiological Health Physicist
- Cleaning Services

## Section 3.0 Site Readiness - Customer's Responsibilities

### 3.1 Installation Requirements

Installation cannot proceed until verification of site-readiness occurs. A site is *ready* ONLY when it meets ALL delivery, regulatory, system, network, radiation protection and operational requirements, as well as requirements for any options. Responsibility for completing all work necessary to install the system rests with the purchaser, and includes:

- Completion of all items in [Section 3.1.1](#) (required before installation can begin).
- Verification by the PMI of the completion of ALL items on the Pre-Installation Checklist.
- Review and preparation of all site-ready items.

To ensure timely delivery and installation, GE recommends that the customer complete all necessary work and schedule a site-ready visit no later than THREE days prior to the delivery date. This visit will verify that the site meets all system siting requirements and will result in a call or report to the Project Manager of Installation indicating a *site-ready* condition and confirming that the installation can proceed. The site-ready visit will review and verify all of the installation requirements listed below. Use the Pre-Installation Checklist to ensure that the site meets ALL of these requirements.

The customer and/or the customer's contractors will provide signature confirmation (written sign-off) that all work listed below was completed PRIOR to delivery.

#### 3.1.1 Finished Room Condition

##### 3.1.1.1 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 required.

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.

##### 3.1.1.2 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.

### **3.1.2 Delivery Requirements**

Prior to delivery discuss the following with the Project Manager:

- Can Elevators, doorways and hallways accommodate delivery. Review elevator size requirements: PET and CT require 110 in. x 42 in. (2794 mm x 1066.8 mm) clearance.
- Is floor protection required?
- Is rigging required?

### **3.1.3 Regulatory Requirements**

Verify that the site conforms to all of the following:

- The room meets all regulatory clearance requirements.
- The room meets all minimum size requirements.
- The site print is on-site and reflects actual room size and layout.
- The room meets all local codes: Review JACHO and OSHA requirements.

### **3.1.4 System Requirements**

Confirm that the room meets:

- All structural requirements, including:
  - Floor levelness requirements
  - Floor vibration requirements
  - Floor thickness requirements
- All minimum HVAC requirements.
- All minimum electrical requirements and includes a Lock-out and tag-out (LOTO) - compatible A1 disconnect.
- Finished room requirements, with no construction occurring in the scan room or neighboring suite areas.

### **3.1.5 Operational Requirements**

Ensure that the site meets all operational requirements, including:

- Provision of adequate radiation protection.
- Maintenance of necessary operational clearances.
- Approval of final layout obtained.
- Review and confirmation from your PMI that your workspace matches the site print.

### **3.1.6 Network**

Ensure that network communication is in place and active.

### **3.1.7 Options**

Confirm the following:

- All customer installation options reviewed and final locations determined.
- All GE-supplied installation options reviewed and final locations determined.

### 3.1.8 Radiation Protection

Ensure that a qualified radiological health physicist has reviewed the scan suite and verified the adequacy of existing radiation protection.

| GE<br>Y N   | CUST<br>Y N                                       | General / Site Requirements<br><i>Must be completed 5 weeks before scheduled delivery date</i>  |
|---|---|---|
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | Have all required radioactive material licenses and approvals been obtained for the equipment and facility?   |
|   | <input type="checkbox"/> <input type="checkbox"/> | 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. |

**NOTICE** **SERVICE NOTICE:** An improperly prepared site—one that is in a state of construction—can result in a delayed installation date and/or damage to the system.

## Section 4.0 Site Readiness—GE's Responsibilities

### 4.1 Project Manager of Installation Tasks

The GE Healthcare Project Manager of Installation will assist the purchaser in meeting all system siting requirements.

#### 4.1.1 Pre-Installation Delivery Tasks

In addition, the PMI will also perform the following pre-installation delivery tasks:

- Determine the delivery type: ground, dock or lift.
- Determine whether delivery requires tilt dollies or riggers; order dollies and lifting crates as needed.
- Determine whether the delivery requires the use of floor protection.
- Determine whether ground delivery requires the use of a tilt-bed truck, lift truck, rigging or lifting; and inform GE Transportation of the need for a special delivery.

#### 4.1.2 Installation Environmental Health and Safety Site Review

Installation personnel must comply with the existing GE Healthcare PPE policy during the installation/de-installation process at a minimum. Use of hardhats may be required if personnel must walk through parts of the site that are still under construction.

Prior to system delivery an inspection of the installation site must be conducted to identify any potential environmental health risks that may need to be known in advance.

- Asbestos/fiberglass insulation/fire proofing/lead/concrete dust
- Existence of lead paint
- Presence of potential blood born pathogens and bodily fluids (De-installs)
- Hot/cold unprotected surfaces
- Chemical liquids (eyes/skin/clothes)
- Sharp objects such as needles, blades, nails, screws
- Tripping objects such as floor/wall anchors, conduit, cabling

- Electrical Stored Energy that cannot be locked out at the location of the system by GE Healthcare personnel
- Mechanical Stored Energy that cannot be locked out on the site by GE Healthcare personnel
- Potential radiation exposure

Have mitigating tasks been completed with the Customer and/or communicated GE Healthcare workers that will be working on site prior to system delivery to minimize/eliminate these hazards?  
Yes No

#### **4.1.3 Site Review with Customer**

A site-ready visit should occur prior to the delivery date. This visit will verify that the site meets all system siting requirements and will confirm that installation can proceed. During the site-ready visit, a GE representative will obtain signature confirmation (written sign-off) from the customer or the customer's contractors on the GE Healthcare Site Readiness Checklist, confirming that the site is, in fact, ready.



# Chapter 4

## Regulatory Requirements

---

### Section 1.0 Regulatory Clearances

#### 1.1 Regulations

Review all codes in your area prior to your installation date. US customers should consider these codes:

- OSHA 29 CFR 1910
- NFPA 70E (Standard for Electrical Safety in the Workplace)
- NFPA 101 (Life Safety Code)
- NFPA 99 (Standard for Health Care Facilities)
- ADA Amendments Act of 2008 (Americans with Disabilities Act)

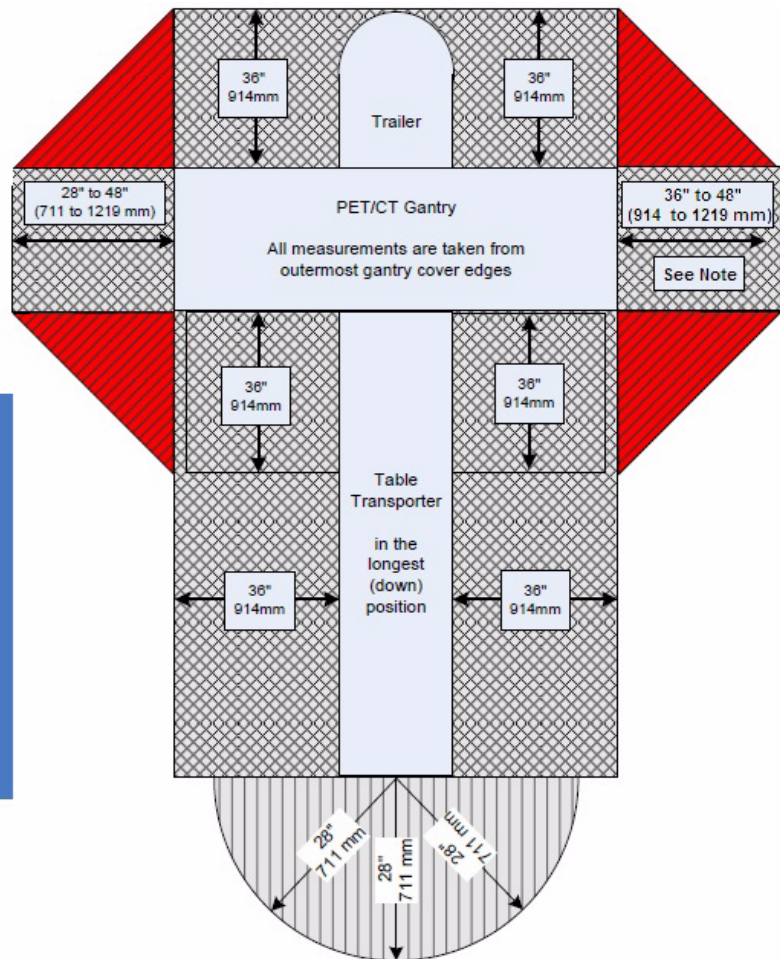
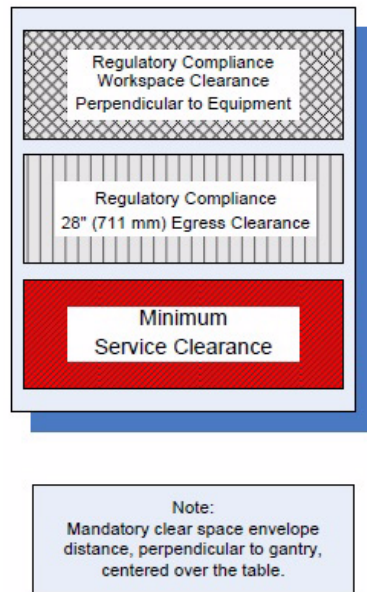
**NOTICE** All systems installed within the United States and United States territories and within U.S. government facilities, regardless of country, must comply with all United States Federal and local regulations. All systems installed outside the United States must comply with either the national, state and local regulatory clearance requirements for the country in which the installation occurs or U.S. Federal regulations, whichever is greater.

#### 1.2 Clearance Requirements

[Figure 4-1, on page 18](#) provides a map of clearance requirements necessary for U.S. regulatory compliance.

Note: [Figure 5-1, on page 25](#) provides a similar map of detailed dimensional clearance measurements necessary for safe servicing of the system.

**Note:**  
914mm (36") if side of system being serviced is directly facing an ungrounded surface or wall without live voltage panels and without surface mounted ducts or conduits.  
1067mm (42") if side of system being serviced is directly facing a grounded surface or wall.  
1219mm (48") if side of system being serviced is directly facing a surface or wall with live voltage panels, surface mounted ducts, or conduits.



**Figure 4-1 Regulatory Clearance Requirements for the PET/CT System**

### 1.2.1 Minimum Regulatory Workspace Clearances by Subsystem

When referring to the tables below, bear in mind the following:

- These requirements apply to equipment operating at 600 V or less, where examination, adjustment, servicing or maintenance is likely to be performed with live parts exposed.
- The customer **MUST** maintain the required regulatory clearance distances and may not use these areas for storage. This applies during normal system operation as well as during service inspection or maintenance.
- Direction of Service Access refers to a direction perpendicular to the surface of the equipment serviced.

| Workspace Requirement                                       | Minimum Clear Space                    | Additional Conditions  |
|---|--|--|
| Direction of Service<br>Access: (Front and Rear of Console) | N/A<br>(No exposed live part hazards.) |  |
| Service access width:<br>(Front-Back of Workspace)          |  | Refers to the width of the working space in front of equipment. 762 mm (30 in.) min or the equipment width, whichever is greater.  |
| Head clearance  | 1981 mm (78 in.)                       | Refers to the height of the workspace measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the height of the equipment, whichever is greater. |

Note: Distances are measured to the finished covers.

**Table 4-1 TIO Console: Minimum Workspace Clearance**

| Workspace Requirement                                      | Minimum Clear Space                                 | Additional Conditions  |
|--|---|--|
| Direction of Service<br>Access (Front and Rear of Console) | 1219 mm (48 in.)<br>(No exposed live part hazards.) | Front only   |
| Service Access Width<br>(Front-Back of Workspace)          | 1219 mm (48 in.)<br>Movable 711 mm (28 in.)         | Refers to the width of the working space in front of equipment. 762 mm (30 in.) min or the equipment width, whichever is greater.  |
| Head Clearance   | 1981 mm (78 in.)                                    | Refers to the height of the workspace measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the height of the equipment, whichever is greater. |

**Table 4-2 GOC4/GOC5/GOC6.5 Console: Minimum Workspace Clearances**

| Workspace Requirement                            | Minimum Clear Space | Additional Conditions   |
|--|---------------------|---|
| Direction of Service<br>Access: Front of Console | 914 mm (36 in.)     | There are no exposed live part hazards with the cover in place. If the console is placed under a counter, the front edge of the console must be even with the vertical edge of the console workspace.<br><br>Note: This component is typically serviced from the front with access to the rear. |
| Service access width:<br>Front of Console        | 762 mm (30 in.)     | This is the width of the workspace in front of the equipment. A minimum of 762 mm (30 in.) or the width of the equipment, whichever is greater, is required.  |

**Table 4-3 Console Subsystem**

| Workspace Requirement | Minimum Clear Space | Additional Conditions  |
|-----------------------|---------------------|--|
| Head Clearance        | 1981.2 mm (78 in.)  | This is the height of the workspace measured from the floor at the front edge of the equipment to the ceiling or overhead obstructions(s).<br><br>A minimum of 1981.2 mm (78 in.) or the height of the equipment, whichever is greater, is required. |

**Table 4-3 Console Subsystem**

| Workspace Requirement                      | Minimum Clear Space | Additional Conditions   |
|--|---------------------|---|
| Direction of Service Access (Front of PDU) | 914 mm (36 in.)     | 1219 mm (48 in.) if exposed live parts of 151 - 600 volts are present on both sides of the workspace with the operator between.<br><br>1067 mm (42 in.) if the opposite wall is grounded and exposed live parts of 151 - 600 volts are present. |
| Service Access Width (Front of Workspace)  | 762 mm (30 in.)     | Refers to the width of the working space in front of equipment. 762 mm (30 in.) min or the equipment width, whichever is greater.   |
| Head Clearance                             | 1981 mm (78 in.)    | Refers to the height of the workspace measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the height of the equipment, whichever is greater.                            |

**Table 4-4 NGPDU: Minimum Workspace Clearances**

Note: For the gantry and table, distances are measured from the finished covers.

| Workspace Requirement                          | Minimum Clear Space | Additional Conditions   |
|--|---------------------|---|
| Direction of Service Access (All Sides)        | 1067 mm (42 in.)    | 1219 mm (48 in.), if exposed live parts of 151 - 600 volts are present on both sides of the workspace with the operator between.<br><br>1067 mm (42 in.), if the opposite wall is grounded and exposed live parts of 151 - 600 volts are present. |
| Service Access Width (Left-Right of Workspace) | 762 mm (30 in.)     | Refers to the width of the working space in front of equipment. 762 mm (30 in.) minimum or the equipment width, whichever is greater.   |
| Head Clearance                                 | 1981 mm (78 in.)    | Refers to the height of the workspace measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the height of the equipment, whichever is greater.                              |

**Table 4-5 PET/CT - Minimum Workspace Clearances**

| Workspace Requirement                          | Minimum Clear Space | Additional Conditions  |
|--|---------------------|--|
| Direction of Service Access (Table Head)       | N/A                 |  |
| Direction of Service Access (Table Sides)      | 914 mm (36 in.)     | Can reduce to 457 mm (18 in.), provided that 711 mm (28 in.) is maintained on the opposite side of the table.  |
| Direction of Service Access (Table Foot)       | 711 mm (28 in.)     | 406 mm (16 in.) minimum for Front Gantry Cover removal, only if an unobstructed egress space of 711 mm (28 in.) exists around the equipment for room exit, and no trip hazards exist along the path of egress.       |
| Service Access Width (Left-Right of Workspace) | 762 mm (30 in.)     | Refers to the width of working space in front of equipment. 762 mm (30 in.) minimum or the equipment width, whichever is greater.  |
| Head Clearance                                 | 1981 mm (78 in.)    | Refers to the height of the workspace measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the height of the equipment, whichever is greater. |

**Table 4-6 Table - Minimum Workspace Clearances**

| Workspace Requirement                      | Minimum Clear Space | Additional Conditions   |
|--|---------------------|---|
| Direction of Service Access (front of UPS) | 914 mm (36 in.)     | 1219 mm (48 in.), if exposed live parts of 151 - 600 volts are present on both sides of the workspace with the operator between.<br><br>1067 mm (42 in.), if the opposite wall is grounded and exposed live parts of 151 - 600 volts are present. |
| Service Access Width (front of workspace)  | 762 mm (30 in.)     | Refers to the width of working space in front of equipment. 762 mm (30 in.) minimum or the equipment width, whichever is greater.   |
| Head Clearance                             | 1981 mm (78 in.)    | Refers to the height of the workspace, measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the equipment height, whichever is greater.                                    |

**Table 4-7 UPS Option: Minimum Workspace Clearances**

| Workspace Requirement                                 | Minimum Clear Space | Additional Conditions   |
|---|---------------------|---|
| Direction of Service Access<br>(left side of PARC)    | 914 mm (36 in.)     | If exposed live parts of 151 - 600 volts are present on both sides of the workspace with the operator between. 1067 mm (42 in.) If the opposite wall is grounded and exposed live parts of 151 - 600 volts are present. This side is serviced with power on.      |
| Direction of Service Access<br>(right side of PARC)   | 711 mm (28 in.)     | If exposed live parts of 151 - 600 volts are present on both sides of the workspace with the operator between. 1067 mm (42 in.), if the opposite wall is grounded and exposed live parts of 151 - 600 volts are present. This side is NOT serviced with power on. |
| Service Access Width<br>(front and back of workspace) | 203 mm (8 in.)      | Not required.   |
| Head Clearance  | 1981 mm (78 in.)    | Refers to the height of the workspace, measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in.) or the equipment height, whichever is greater.  |

**Table 4-8 Workspace Requirements for PARC**

| Workspace Requirement   | Minimum Clear Space | Additional Conditions   |
|---|---------------------|---|
| Direction of Service Access<br>(left and right side of trailer) | 914 mm (36 in.)     | If exposed live parts of 151 - 600 volts are present on both sides of the workspace with the operator between. 1067 mm (42 in.) If the opposite wall is grounded and exposed live parts of 151 - 600 volts are present. |
| Direction of Service Access<br>(rear of trailer)                | 711 mm (28 in.)     | The rear is NOT serviced with power on.   |

**Table 4-9 Workspace Requirements for Trailer**

## Section 2.0 Terms and Definitions

- > **CLEARANCES** - The clear space or distance between or around objects and equipment, governed by all applicable safety, service and regulatory requirements and representing the lowest margin of freedom permissible for equipment siting.
- > **DIMENSIONS** - The measurements comprising the length, width, depth and height of equipment.
- > **EGRESS** - A single path of exit from within any room. Egress must conform to these requirements:
  - OSHA requires a minimum width of 711 mm (28 in.) of continuous and unobstructed space, free of trip hazards, along the entire path of exit.
  - The path of exit may contain only OSHA-approved ramps.
  - All doors used to improve egress must lead to an exit.
  - The path of exit cannot include the surface floor raceway in areas that would require lifting to remove the front or rear gantry covers for service.

Note: Gantry front cover removal requires the use of tilting dollies that move side-to-side to reach a park position of 457 mm (18 in.) at the foot of the table. If the planned egress route is not at the back of the table, ensure that a clear space of at least 457 mm (18 in.) exists at the back of the table to park the gantry front cover. If not planning to park the gantry front cover at the back of the table, be sure to maintain at least 305 mm (12 in.) of clear space along the back of the table to allow movement of the gantry front cover along the back of the table.

- > **EGRESS CLEARANCE** - Egress requires a clear, unobstructed route out of the room, either around the back of the gantry or around the back of the table. If not situating the egress route around the back of the table, maintain 457 mm (18 in.) of clearance at the back of the table, with a continuous width of 3200 mm (126 in.), equaling 1600 mm (63 in.) clearance on each side of the table to allow removal of the front cover. Ascertain the amount of clearance by measuring from the table center line out to any obstruction.
- > **(PRE-INSTALLATION) ESCALATION** - The process used to consult CT Engineering, the Design Center or EHS to resolve pre-installation issues related to siting concerns and requirements.
- > **GROUNDING WALL** - Any wall with electrical conductivity to earth constitutes a ground. Conductive materials generally found in walls include masonry, concrete and tile. Treat as grounded additional elements commonly found in walls, including but not limited to:
  - 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
  - floor electrical boxes
  - floor HVAC boxes
  - floor medical gas

Common wall components *not* constituting grounded elements include:

- standard wall outlet
  - light switches
  - telephones
  - communication wall jacks
- > **HEAD CLEARANCE** - The height dimension of the workspace, measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. It requires a minimum of 1981 mm (78 in.) or the height of equipment, whichever is greater.
- > **MINIMUM** - The lowest limit permitted by law or other authority.
- > **SERVICE ACCESS WIDTH** - The width of the working space in front of the equipment, and requires a minimum of 762 mm (30 in.) or the width of the equipment, whichever is greater.
- > **WORKSPACE** - A three-dimensional box of space required for safe inspection or service of energized equipment. It consists of depth, width and height, with the depth dimension measured perpendicular to the direction of access. U.S. regulation requires a minimum depth of 914 mm (36 in.). Additional conditions can increase the minimum requirement. For example, FCT defines *workspace* as the envelope of the component superstructure, measured for the NGPDU with the front panel removed, and measured for the Gantry and Table with the external covers removed.

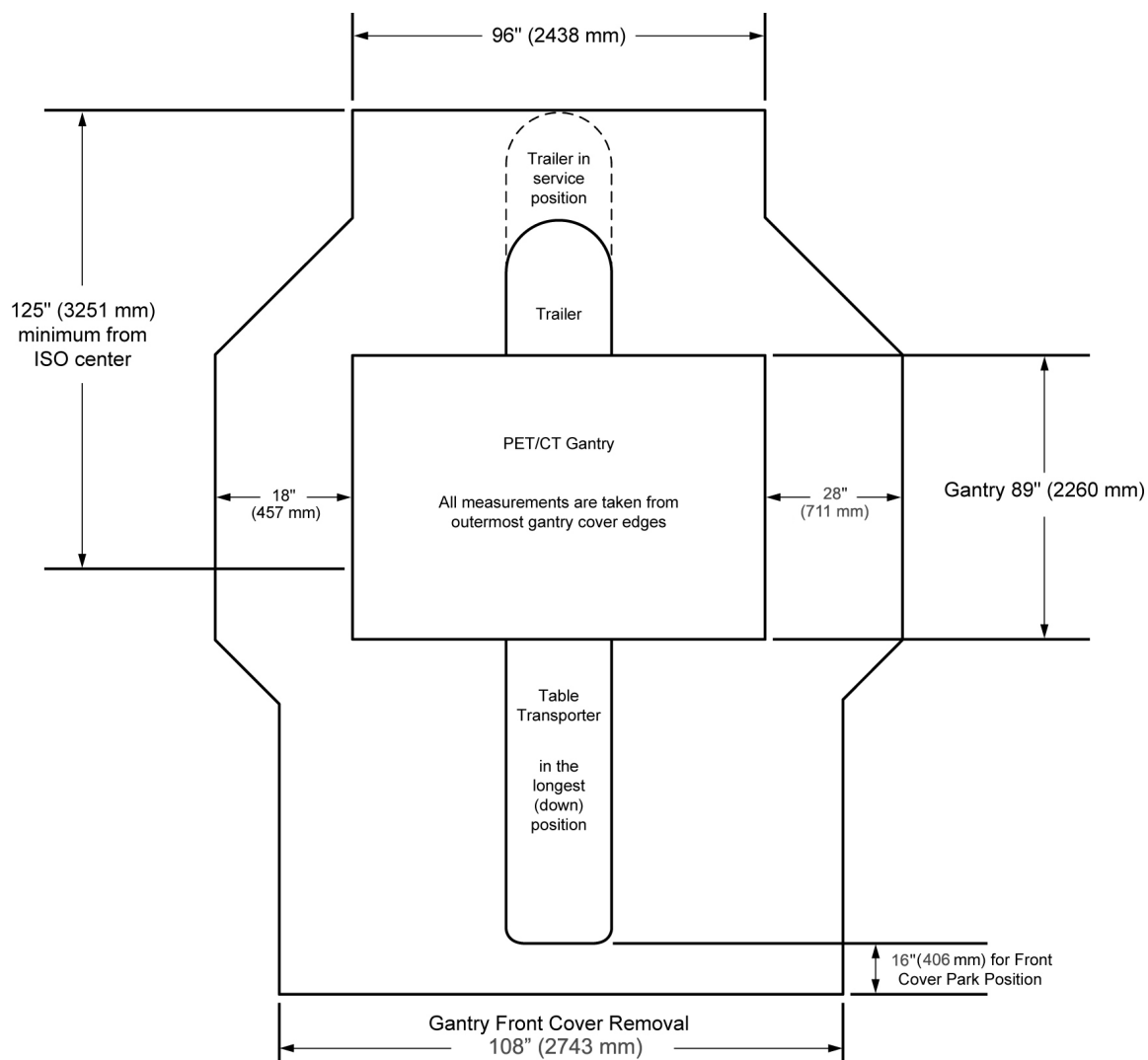


# Chapter 5

## Service Clearance Requirements

### Section 1.0 Measuring Service Clearances

System servicing also requires sufficient space to remove the covers from the system. One service engineer shall be able to accomplish all service component replacement tasks without needing special tools or equipment. As some replacement procedures require components that ship in large boxes, such as tube and detector changes and HV tank replacement, all room layouts shall provide service space and access around the table to the gantry right side.



**Figure 5-1 Cover Management and FRU Replacement Clearances**

## Section 2.0 Service Clearances for Single Service Engineer

Note: When Calculating service clearances, refer to [Figure 5-1](#) for all service clearance needs.

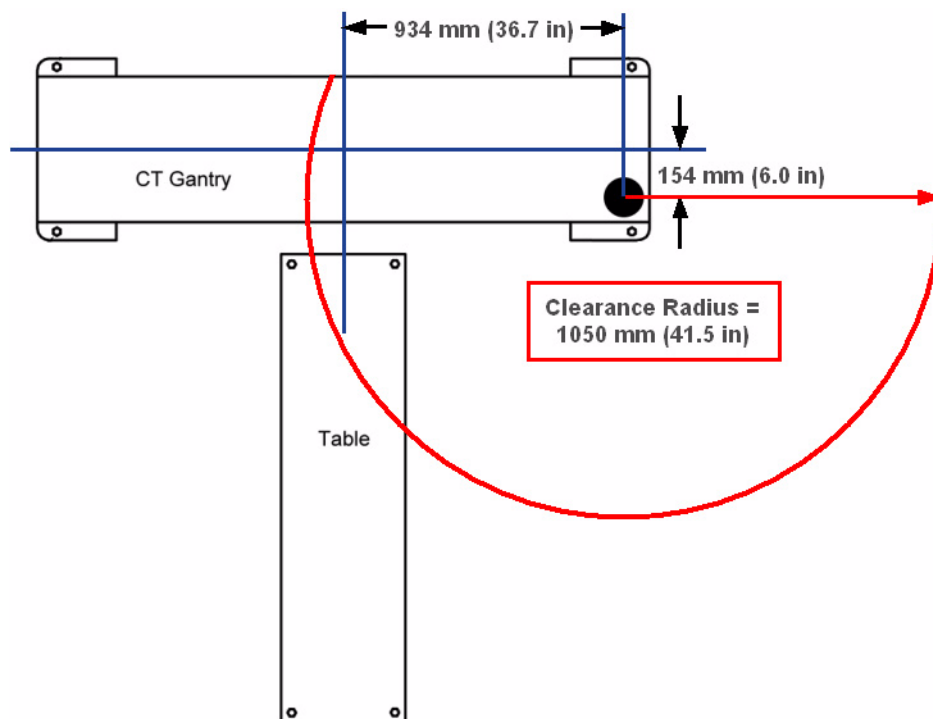
### 2.1 Cover Removal

- Gantry front cover removal requires the use of the tilting cover dollies and a minimum clearance space of 2743 mm (108 in.) to maneuver the cover, as illustrated in [Figure 5-1](#). The dollies allow the service engineer to separate the cover from the gantry, tilt it 90 degrees, roll it to the foot end of the table, and then tilt it an additional 90 degrees, so that it is upside-down relative to its normal system-mounted condition. After removal, the service engineer must then move the gantry front cover to a position that satisfies the minimum regulatory clearances.
- The gantry rear cover with service dollies installed requires a width of 2388 mm (94 in.) and a depth of 584 mm (23 in.) of clearance for removal. The design center should calculate sufficient space to allow the service engineer to move the cover either straight back or to one side of the table to satisfy the minimum service clearances shown in [Figure 5-1](#), as the rear cover cannot violate the workspace on the rear, or on either side of the gantry. The PMI and customer should discuss this consideration and make the necessary provisions.
- The scan room must offer sufficient space to allow adequate egress during service operations that require both front and rear cover removal. If the customer and PMI have any concern that site will not provide adequate space for egress under these conditions, they should discuss these requirements and make the necessary provisions to accommodate this event.
- A single service engineer can safely perform servicing of the table. Ensure sufficient clear space to maintain egress clearances with the table covers or cradle removed.
- A single service engineer can safely perform servicing of the system. Ensure sufficient clear space to maintain egress clearances with covers or cradle removed.

## Section 3.0 Service Clearances for Additional Components

### 3.1 Gantry Service Clearance

Specifications for Boom Assembly clearance arc are defined in [Figure 5-2](#). The Boom Assembly is used during Tube and Detector replacement.



*Figure 5-2 Boom Assembly Clearances*

### 3.2 Power Distribution Unit (NGPDU) Service Clearance

When positioning this component, consider regulatory compliance, as defined in [Chapter 4, Section 1.0](#), Regulatory Clearances. See [Table 4-4](#) in that section.

### 3.3 Uninterruptable Power Supply (UPS) Service Clearance

When positioning this component, consider regulatory compliance, as defined in [Chapter 4, Section 1.0](#), Regulatory Clearances. See [Table 4-7](#) in that section.

### 3.4 GOC4/GOC5/GOC6.5 Console Service Clearance

The operator console does not present an exposed live parts hazard. However, the site shall maintain a working space with a minimum depth of 1219 mm (48 in.), extending the full width of the operator console, at all times for service activity.

The console is on wheels. As some service activities require access to the rear of the console, be sure to maintain sufficient space for moving the console to allow rear service access.

See [Figure 6-1](#) for a suggested control room layout.

### 3.5 TIO Console Service Clearance

The operator console does not present an exposed live parts hazard. However, the site shall maintain a working space at all times with a minimum depth of 1219 mm (48 in.), extending the full width of the operator console for service activity.

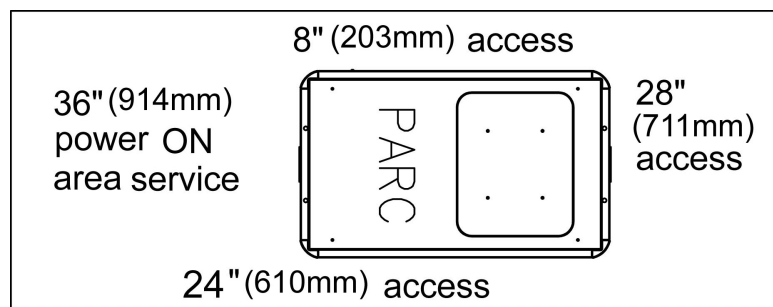
The console is on wheels. As some service activities require access to the rear of the console, be sure to maintain sufficient space for moving the console to allow rear service access.

See [Figure 6-1](#) for a typical control room layout.

### 3.6 PARC Service Clearance

Unit is on wheels and is serviced from the left side with power turned on. Power connections are located in the rear. Access to the right side is required for power off service.

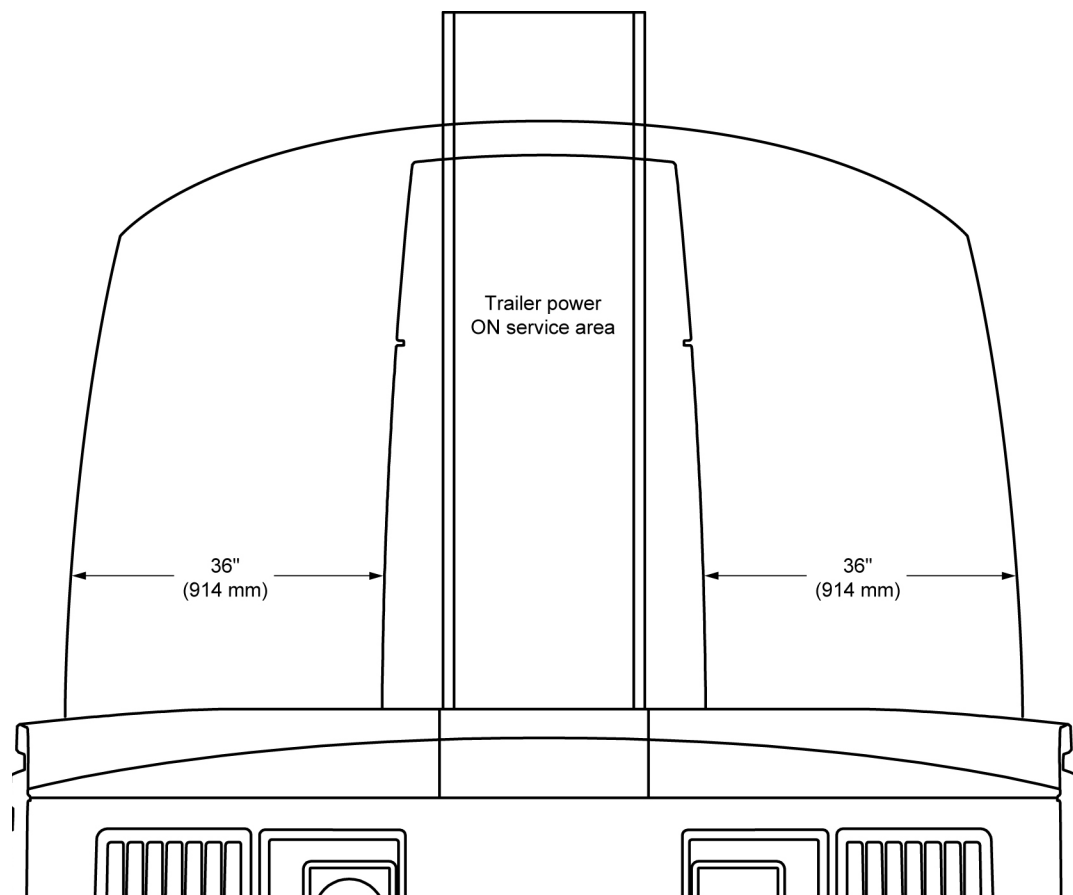
Some locations may require conduit connections/seismic mounting. Service access must be maintained.



*Figure 5-3 PARC Power On Service Clearance*

### 3.7 Trailer Service Clearance

Trailer is serviced from the right and left sides with power on and the gantry in the home position. Gantry-expanded power-on service is not recommended.



**Figure 5-4 Trailer Power On Service Clearance**

## 3.8 Storage Cabinet and Equipment

A storage cabinet is provided by GE Healthcare to store all supplied service equipment. (See [Table 5-1](#) or [Table 5-2](#) for equipment list.) This storage cabinet should be located in the scan room suite area for easy service access.

| Item                       | Size  | Weight (total)                      |
|----------------------------|---|-------------------------------------|
| Storage Cabinet            | 18" D x 36" W x 42" H<br>(46 x 91 x 107 cm)         | 100 lb (45.3 kg)<br>(approximately) |
| QA Phantom (water filled)  | 9" x 6"<br>(23 x 15 cm)                             | 10 lb (4.5 kg)                      |
| Phantom Holder             | 10" x 10"<br>(25 x 25 cm)                           | 20 lb (9.1 kg)                      |
| FE Documents & CD/DVD      |   | 15 lb (6.8 kg)                      |
| 35 CM Poly (Circle)        | 14" x 4"<br>(35 x 11 cm)                            | 20 lb (9.1 kg)                      |
| 48 CM Poly (Circle)        | 19" x 3"<br>(48 x 8 cm)                             | 25 lb (11.3 kg)                     |
| Stool                      | 19" x 19"<br>(48 x 48 cm)                           | 2 lb (1 kg)                         |
| Blue Tote                  | 30" x 20" x 17"<br>(81 x 51 x 32 cm)                | 4 lb (2 kg)                         |
| Install Support Kit (box)  | 12" x 12" x 15"<br>(30 x 30 x 38 cm)                | 20 lb (9.1 kg)                      |
| Tube Hoist Kit             | 30" x 3" and 15" x 6"<br>(77 x 8 cm and 38 x 15 cm) | 30 lb (13.6 kg)                     |
| Balance Weight Kit         | (2 boxes)   | 73 lb (33 kg)                       |
| Spatial Resolution Phantom | 7" x 6" x 3"<br>(18 x 15 x 8 cm)                    |                                     |

**Table 5-1 Storage Cabinet and Equipment (Discovery 690 VCT, Discovery Elite)**

| Item                       | Size  | Weight (total)                      |
|----------------------------|---|-------------------------------------|
| Storage Cabinet            | 18" D x 36" W x 42" H<br>(46 x 91 x 107 cm)         | 100 lb (45.3 kg)<br>(approximately) |
| QA Phantom (water filled)  | 9" x 6"<br>(23 x 15 cm)                             | 10 lb (4.5 kg)                      |
| Phantom Holder             | 10" x 10"<br>(25 x 25 cm)                           | 8 lb (3.6 kg)                       |
| FE Documents & CD/DVD      |   | 15 lb (6.8 kg)                      |
| 35 CM Poly (Circle)        | 14" x 3"<br>(35 x 8 cm)                             | 15 lb (6.8 kg)                      |
| 48 CM Poly (Circle)        | 19" x 3"<br>(48 x 8 cm)                             | 25 lb (11.3 kg)                     |
| Stool                      | 19" x 19"<br>(48 x 48 cm)                           | 2 lb (1 kg)                         |
| Blue Tote                  | 30" x 20" x 17"<br>(81 x 51 x 32 cm)                | 4 lb (2 kg)                         |
| Install Support Kit (box)  | 12" x 12" x 15"<br>(30 x 30 x 38 cm)                | 20 lb (9.1 kg)                      |
| Tube Hoist Kit             | 30" x 3" and 15" x 6"<br>(77 x 8 cm and 38 x 15 cm) | 20 lb (9.1 kg)                      |
| Balance Weight Kit         | (2 boxes)   | 73 lb (33 kg)                       |
| Spatial Resolution Phantom | 7" x 6" x 3"<br>(18 x 15 x 8 cm)                    |                                     |

**Table 5-2 Storage Cabinet and Equipment (Optima 560, Discovery 600, Discovery 690 Elite)**





# Chapter 6

## Room Sizes

### Section 1.0 Typical Room Dimensions

The typical room size and configuration represents that most commonly found at installation sites. It offers adequate workspace and may provide adequate space for a sink, but allows only limited space to add millwork and still meet all regulatory requirements. The generous size of this room accommodates the needs of larger clinics and medium-sized hospitals, where patients may require transportation into the scan area using gurneys and wheelchairs, and where they may require the assistance of smaller medical care teams. The typical room size provides access for crash carts and other emergency medical equipment on only one side of the table. This room size supports all service activities, including tube change, and may offer compatibility with some future upgrades and two-step installations.

[Figure 6-1](#) shows the typical room layout. You need to know the locations for medical gas, surface ductwork or other items that make a grounded wall.

Note: The room dimensions are the same for all products listed in this manual.

Note: Your room layout may meet the typical room requirements but appear different than [Figure 6-1](#). Your salesperson can provide a detailed room layout for your site.

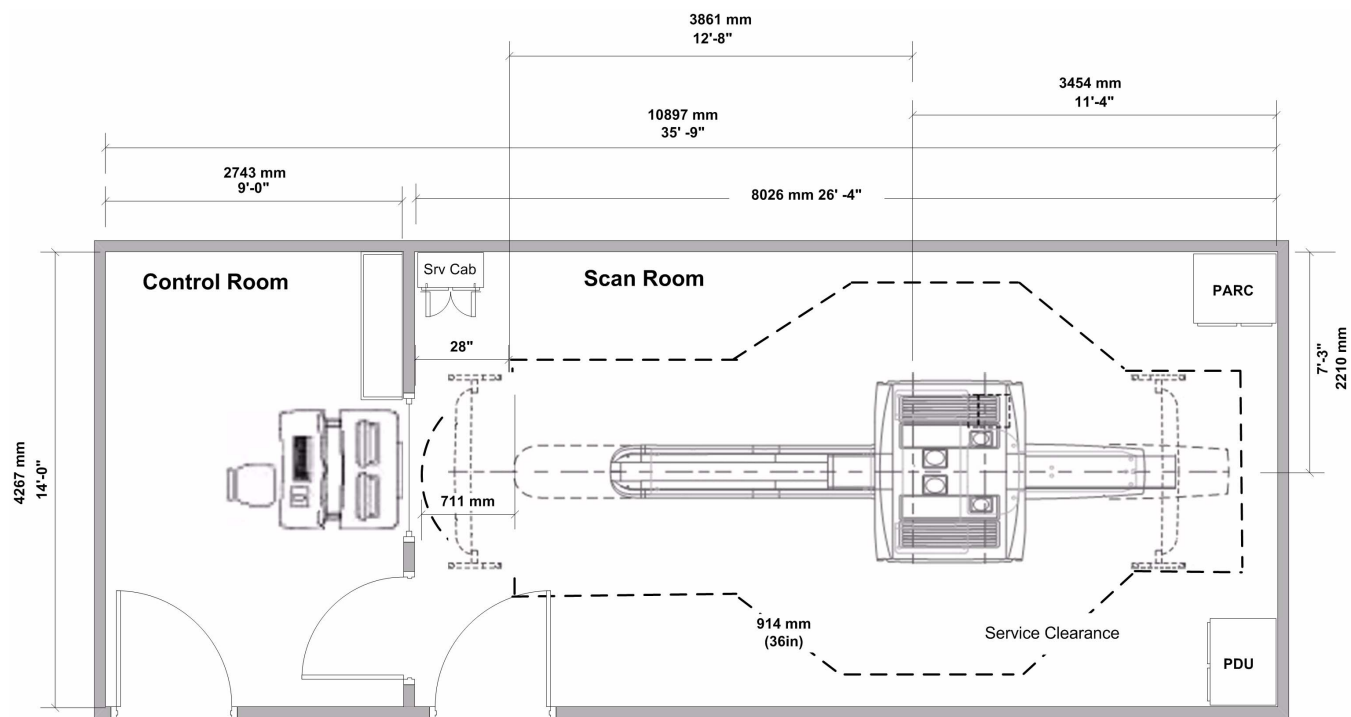
Note: All regulatory requirements apply.

| System Configuration  | Typical Room Size (mm) | Typical Room Size (in.) |
|---|------------------------|-------------------------|
| Scan Room (all)   | 4420 mm x 8382 mm      | 14 ft.x 26 ft., 5 in.   |
| <b>Note:</b> Equipment orientation may require additional room space. See <a href="#">Figure 4-1 on p. 18</a> |                        |                         |

**Table 6-1 Scan Room Clearance Requirements**

| System Configuration                           | Typical Room Size (mm) | Typical Room Size (in.)  |
|--|------------------------|--------------------------|
| Control Room (GOC Console)                     | 2743 mm x 4420 mm      | 9 ft., 0 in. x 14 ft.    |
| Control Room (Freedom Workspace Console Table) | 3000 x 1700 mm         | 9 ft 10 in. x 5 ft 7 in. |

**Table 6-2 Control Room Clearance Requirements**



**Figure 6-1 Typical Room Layout (GOC Console Shown)**

## Section 2.0 What is the Recommended Minimum Room Size?

The recommended minimum room size and configuration represents the smallest functionally acceptable space for the product and represents the type of room often found at doctor's offices and smaller clinics and outpatient facilities. Due to its limited size and to functional and regulatory requirements, the recommended minimum room size usually provides only limited workspace, and leaves to no space to add in-room millwork and sinks and still meet the necessary regulatory and service requirements. The recommended minimum room size can accommodate the transportation of patients into the scan area using wheelchairs, and provides access space for crash carts and other emergency medical equipment on only one side of the table.

Sites considering the recommended minimum room size may not have been designed with the structural requirements necessary to support the system and consequently may require upgrading prior to installation.

Customers considering the recommended minimum room size should discuss their workspace requirements and future upgrade plans with their PMI, as the size and layout of these rooms often eliminates them from any future upgrade considerations and offers no compatibility with future two-step installations.

If using the square meterage (square footage) to determine regulatory compliance, please note that the front and rear cover clearances are wider than the regulatory clearance along the table length, and that the cover park position is behind the table in the home position.

**Note:** Sites must provide sufficient space to allow the removal of the rear cover, which is on wheels, from behind the gantry during service operations. Refer to [Chapter 5, Section 1.0, Measuring Service Clearances, on page 25](#). In rooms where it is necessary to have the equipment placed diagonally, all service access and cover removal specifications must be met.

## 2.1 Recommended Minimum Room Dimensions

### 2.1.1 Seismic Overview

Refer to the guidelines below when mounting the system in seismic zones:

- Responsibility for proper seismic mounting rests with the customer. Refer to all applicable laws and codes for your locality.
- Seismic angle brackets are included with the PDU (Power Distribution Unit) and console for sites requiring seismic anchoring of these units.
- GE-supplied anchors may not meet local seismic laws and codes. Use them only if a qualified structural engineer approves them for use in local seismic applications.
- The customer's contractor will often supply a state-certified print or equivalent, showing seismic installation instructions.
- Consider seismic requirements for ceiling-mounted fixtures and refer to the appropriate installation instructions for ceiling-mounted fixtures.

**Note:** The seismic recommended minimum room layout is larger than the limited access recommended minimum to allow for equipment mounting to meet seismic requirements.

All regulatory requirements apply, with the addition of no energized left-side service

**CAUTION** **Operational Caution:** In this recommended minimum room layout (356 mm to 686 mm [14 in. to 27 in.]) the customer should consider workflow, customer access for patient care, and critical-care operations space requirements. Additionally, this room provides only limited equipment access on the gantry left side when loading patients or when positioning patient equipment in the room between the gantry and the wall.

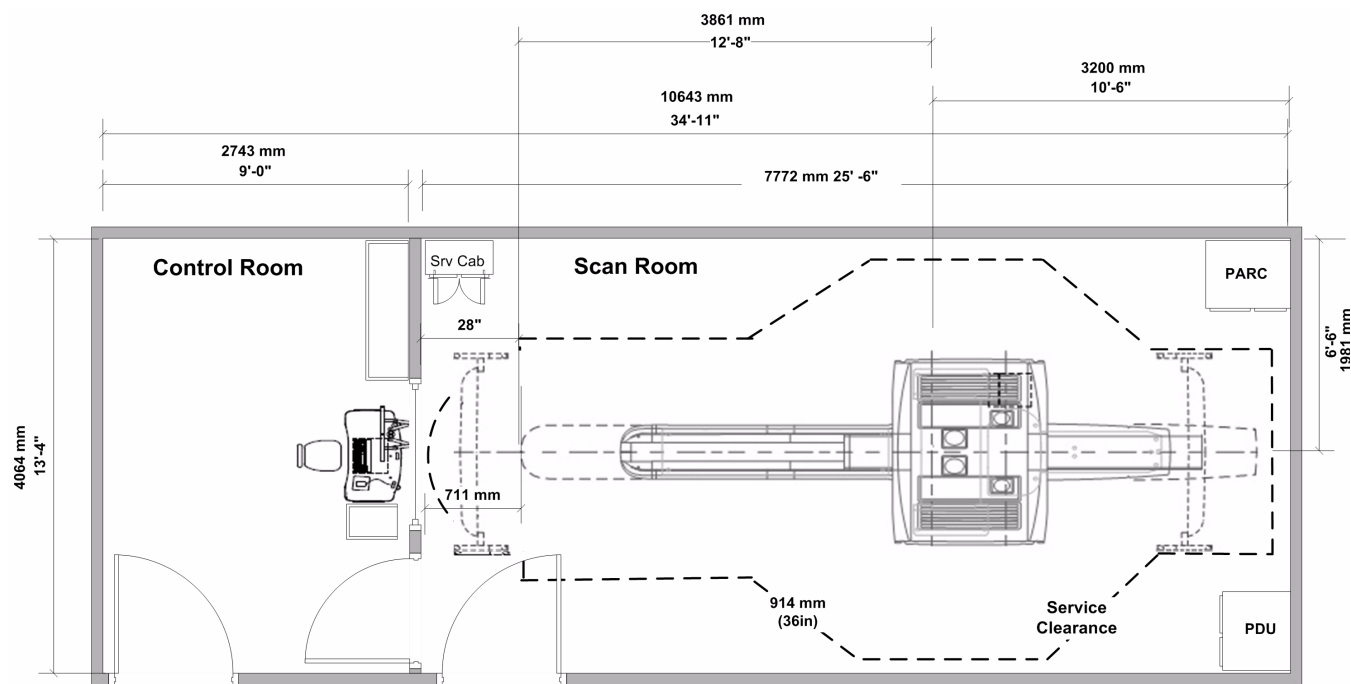
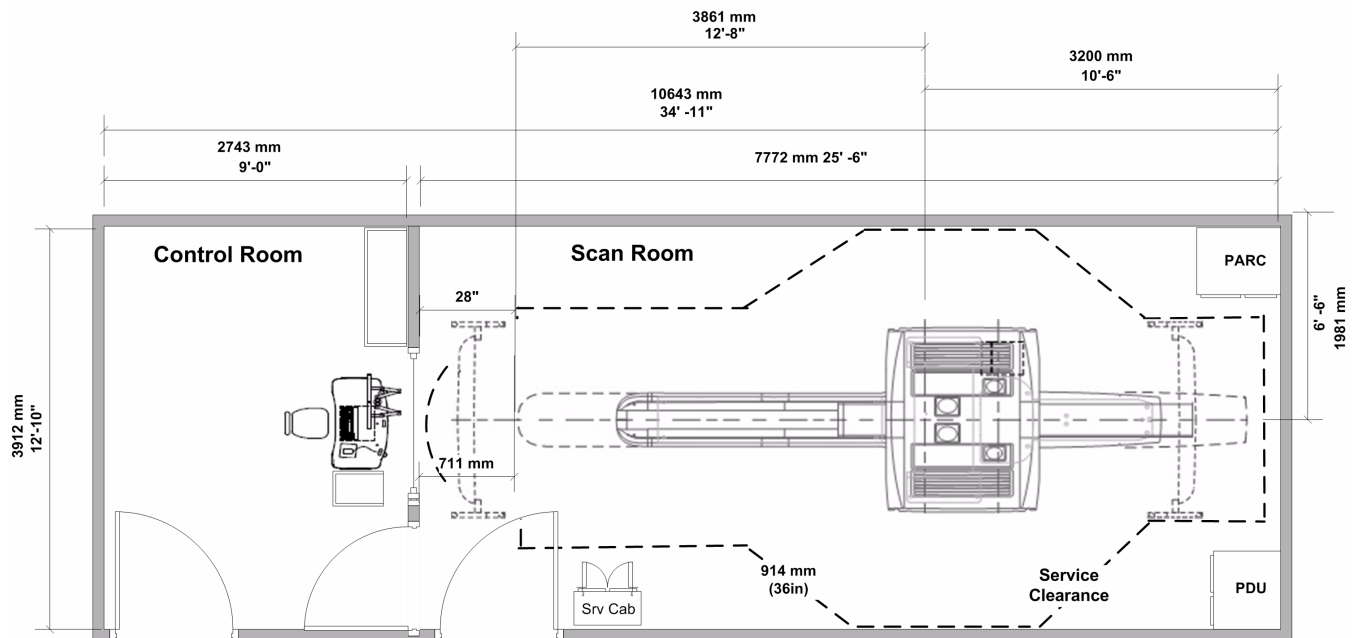


Figure 6-2 Recommended Minimum Seismic Room Configuration (TIO Console Shown)

| Seismic System Configuration | Minimum Room Size (mm) | Minimum Room Size (in.)      |
|------------------------------|------------------------|------------------------------|
| Scan Room Size               | 4267 mm x 7772mm       | 13 ft, 4 in. x 25 ft., 6 in. |
| Control Room Size            | 2438 mm x 4268 mm      | 9 ft, 0 in. x 13 ft., 4 in.  |

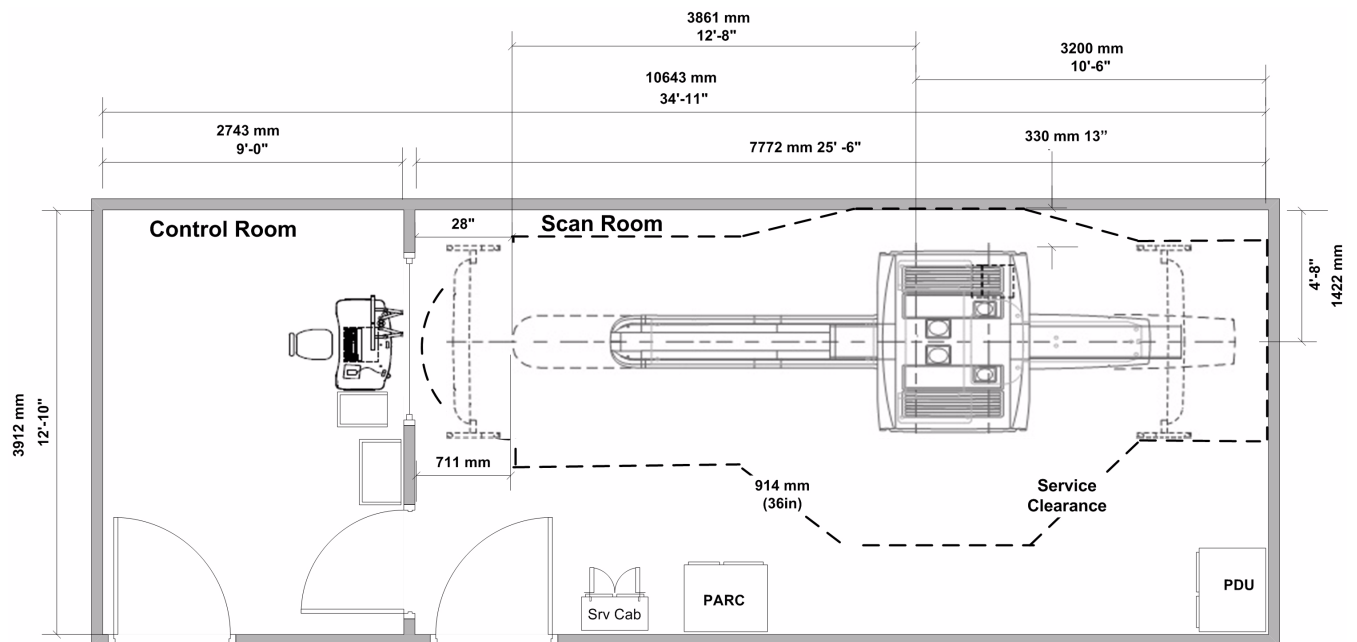
Table 6-3 Recommended Minimum Room Size Dimensions by System (Seismic)



**Figure 6-3 Recommended Minimum Non-seismic Room Size Config (Gantry Centered)**

| Non-Seismic System Configuration | Minimum Room Size (mm) | Minimum Room Size (in.)       |
|----------------------------------|------------------------|-------------------------------|
| Scan Room Size                   | 3915 mm x 7772 mm      | 12 ft., 10 in x 25 ft., 6 in. |
| Control Room Size                | 2438 mm x 3912 mm      | 9 ft., 0 in. x 12 ft., 10 in. |

**Table 6-4 Recommended Minimum Room Size Dimensions by System (Non-Seismic)**



**Figure 6-4 690 Recommended Minimum Non-seismic Room Size Config (Gantry Off-Center)**

## Section 3.0 NEC Conduit and Duct Fill Rate

Full operation, service, and safety of the system requires the maintenance of sufficient regulatory and service clearances around equipment.

Cable length constitutes an important consideration in room layout. The PET/CT system ships with standard (long) length cables.

Refer to the electrical page of your GE site print for the specific requirements of your site. The following rules govern cable usage for the system:

- Do not cut or otherwise shorten long cables.
- Do not store excess cable length behind the Operator Console, Gantry, UPS, PARC or PDU.
- Store excess cable in wall or floor ducts, if desired, provided that sufficient space exists. Refer to NEC code to determine cable fill rates for conduits and ducts.
- All installed systems shall comply with NEC 70-E Electrical Regulations governing conduit or duct fill.

If you have excess cables you must provide a vertical wall duct or other suitable storage to store the excess cable. If you select the vertical wall duct dividers should be provide for cable separation. Cables are typically stored in a figure 8 configuration.

# Chapter 7

## System Component Dimensions

### Section 1.0 Primary Component Dimensions

| Description  | Width          |      | Depth |      | Height  |       |
|--|----------------|------|-------|------|---------|-------|
|  | mm             | inch | mm    | inch | mm      | inch  |
| PET-CT Gantry (overall) without Trailer  | 2235           | 88   | 1473  | 58   | 1930    | 76    |
| Table (at max elevation; 1" [25 mm] below Gantry ISO center)   | 660            | 26   | 3454  | 136  | 1067    | 42    |
| Power Distribution Unit (PDU)  | 711            | 28   | 559   | 22   | 1067    | 42    |
| GOC6.5 Operator's Console  | 1245           | 49   | 1219  | 48   | 813     | 32    |
| TIO Operator's Console   | 470            | 19   | 740   | 29   | 640     | 25    |
| TIO Freedom Workspace Table (adjustable height)  | 1350           | 53   | 741   | 29   | 683-912 | 27-36 |
| UPS  | 305            | 12   | 813   | 32   | 1219    | 48    |
| PARC   | 1016           | 40   | 635   | 25   | 1499    | 59    |
| A1 Disconnect:<br><ul style="list-style-type: none"> <li>Optima 560, D600, D690 Elite: E4502AB (90A), E4502AC (110A)</li> <li>D690 VCT, D-Elite: E4502AE (125A), E4502AF (150A)</li> </ul> | Not Applicable |      |       |      |         |       |
| GOC4 Operator's Console (Note 1)   | 1245           | 49   | 1219  | 48   | 813     | 32    |
| GOC5 Operator's Console (Note 1)   | 1245           | 49   | 1219  | 48   | 813     | 32    |

**Note 1:** Not in production after Oct 2010.

**Table 7-1 Subsystem Dimensions**

| Item  | Size   | Weight (total) |
|---|--|----------------|
| Rear Cover Dollies<br>(Hang behind cabinet) | 62" x 32"<br>(158 x 82 cm)                           | 25 lb (11 kg)  |
| Front Cover Dollies                         | 34" x 8" and 34" x 6"<br>(85 x 20 cm and 85 x 15 cm) | 35 lb (16 kg)  |

**Table 7-2 Gantry Cover Dollies**

## Section 2.0 Minimum Operating Clearances

The sections below provide the minimum dimension and operating clearance information for each category of components listed. Be sure the site conforms to each of these specifications.

### 2.1 Ceiling Pedestal Mount Installation

The distance from the floor to the lowest point of the ceiling pedestal mount for the injector or monitor cannot measure less than 2134 mm (84 in.).

**NOTICE** Failure to maintain a distance of at least 2134 mm (84 in.) from the floor to the lowest point of the injector or monitor ceiling pedestal mount may pose a safety hazard.

### 2.2 Injector Control Installation

Minimum dimensions and clearances include the following requirements for the injector control:

- Provision of a suitable work area for placement of the injector control within reach of the operator console. Refer to the injector documentation for detailed installation instructions.
- Wall-mounted, ceiling-mounted, and pedestal units require routing of cables from the gantry area to the operator console area. The supplied cable measures 15.2 m (50 ft).
- Injectors require an AC power source separate from the system.
- Integrated Injectors obtain their AC power from the system console.

**Note:** Do not route the injector cables with the system cables.

- Available mounts come in several different lengths and configurations. Refer to the injector documentation for detailed installation instructions.

### 2.3 System Operational Clearances

The clearances listed below govern system operation; be sure that the site maintains each of these clearances.

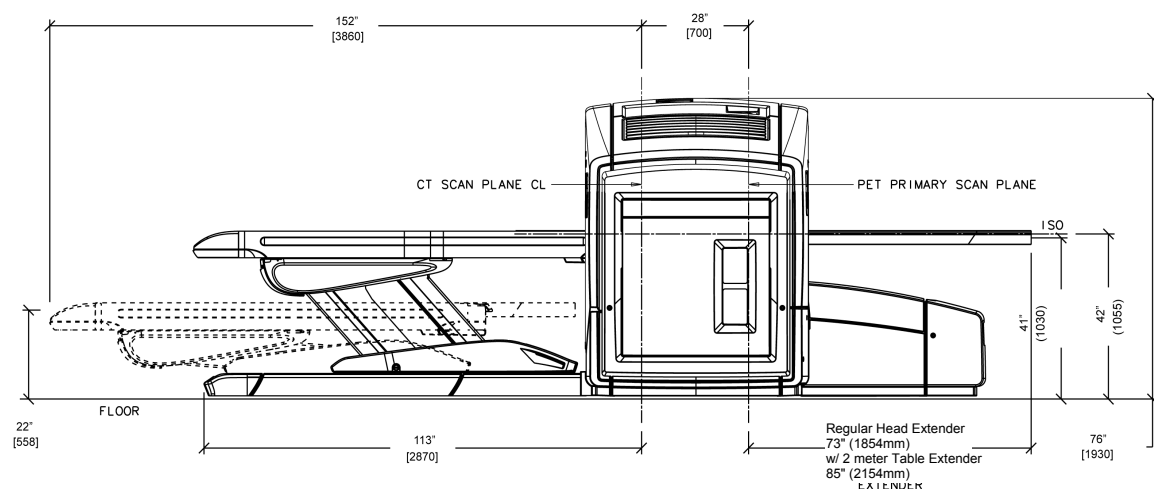
| System Operation   | mm      | inches  |
|--|---------|---------|
| Ceiling Pedestal mount (optional)<br>Lowest point to floor injector or monitor | 2134 mm | 84 in.  |
| Finished ceiling to floor (suggested)  | 2743 mm | 108 in. |
| Finished ceiling to floor (minimum)  | 2286 mm | 90 in.  |
| Back of Console to wall  | 152 mm  | 6 in.   |
| Back of PARC   | 152 mm  | 6 in.   |
| Back of PDU to wall  | 152 mm  | 6 in.   |

**Table 7-3 Minimum Dimensions and Operational Clearances**

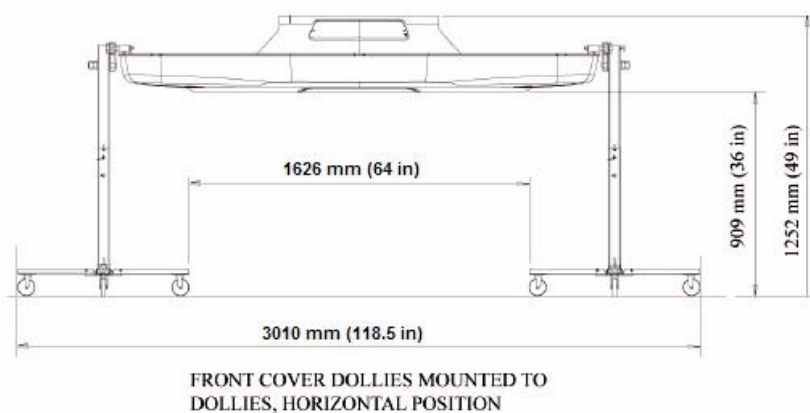
**Note:** For installations with a finished ceiling height that is less than suggested, consideration should be given to utilizing floor mounted components, or attaching the mounting plate in the overhead (for example, above dropped ceiling tiles).



## 2.4 System Dimensions



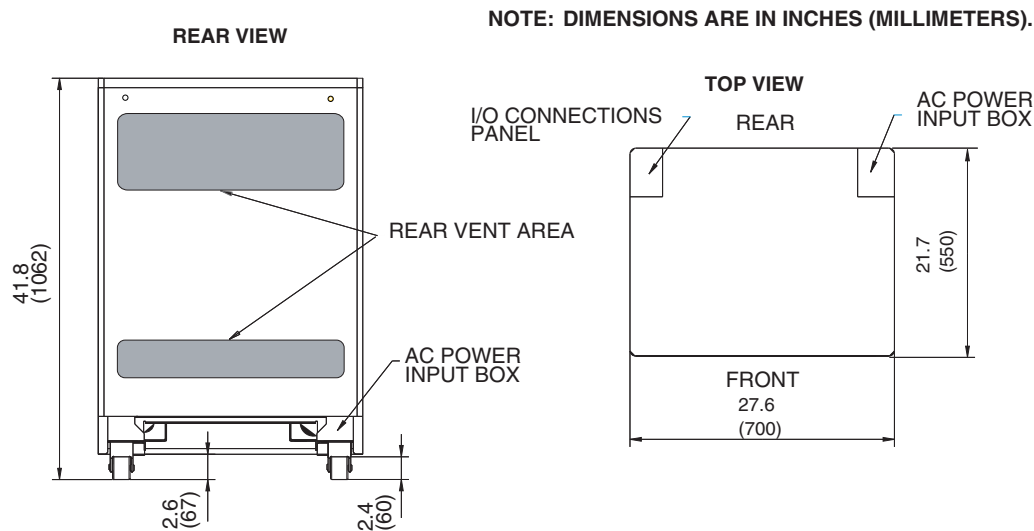
**Figure 7-1 PET/CT System Side Profile**



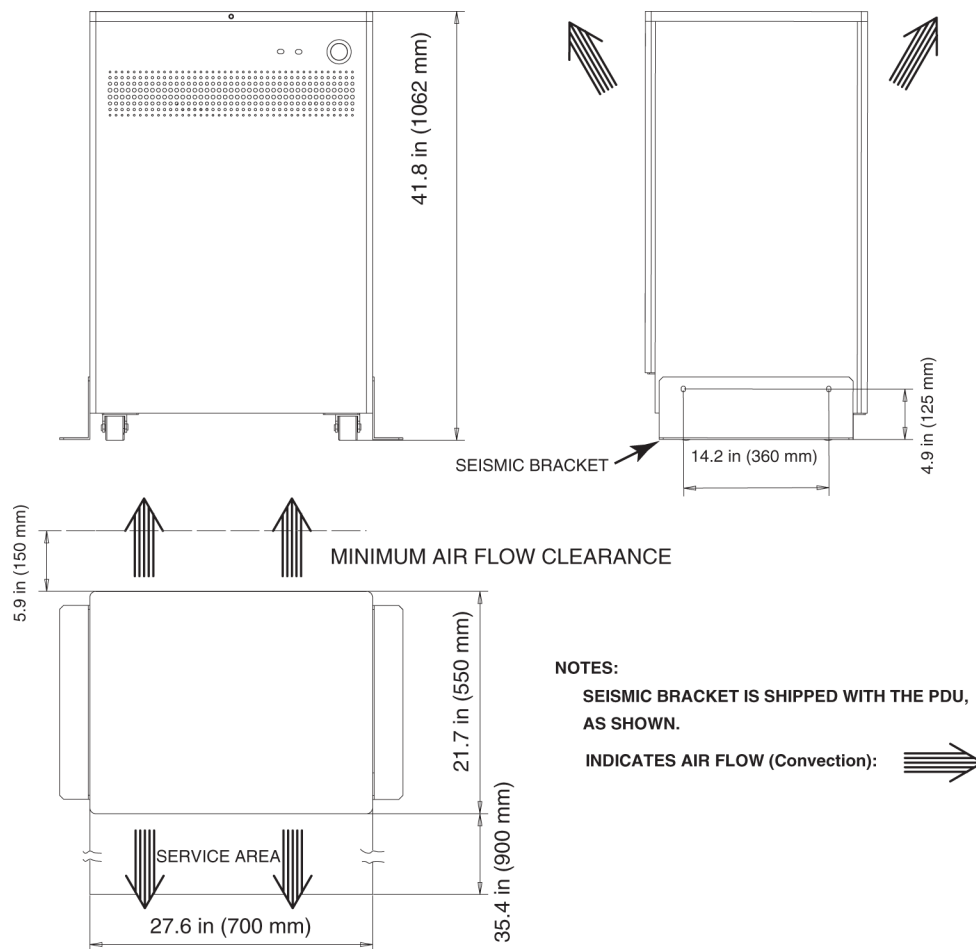
**Figure 7-2 Gantry Front Cover with (Horizontal) Service Dolly Dimension**

## 2.5 Power Distribution Unit Dimensions

PDU dimensions, air intake/exhaust, and service areas appear below.



**Figure 7-3 Power Distribution Unit (NGPDU)**



**Figure 7-4 Power Distribution Unit (NGPDU)**

## 2.6 Uninterruptible Power Supply

The Powerware 9355 Partial System UPS has been selected for use with the PET/CT system. 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 7-5 Powerware 9355 UPS**

| Description                                     | Width |      | Depth |      | Height |      | Net Weight |     |
|---|-------|------|-------|------|--------|------|------------|-----|
|   | mm    | inch | mm    | inch | mm     | inch | lb.        | kg  |
| 9355 Powerware Uninterrupted Power Supply (UPS) | 305   | 12   | 813   | 32   | 1218   | 48   | 619        | 281 |

**Table 7-4 9355 Powerware UPS Dimensions**

2.7 D690 VCT GOC6.5 Operator Console Dimensions and Ergonomic Specifications

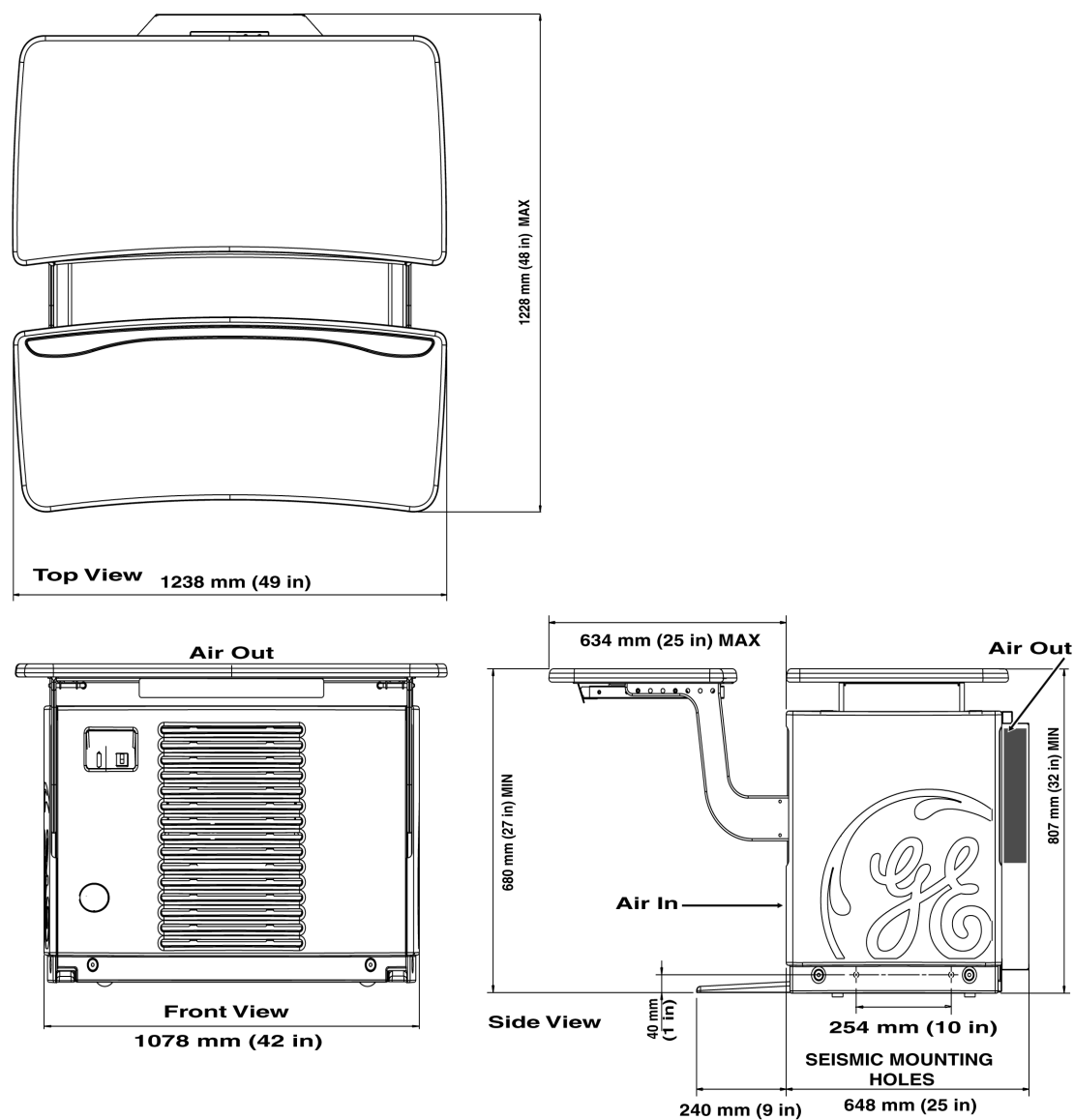
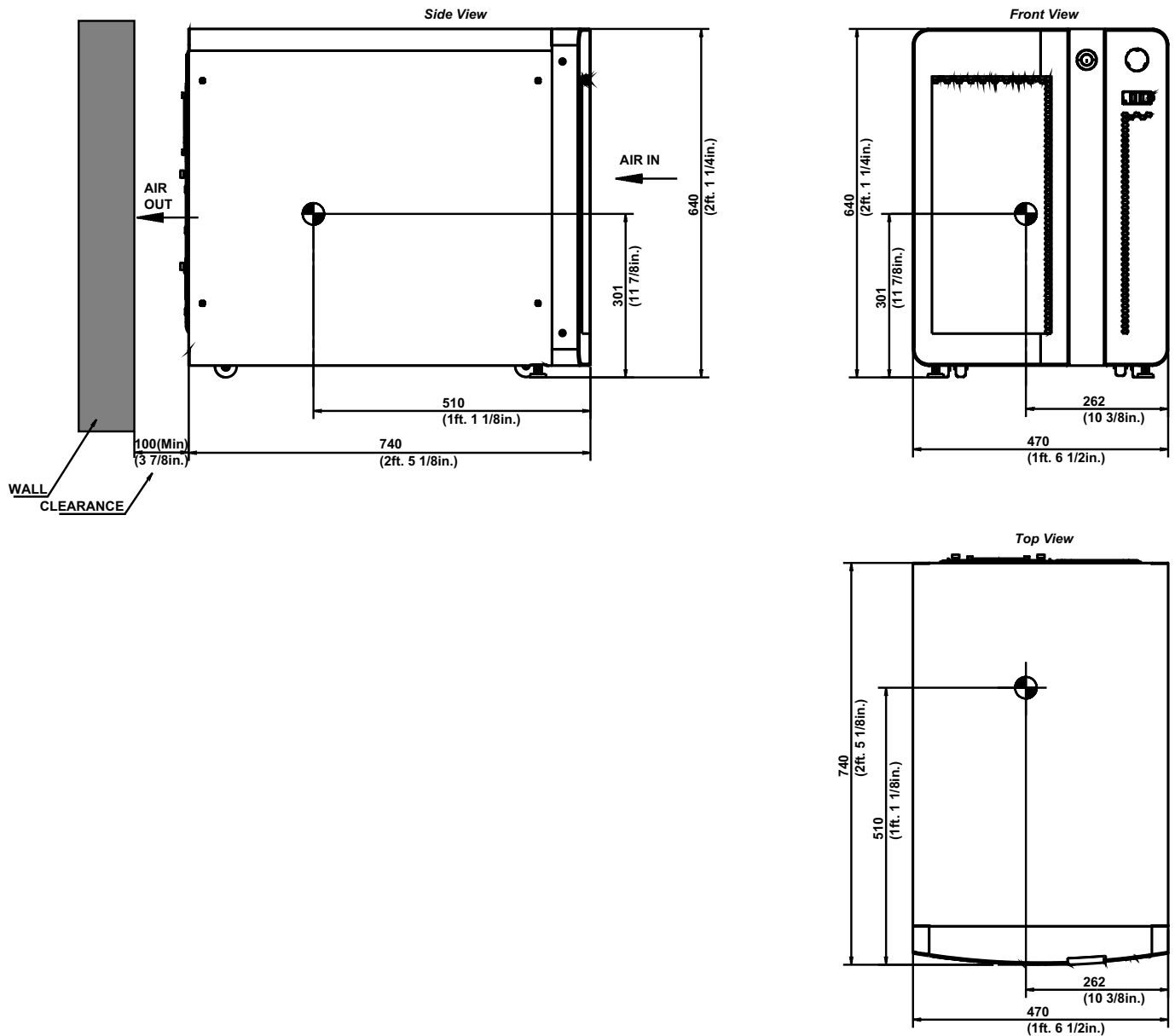


Figure 7-6 D690 VCT GOC6.5 Operator Console Dimensions and Ergonomic Specifications

| Description                | Width |      | Depth |      | Height |      |
|----------------------------|-------|------|-------|------|--------|------|
|                            | mm    | inch | mm    | inch | mm     | inch |
| Remote Color Monitor (LCD) | 413   | 16   | 203   | 8    | 406    | 16   |

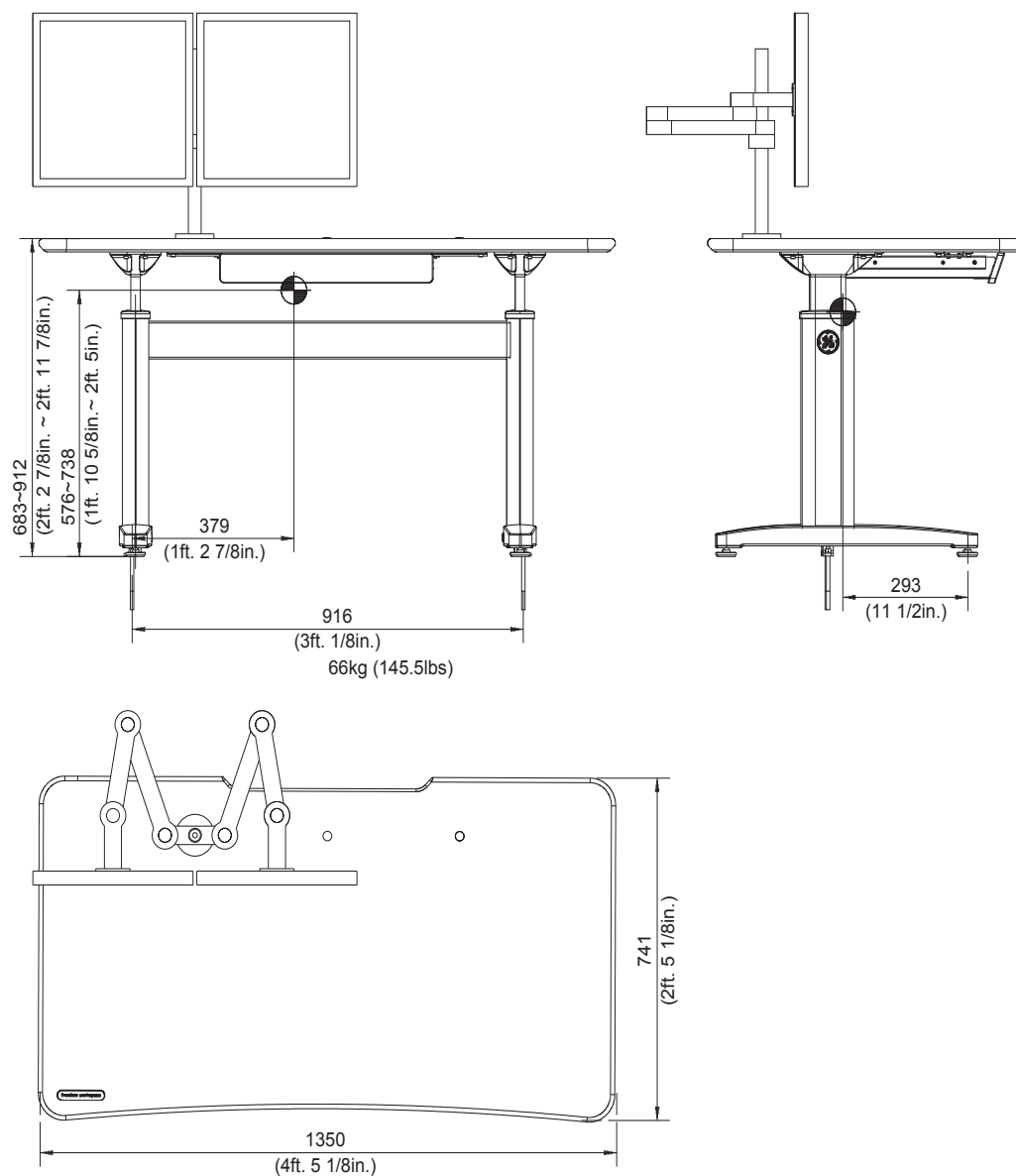
Table 7-5 Dimensions of Peripherals

## 2.8 Optima 560, D600, D690 Elite TIO Operator Console Dimensions and Ergonomic Specifications



**Figure 7-7 Optima 560, Discovery 600, Discovery 690 Elite TIO Operator Console Dimensions and Ergonomic Specifications**

## 2.9 Optima 560, D600, D690 Elite TIO Freedom Workspace Table Dimensions and Ergonomic Specifications



**Figure 7-8 Optima 560, Discovery 600, Discovery 690 Elite TIO Freedom Workspace Table  
Dimensions and Ergonomic Specifications**

2.10 PET Acquisition Reconstruction Controller (PARC)

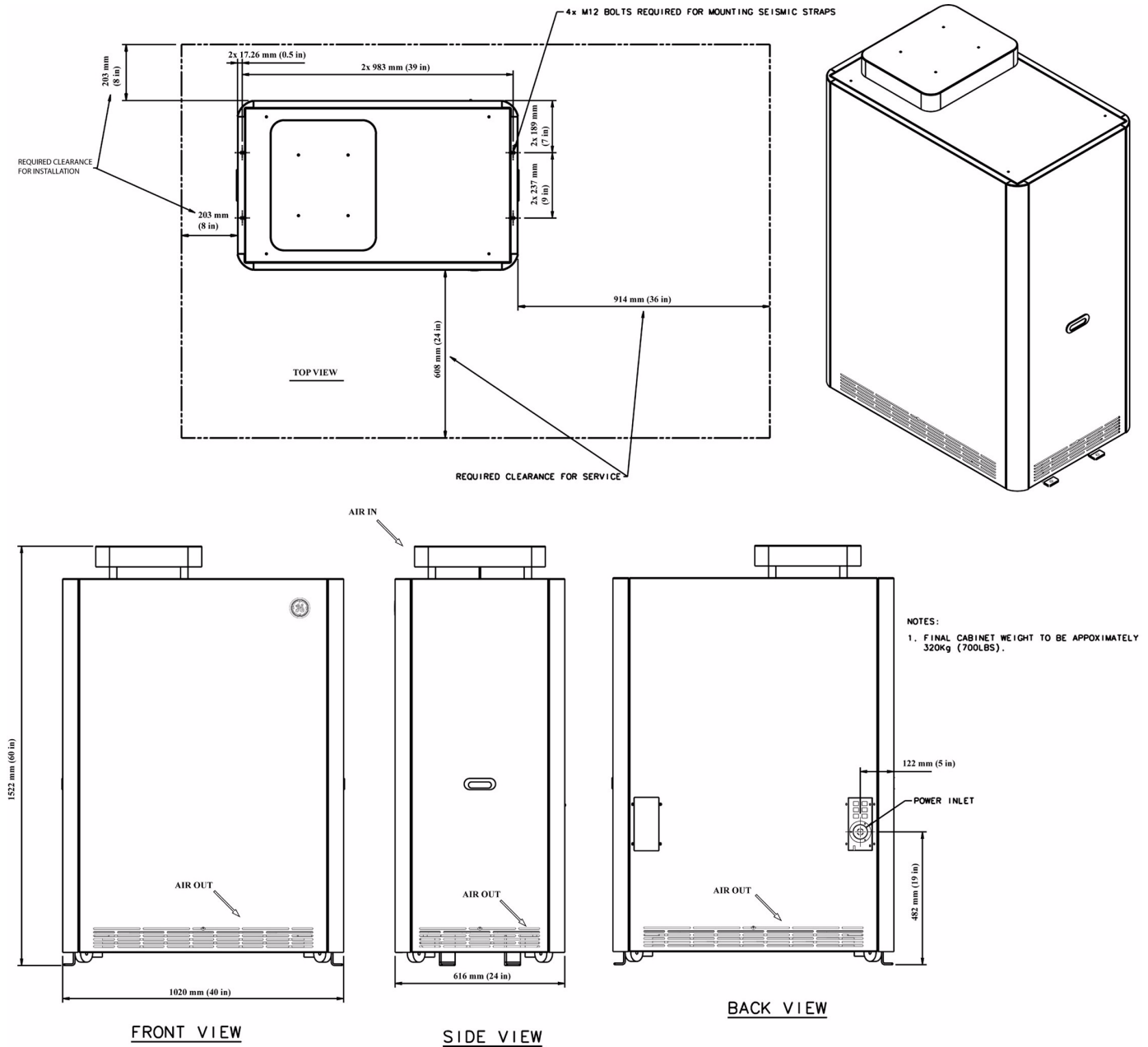


Figure 7-9 PARC

| Description | Width |      | Depth |      | Height |      |
|-------------|-------|------|-------|------|--------|------|
|             | mm    | inch | mm    | inch | mm     | inch |
| PARC        | 1020  | 40   | 816   | 32   | 1522   | 60   |

Table 7-6 Dimensions of PARC

2.11 D600 GOC4 Operator Console Dimensions and Ergonomic Specifications

Note: Not in production after Oct 2010.

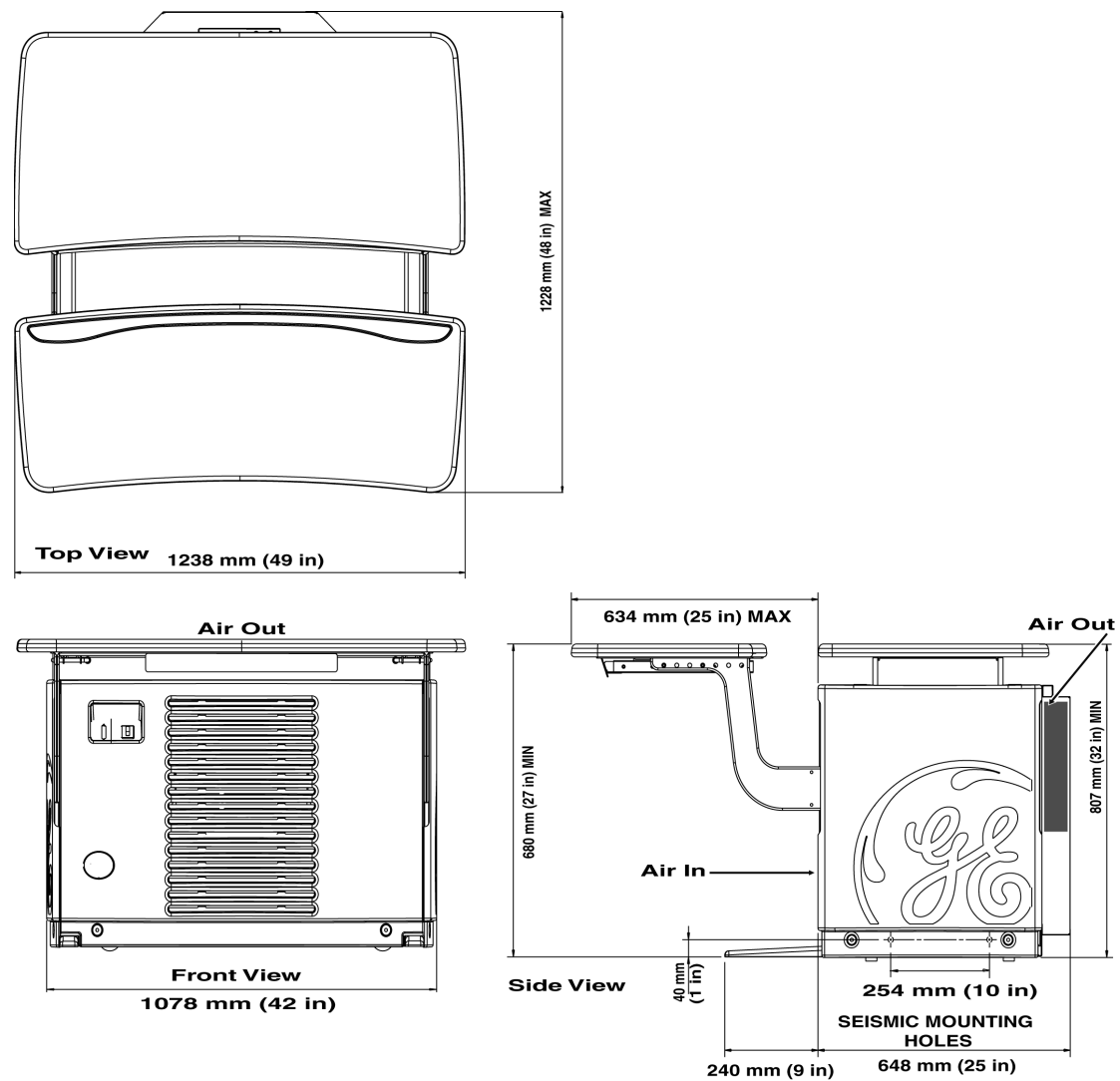


Figure 7-10 D600 GOC4 Operator Console Dimensions and Ergonomic Specifications

| Description                | Width |      | Depth |      | Height |      |
|----------------------------|-------|------|-------|------|--------|------|
|                            | mm    | inch | mm    | inch | mm     | inch |
| Remote Color Monitor (LCD) | 413   | 16   | 203   | 8    | 406    | 16   |

Table 7-7 Dimensions of Peripherals



2.12 D690 VCT GOC5 Operator Console Dimensions and Ergonomic Specifications

Note: Not in production after Oct 2010.

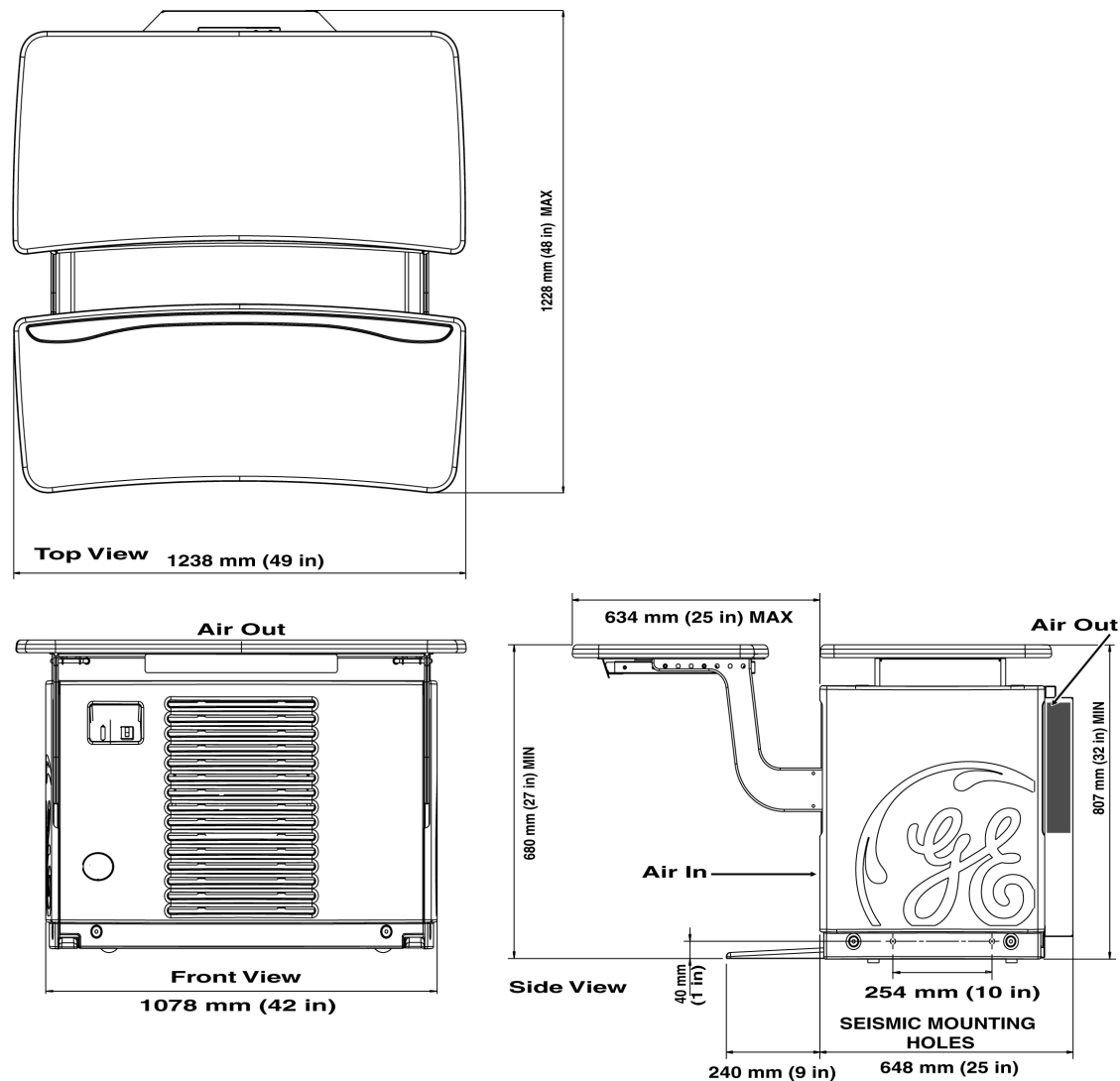


Figure 7-11 D690 VCT GOC5 Operator Console Dimensions and Ergonomic Specifications

| Description                | Width |      | Depth |      | Height |      |
|----------------------------|-------|------|-------|------|--------|------|
|                            | mm    | inch | mm    | inch | mm     | inch |
| Remote Color Monitor (LCD) | 413   | 16   | 203   | 8    | 406    | 16   |

Table 7-8 Dimensions of Peripherals



# Chapter 8

## Structural and Mounting Requirements

---

### Section 1.0 Overview

#### 1.1 Importance of Meeting Structural Requirements

System performance specifications require close consideration of the customer's floor properties.

This chapter provides critical information and guidelines to help the customer's contractor, architect, and structural engineer arrive at a proper assessment and design of the customer's floor and ceiling. The customer or PMI should communicate the information in this chapter to the architect, structural engineer, and contractor prior to construction or renovation. Failure to properly evaluate the customer's floor properties may result in limited performance and possible safety hazards.

##### 1.1.1 Levelness, Vibration, and Floor Loading

All floors, whether configured to use the recommended GE-supplied anchoring system or an equivalent anchoring method, must meet the requirements for **levelness**, **vibration**, and **floor loading** listed in [Section 3.0 on Page 52](#).

##### 1.1.2 Seismic Loading

Local laws and building codes in some areas may require the customer's contractor and structural engineer to consider seismic loads. A copy of the seismic calculations can be obtained by the on-site [GE Representative](#) for the customer's contractor and structural engineer to complete the proper seismic calculations

##### 1.1.3 Anchoring

[Section 5.0 on Page 60](#) lists the information necessary for the customer's contractor or structural engineer to properly implement the GE-supplied anchoring system, if appropriate for the site. Please note that local laws, building codes, seismic considerations, and building or structural limitations may require the use of anchoring methods other than the GE-supplied anchoring system. In such cases, responsibility for providing an equivalent anchoring method rests solely with the customer's contractor or structural engineer.

Consult your architect, structural engineer, contractor, or PMI to resolve any questions.

**NOTICE** Responsibility for providing an approved support structure and mounting method for all floor types other than those listed in this chapter rests with the purchaser. General Electric accepts no responsibility for any failure of the support structure or anchoring method, including seismic mounting and anchoring. GE accepts no responsibility for methods other than those listed.

## Section 2.0 Ceiling Requirements

The minimum ceiling height above the table and gantry shall measure at least 2286 mm (90 in.) when measured from the floor to the finished ceiling. The purchaser or their contractor shall complete the installation of all pedestals for ceiling-mounted components. The PMI will provide the necessary bolt hole information upon request.

Note: A finished ceiling is required.

## Section 3.0 Minimum Floor Requirements

### 3.1 Floor Levelness Specifications

#### 3.1.1 Critical Specifications

Accurate patient positioning during scanning depends on proper alignment of the Gantry and the Table. The floor levelness specifications listed below ensure that the table and gantry height adjusters have enough range to allow proper leveling of the system.

| Specification | Metric (minimum)                   | English (minimum)                   |
|---------------|------------------------------------|-------------------------------------|
| Levelness     | 6 mm maximum variance over 3048 mm | 1/4 in. maximum variance over 10 ft |

**Table 8-1 Critical Specifications for Floor Levelness**

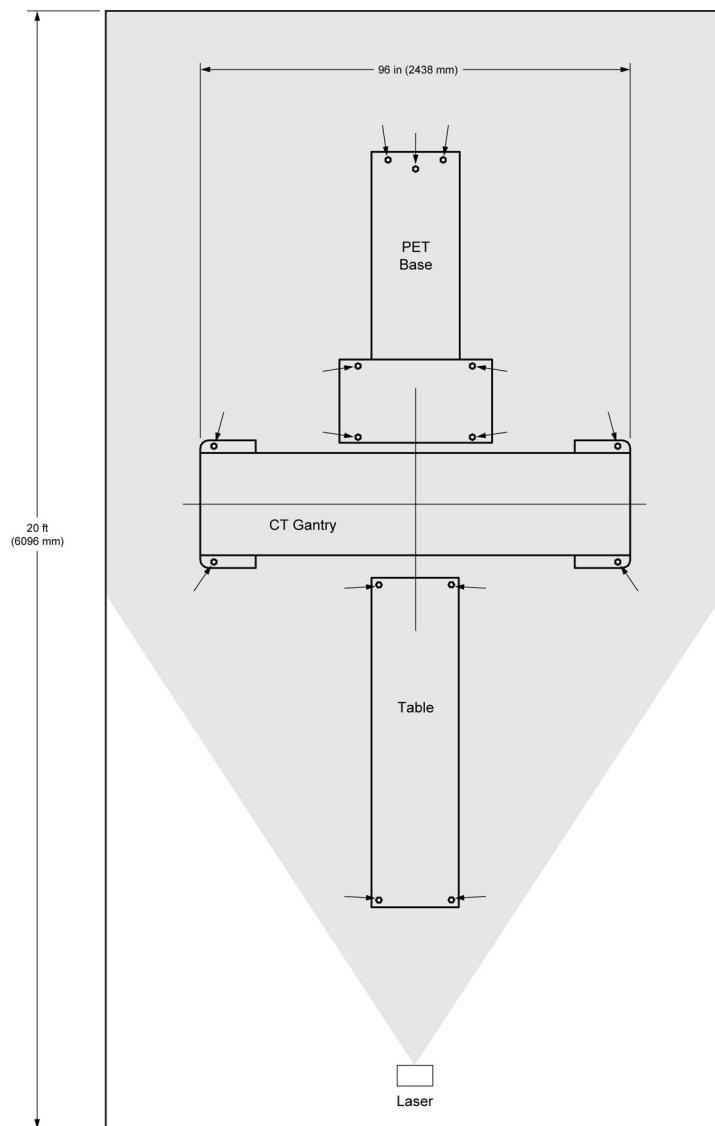
#### 3.1.2 Floor Levelness Guidelines

Consider the following factors when determining floor levelness:

- Factors that can disturb the levelness of a weak floor, including:
  - Moving weights such as gurneys or heavy personal equipment.
  - Changes in the system's center of gravity when the table moves, as the table can carry a patient load of up to 227 kg (500 lbs).
- Resilient tile, carpeting, or equivalent that may yield or compress over time. At sites with such floor coverings, be sure to cut away the tile or carpeting where the table and gantry adjusters touch the floor to expose the stable base material, upon which to seat the adjusters.
- Floor shims are not permitted.
- Refer to the steps listed below in [Section 3.1.3](#) and to [Figure 8-1](#) to check whether the floor of the scan suite meets the floor levelness specifications for the system.

#### 3.1.3 Measuring Floor Levelness

- 1.) Using the GE floor template (P/N 5322810) to establish the room layout and system location, locate the table, CT gantry, and PET base anchor holes.
- Note: To order a GE floor template, contact the GE Project Manager of Installation.
- 2.) Place the gantry template on the floor and align it according to the GE site print.
  - 3.) Place the table template over the top of the gantry template and align the scan and table centerlines.
  - 4.) Secure the templates to the floor.
  - 5.) Use a laser to check the levelness of the floor across the entire area covered by the template, as shown in [Figure 8-1](#).



GE-00009

**Figure 8-1 Determining Floor Levelness**

## 3.2 Floor Vibration Specifications

### 3.2.1 Requirements

CT systems are sensitive to vibration and may display limited performance if exceeding the vibration limits listed below. The band of frequencies in which systems exhibit the most sensitivity appears at or near the resonant frequencies of the gantry and the patient table, the latter of which varies depending on patient mass and location. These frequencies fall within the following ranges:

- Patient table: 2 – 10 Hz
- Gantry: 8 – 14 Hz

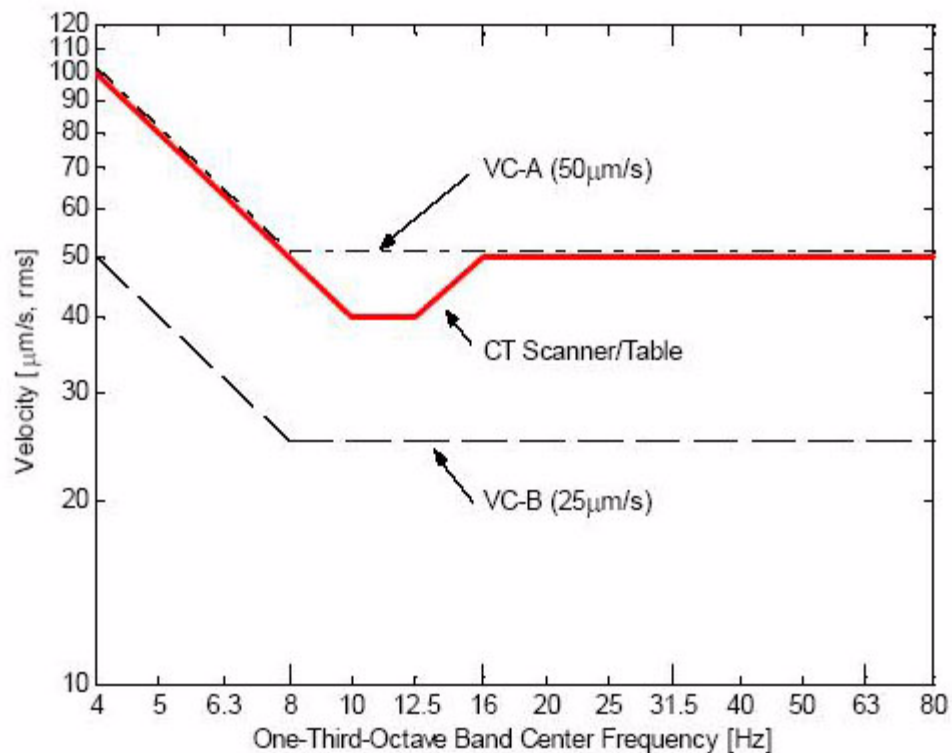
Floor vibration from any intermittent or continuous source, such as walking, running, exercising, mechanical equipment and traffic, must not exceed the levels shown in [Figure 8-2](#) or [Figure 8-3](#), as represented by the solid line labeled *CT Scanner/Table*. These figures compare this limit to the

limits of what the AISC (American Institute of Steel Construction) and the ISO (International Organization for Standardization) call Class A (VC-A) and Class B (VC-B).

Note: In Figure 8-2 and Figure 8-3 the symbol  $\mu$  represents  $10^{-6}$ .

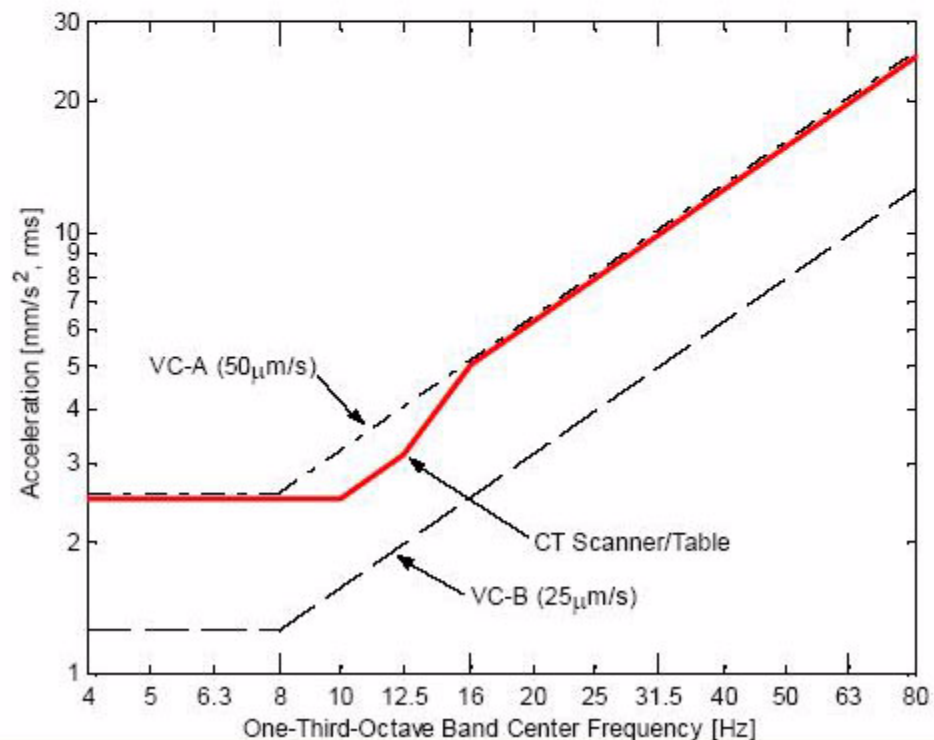
The preferred format for measuring vibration is *velocity versus frequency*, as shown in Figure 8-2. However, should it prove necessary to measure acceleration and there is no means to convert the measured data to velocity, then use the equivalent acceleration limit shown in Figure 8-3, derived from the velocity spectrum.

| Frequency [Hz] | Velocity [ $\mu\text{m/s}$ , rms] |
|----------------|-----------------------------------|
| 4              | 100                               |
| 10             | 40                                |
| 12.5           | 40                                |
| 16             | 50                                |
| 80             | 50                                |



**Figure 8-2 Allowable floor vibration in velocity units compared to ISO class A & B limits**

| Frequency [Hz] | Acceleration [mm/s <sup>2</sup> , rms] |
|----------------|--|
| 4              | 2.5                                    |
| 10             | 2.5                                    |
| 12.5           | 3.1                                    |
| 16             | 5                                      |
| 80             | 25                                     |



**Figure 8-3 Allowable floor vibration in acceleration units compared to ISO class A & B limits**

### 3.2.2 Sources of Floor Vibration

Consider that vibrations strong enough to effect the floor may emanate from the following sources in and around the scanning facility, requiring possible isolation of the floor or structure from them:

- hospital power plants housing pumps, motors, air handling equipment, or air conditioning units
- nearby rooms with exercise equipment or where running, jumping, or exercising occurs
- hallway foot traffic
- elevators
- parking lots
- roadways
- subways
- trains
- heliports

## Section 4.0 Floor Loading and Component Weights

The customer's contractor and structural engineer should use the information in [Table 8-2](#) (Discovery 690 VCT, Discovery Elite) or [Table 8-3](#) (Optima 560, Discovery 690 Elite, Discovery 600) to help determine whether the floor structure in the scan suite possesses sufficient strength to support the weight of the system.

| System Component              | Net Weight<br>kg (lb.)                             | Overall<br>W x D<br>mm (in.)   | Load Pattern<br>in. (mm)  | Max<br>Uplift<br>Load N<br>(lb.) | Max<br>Compressive<br>Load<br>N (lb.) | Normal Method of<br>Mounting<br>mm (in.)<br>(GE-supplied <sup>1</sup> )  |
|-------------------------------|--|--------------------------------|---|----------------------------------|---------------------------------------|--|
| CT Gantry                     | 1850<br>(4079)                                     | 2267 x 1007<br>(89.25 x 39.65) | 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.  | 0                                | 4895<br>(1100)                        | 12.7 mm (1/2 in.) diam. x 254 mm (10 in.) long per P/N 2106573-2 at four leveling pads into concrete floor.                    |
| PET Gantry                    | 1968<br>(4339)                                     | 1931 x 720<br>(76.0 x 28.3)    | While in the imaging position, the effective PET load area is 15.7 x 25.4 (398 x 645) with 7 pads each 2.5 (63.5) as well as 2 pads that do not get anchored (support only) | 0                                | 6101<br>(1250)                        | Hilti Kwik-Bolt II 12.7mm (1/2 in.) diameter by 8 in. (203mm) long per P/N 2106573 at seven leveling pads into concrete floor. |
| Patient Table                 | 1049<br>(2308)<br>Includes 227<br>(500)<br>Patient | 650 x 3450<br>(25.6 x 135.8)   | Rectangular base 21.7 x 84.0 (550 x 2134) with 6 round pads, each 2.5 (63.5) in contact with the floor  | 890<br>(200)                     | 4926<br>(1107)                        | Hilti Kwik-Bolt II 12.7mm (1/2 in.) diameter per 8 in. (203 mm) long per P/N 2106573 at four leveling pads into concrete floor |
| Power Distribution Unit (PDU) | 370<br>(813)                                       | 700 x 550<br>(27.6 x 21.6)     | Four Casters support area of 28 x 22 (711 x 559).   | 0                                | 1070<br>(240)                         | Castors are for positioning and service. Set on floor. May be anchored to floor with angle brackets in seismic zones.          |

### 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.

**Table 8-2 Discovery 690 VCT, Discovery Elite System Floor Loads**



| System Component   | Net Weight<br>kg (lb.) | Overall<br>W x D<br>mm (in.)           | Load Pattern<br>in. (mm)   | Max<br>Uplift<br>Load N<br>(lb.) | Max<br>Compressive<br>Load<br>N (lb.) | Normal Method of<br>Mounting<br>mm (in.)<br>(GE-supplied <sup>1</sup> )   |
|--|------------------------|--|--|----------------------------------|---------------------------------------|---|
| GOC6.5<br>Operator<br>Console with<br>HP and LCD<br>monitors           | 258<br>(547)           | 559 x 940<br>(22 x 37)                 | Four Casters or<br>leveling feet support<br>area of 46 x 19<br>(1168 x 483).                         | 0                                | 820<br>(184)                          | Casters are for<br>positioning. Set on<br>floor. Console may be<br>anchored to floor using<br>angle brackets <sup>3</sup> .   |
| Monitor -LCD<br>(each)   | 20 (9)                 | 16.5 x 9.7<br>(420 x 247)              |  |                                  |                                       |   |
| Universal Power<br>Supply (UPS)  | 281<br>(619)           | 305 x 814 x<br>1219<br>(12 x 32 x 48)  | Rectangular base<br>22 x 32 (305 x 813)<br>with four castors,<br>each in contact with<br>the floor.  | 0                                | 689<br>(155)                          | Casters are for<br>positioning. Set on<br>floor. Adjust the six<br>leveling pads on the<br>floor.   |
| PARC   | 317<br>(700)           | 635 x 1016 x<br>1422<br>(25 x 40 x 56) | Rectangular base<br>25 x 40 (635 x 1016)<br>with four castors,<br>each in contact with<br>the floor. | 0                                | 779<br>(175)                          | Casters are for<br>positioning and<br>service. Set on floor.<br>Adjust the four leveling<br>pads on the floor. May<br>be anchored to floor<br>with angle brackets <sup>3</sup> in<br>seismic zones. |
| GOC5 Operator<br>Console<br>(Not in<br>production;<br>reference only.) | 258<br>(547)           | 559 x 940<br>(22 x 37)                 | Four Casters or<br>leveling feet support<br>area of 46 x 19<br>(1168 x 483).                         | 0                                | 820<br>(184)                          | Casters are for<br>positioning. Set on<br>floor. Console may be<br>anchored to floor using<br>angle brackets <sup>3</sup> .   |

**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.

**Table 8-2 Discovery 690 VCT, Discovery Elite System Floor Loads (Continued)**

| System Component              | Net Weight<br>kg (lb.)                             | Overall<br>W x D<br>mm (in.)          | Load Pattern<br>in. (mm)  | Max<br>Uplift<br>Load N<br>(lb.) | Max<br>Compressive<br>Load<br>N (lb.) | Normal Method of<br>Mounting<br>mm (in.)<br>(GE-supplied <sup>1</sup> )  |
|-------------------------------|--|---------------------------------------|---|----------------------------------|---------------------------------------|--|
| CT Gantry                     | 1770<br>(3899)                                     | 2057 x 1018<br>(81 x 40)              | Rectangular base plate 28 x 77 (700 x 1966) with four round pads, each 2.5 (63.5) in contact with floor. Individual pad loadings are 910 lb., 960 lb., 1040 lb., and 1090 lb. | 0                                | 4895<br>(1100)                        | Hilti Kwik-Bolt II 12.7 mm (1/2 in.) dia. by 203 mm (9 in.) long per P/N 2106573 at for leveling pads into the concrete floor. |
| PET Gantry                    | 2101<br>(4631)                                     | 1050 x 1635<br>(41.5 x 64.5)          | While in the imaging position, the effective PET load area is 19.2 x 24 (488 x 610) with 7 pads each 2.5 (63.5) as well as 2 pads that do not get anchored (support only)     | 0                                | 1266<br>(6180)                        | Hilti Kwik-Bolt II 12.7mm (1/2 in.) diameter by 8 in. (203mm) long per P/N 2106573 at seven leveling pads into concrete floor. |
| Patient Table                 | 1049<br>(2308)<br>Includes 227<br>(500)<br>Patient | 650 x 3450<br>(25.6 x 135.8)          | Rectangular base 21.7 x 84.0 (550 x 2134) with 6 round pads, each 2.5 (63.5) in contact with the floor  | 890<br>(200)                     | 4926<br>(1107)                        | Hilti Kwik-Bolt II 12.7mm (1/2 in.) diameter per 8 in. (203 mm) long per P/N 2106573 at four leveling pads into concrete floor |
| Power Distribution Unit (PDU) | 370<br>(813)                                       | 700 x 550<br>(27.6 x 21.6)            | Four Casters support area of 28 x 22 (711 x 559).   | 0                                | 1070<br>(240)                         | Casters are for positioning and service. Set on floor. May be anchored to floor with angle brackets in seismic zones.          |
| Universal Power Supply (UPS)  | 281<br>(619)                                       | 305 x 814 x<br>1219<br>(12 x 32 x 48) | Rectangular base 22 x 32 (305 x 813) with four castors, each in contact with the floor.   | 0                                | 689<br>(155)                          | Casters are for positioning. 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.

**Table 8-3 Optima 560, Discovery 600, Discovery 690 Elite System Floor Loads**

| System Component   | Net Weight<br>kg (lb.) | Overall<br>W x D<br>mm (in.)           | Load Pattern<br>in. (mm)   | Max<br>Uplift<br>Load N<br>(lb.) | Max<br>Compressive<br>Load<br>N (lb.) | Normal Method of<br>Mounting<br>mm (in.)<br>(GE-supplied <sup>1</sup> )   |
|--|------------------------|--|--|----------------------------------|---------------------------------------|---|
| PARC   | 317<br>(700)           | 635 x 1016 x<br>1422<br>(25 x 40 x 56) | Rectangular base<br>25 x 40 (635 x 1016)<br>with four castors,<br>each in contact with<br>the floor. | 0                                | 779<br>(175)                          | Casters are for<br>positioning and<br>service. Set on floor.<br>Adjust the four leveling<br>pads on the floor. May<br>be anchored to floor<br>with angle brackets <sup>3</sup> in<br>seismic zones. |
| True-In-One<br>Console w/o<br>monitors                                     | 192 (87)               | 18.5 x 29.2<br>(470 x 740)             | 99 (483)   |                                  |                                       |   |
| Monitor -LCD<br>(each)   | 20 (9)                 | 16.5 x 9.7<br>(420 x 247)              |  |                                  |                                       |   |
| Freedom<br>Workspace (p/n<br>5168666-2)                                    | 108 (49)               | 53 x 29<br>(1350 x 741)                |  |                                  |                                       |   |
| D600 GOC4<br>Console ( <b>Not in<br/>production;<br/>reference only.</b> ) | 213<br>(470)           | 1240 x 1235<br>(40 x 40)               | Four casters of<br>leveling feet support<br>area if 46 x 19 (1186<br>x 483)                          | 0                                | 0                                     | Casters are for<br>positioning. Set on<br>floor. Console may be<br>anchored to floor using<br>angle brackets.   |

**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.

**Table 8-3 Optima 560, Discovery 600, Discovery 690 Elite System Floor Loads (Continued)**

## 4.1 Floor Loading and Anchoring Guidelines

Follow the floor loading and anchoring guidelines below when preparing a site for system installation:

- The table and gantry require secure anchoring to the scan room floor. The power distribution unit and the console sit on the floor with casters; anchoring of these components to the floor is optional, unless desired or required because of seismic considerations.
- The total floor load for a PET system with no UPS measures approximately 3229 kg (7104 lbs).
- Anchors mount through the table and gantry supports. Use the floor template or its dimensions to locate the table and gantry support positions within the scan room, making sure that any anchors that pass through the supports clear all structural beams and interferences in the floor.
- If a loading analysis determines that the gantry and table position should change relative to their position on the GE site print, be sure to take into account the clearance requirements in [Chapter 4, Regulatory Requirements](#) and [Chapter 5, Service Clearance Requirements](#) when determining an appropriate location for the scanner.
- Bear in mind that hospitals and scanning facilities throughout the world may utilize a variety of floor types, and that the disposition of different floor types may necessitate additional planning to adequately accommodate the scanner:
  - Wood floors often require substantial reinforcement. Consequently, GE does not recommend using wood floors.
  - Temperature variation in blacktop or marble floors may allow anchor movement and pullout. Consequently, GE does not recommend using these floors.
  - GE recommends using concrete floors with a minimum thickness of at least 5 in. (127 mm) when using GE-supplied anchoring or any other equivalent anchoring method.

**NOTICE** Responsibility for providing an approved support structure and mounting method for all floor types other than the GE-recommended floor rests with the purchaser. General Electric accepts no responsibility for any failure of the support structure or anchoring method, including those used for seismic mounting. GE accepts no responsibility for methods other than those listed.

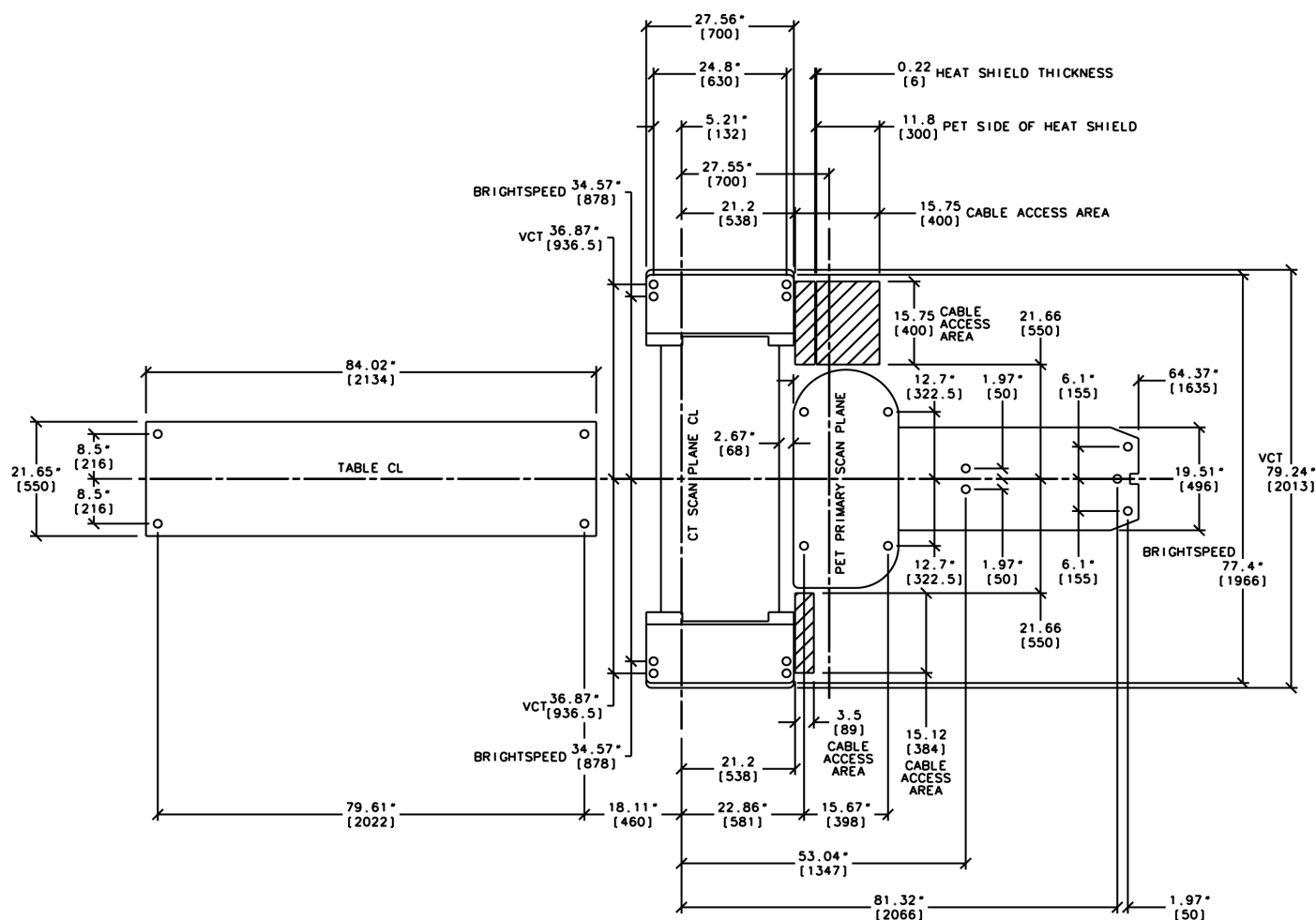
## Section 5.0 GE-Supplied Anchoring

GE supplies anchors for use in mounting the table and gantry. Note that the console and power distribution unit do not require anchoring to the floor. It is the responsibility of the customer to have a structural engineer and trained contractor use either the GE-supplied anchoring method or to provide an equivalent anchoring method to mount the table and gantry to the floor.

Consult your architect, structural engineer, contractor, or PMI to resolve any questions.

**WARNING** POTENTIAL FOR PATIENT INJURY! AN IMPROPERLY SECURED TABLE MAY TIP, DISLODGING THE PATIENT. PATIENT SAFETY DURING SYSTEM OPERATION REQUIRES PROPER ANCHORING OF SYSTEM COMPONENTS.

**Note:** For installation flexibility, [Figure 8-4](#) depicts a cable access area on both the left and right side of the drawing and indicates different sized openings. Only one location should be defined on the final site drawing. The cable access areas defined on the right are the preferred duct/conduit location.



**Figure 8-4 Floor Mounting Detail**

## 5.1 Requirements for using GE-supplied Anchors

Use of GE-supplied anchors shall adhere to the following requirements:

- Use only the GE-supplied anchors when mounting components on concrete floors.
- Adhere to all anchoring requirements listed in [Table 8-4](#).
- Any anchors showing more than 21 mm (~0.9 in.) of thread above the torqued nut shall require the installation of a second anchor in the closest adjacent mounting location. The second anchor shall meet the same requirements in [Table 8-4](#).
- Non-seismic installations must use a minimum of eight (8) anchors to mount the gantry and four (4) anchors to mount the table.
- Fully engage the adjuster lock rings with at least one full thread showing below the notched portion on the Adjuster Screw.

Note: The table will not have the adjuster lock rings shown in [Figure 8-5](#).

| 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 1/2"<br>(254 mm x 13 mm)                         | 8" x 1/2"<br>(203 mm x 13 mm)                          | 8" x 1/2"<br>(203 mm x 13 mm)                          |
| Alternate Anchoring Methods          | Determined by customer contractor.<br><b>See Note.</b> | Determined by customer contractor.<br><b>See Note.</b> | Determined by customer contractor.<br><b>See Note.</b> |

**Note:** The customer's contractor and structural engineer should use the information in [Table 8-2](#) (Discovery 690 VCT, Discovery Elite) or [Table 8-3](#) (Optima 560, Discovery 690 Elite, Discovery 600) to help determine whether the floor structure in the scan suite possesses sufficient strength to support the weight of the system.

**Table 8-4 Mounting Requirements - Major components**

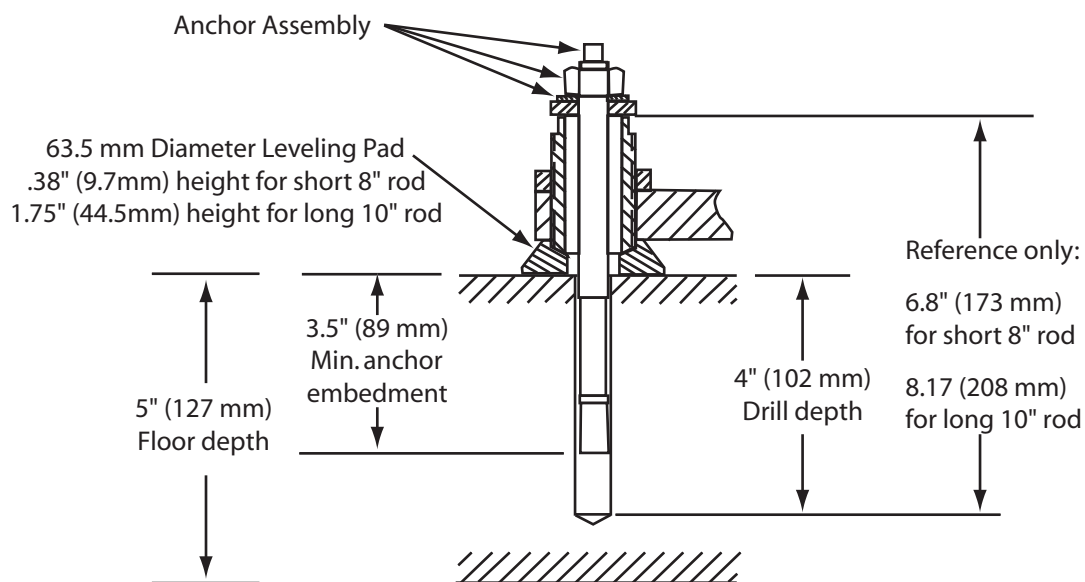
### 5.1.1 Minimum Floor Thickness

For any installation on a floor with a rating less than the values listed in [Table 8-4](#), consult a structural engineering specialist to determine any necessary enhancements.

Support areas of the patient table and gantry must rest on at least 127 mm (5 in) 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 500 lb (227 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 8, Section 4.0](#) for gantry and table mounting details.



Note: Adjusters are used at each anchor location.  
Anchor hole ID is 1/2" (12.7 mm).

**Figure 8-5 Specifications of GE-Supplied Anchors for Table and Gantry**

## Section 6.0 Seismic Mounting

### 6.1 Overview

Refer to the guidelines below when mounting the system in seismic zones:

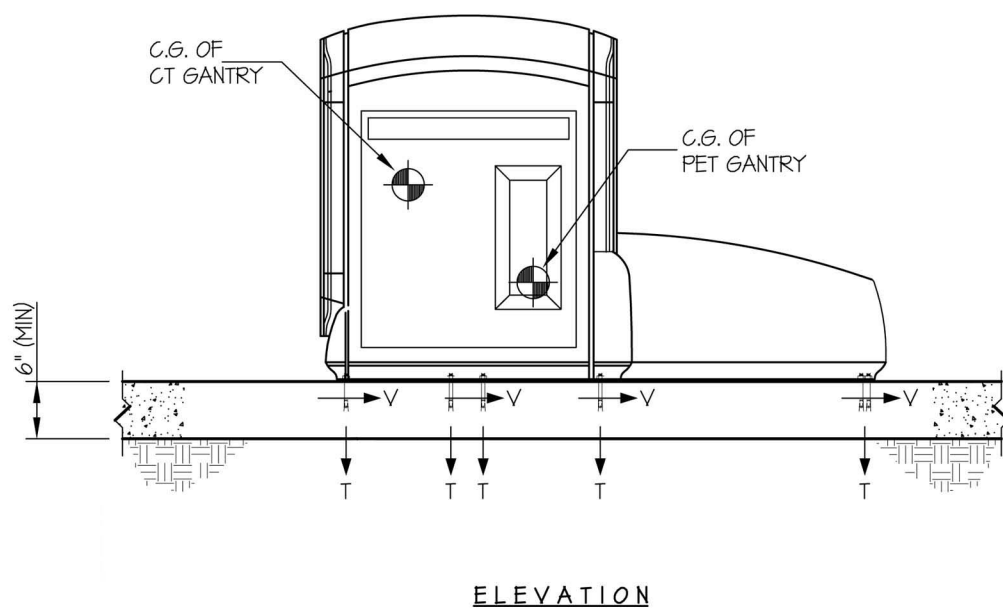
- Responsibility for proper seismic mounting rests with the customer. Refer to all applicable laws and codes for your locality.
- Seismic angle brackets are included with the PDU (Power Distribution Unit) and console for sites requiring seismic anchoring of these units.
- GE-supplied anchors may not meet local seismic laws and codes. Use them only if a qualified structural engineer approves them for use in local seismic applications.
- The customer's contractor will often supply a state-certified print or equivalent, showing seismic installation instructions.
- Consider seismic requirements for ceiling-mounted fixtures and refer to the appropriate installation instructions for ceiling-mounted fixtures.

### 6.2 Center-of-Gravity Information

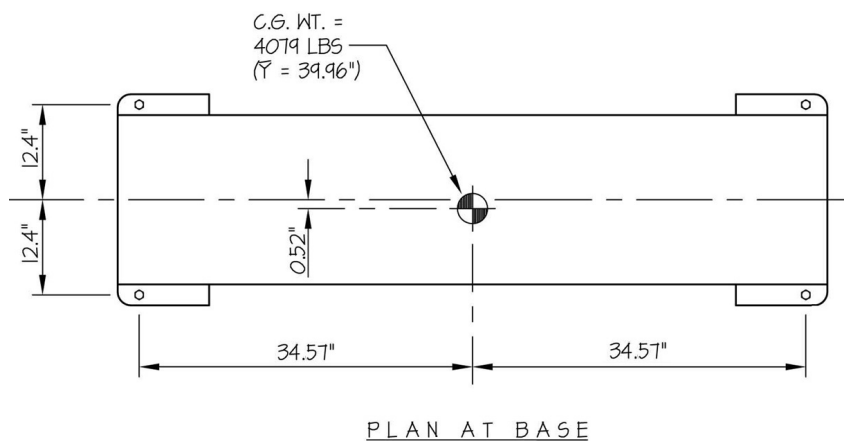
The information in the following figures provides the customer's contractor and/or structural engineer with center-of-gravity information to assist in seismic calculations for the system:

- Gantry: [Figure 8-6](#)
- Patient Table: [Figure 8-9](#)
- Power Distribution Unit: [Figure 8-11](#)
- Operator's Console: [Figure 8-12](#)
- Uninterruptible Power Supply: [Figure 8-14](#)
- Storage Cabinet: [Figure 8-15](#)

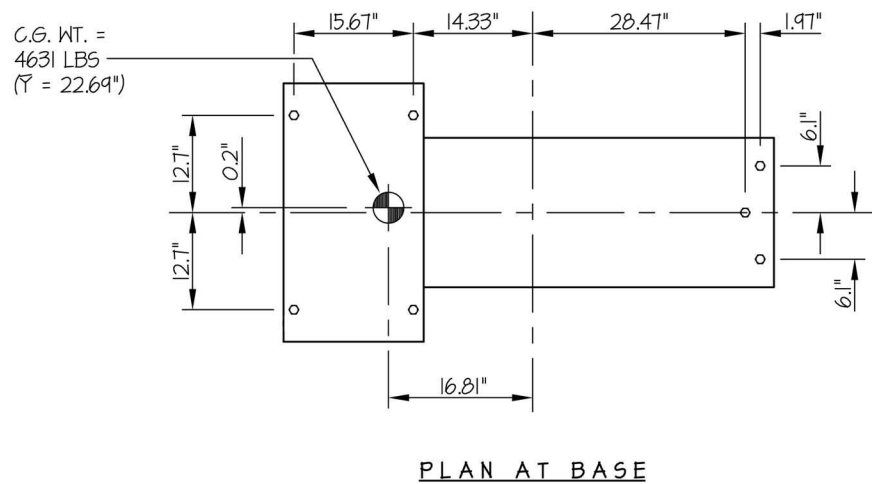




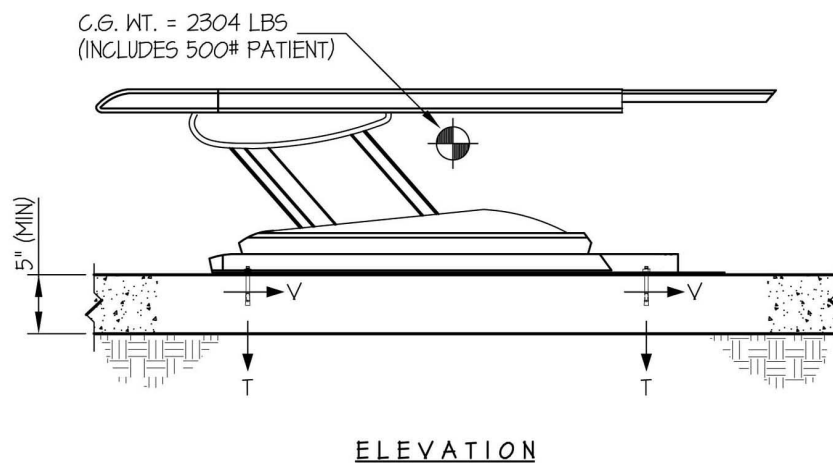
**Figure 8-6 Seismic Anchorage: CT/PET Gantry, Slab on Grade, Side View**



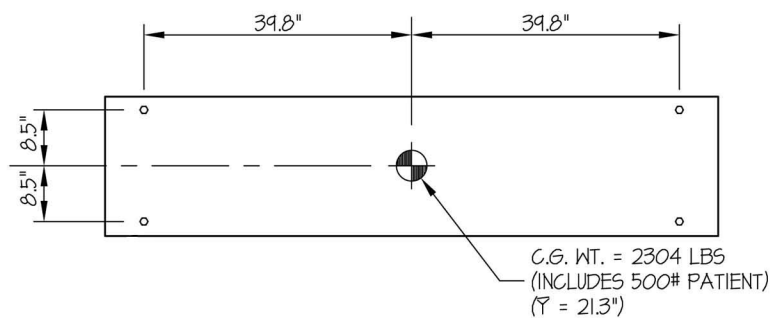
**Figure 8-7 Seismic Anchorage: CT Gantry, Slab on Grade, Top View**



**Figure 8-8 Seismic Anchorage: PET Gantry, Slab on Grade, Top View**

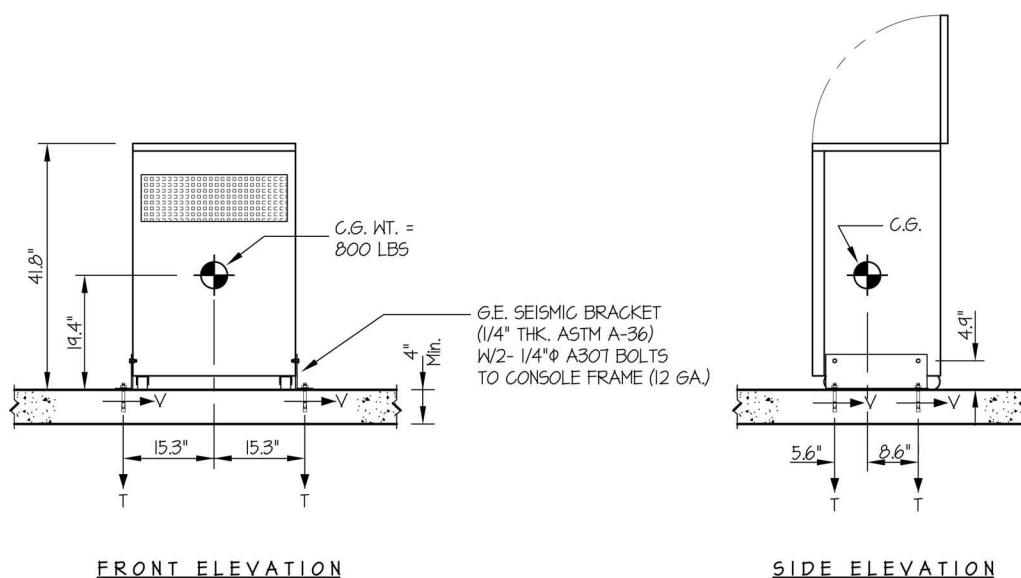


**Figure 8-9 Patient Table**

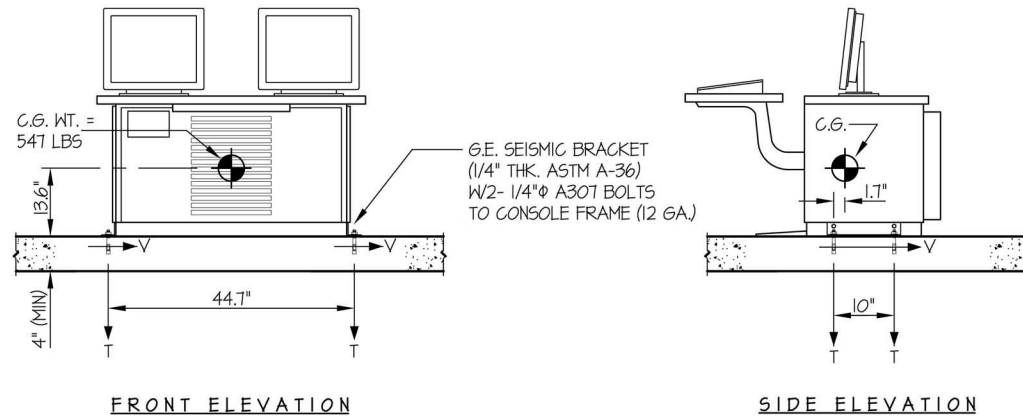


PLAN AT BASE

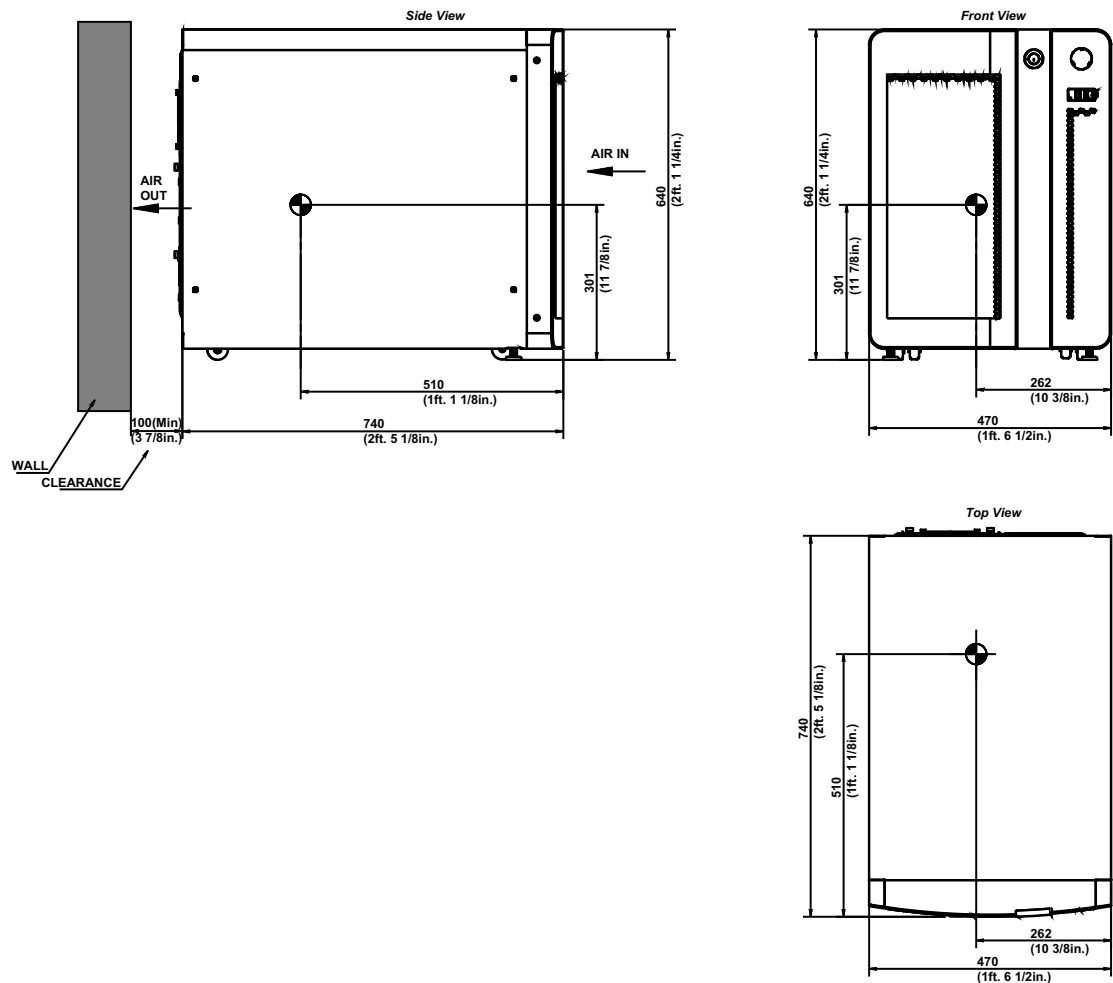
**Figure 8-10 Patient Table**



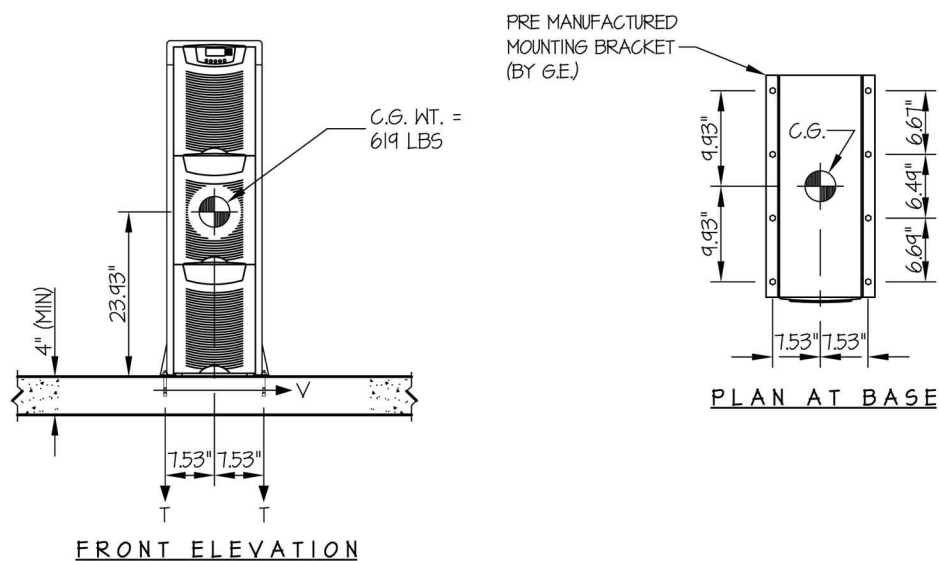
**Figure 8-11 Power Distribution Unit (PDU)**



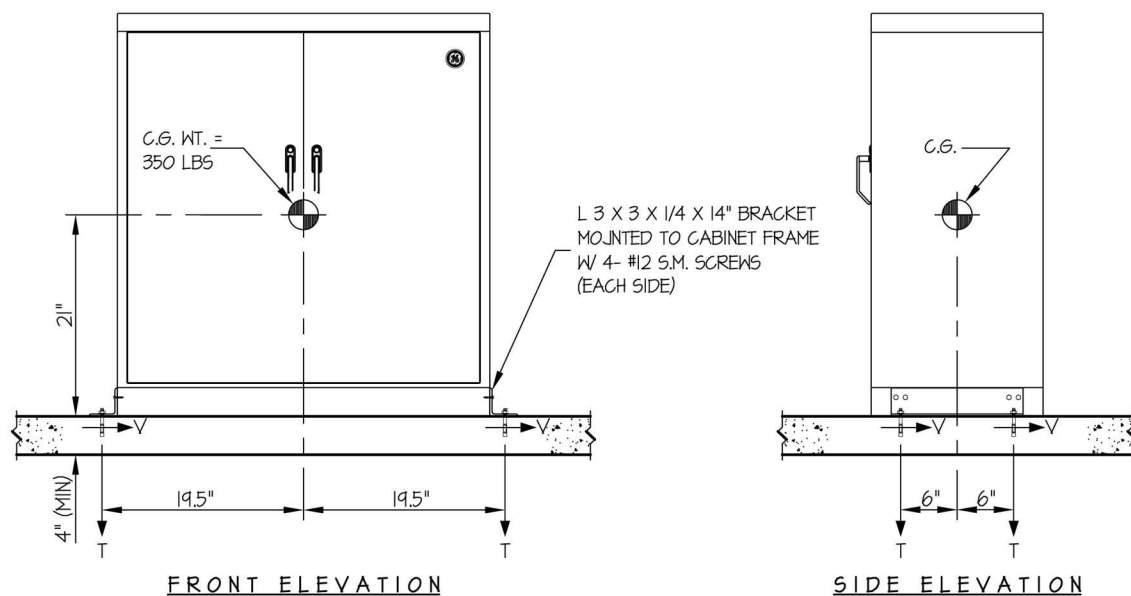
**Figure 8-12 GOC Operator's Console**



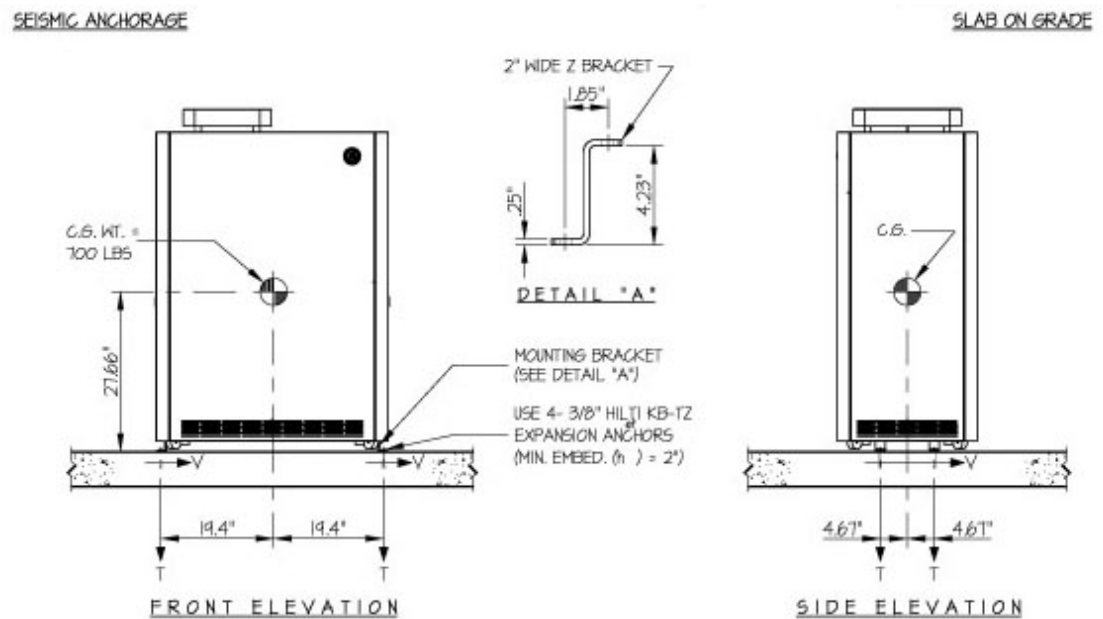
**Figure 8-13 TIO Operator's Console**



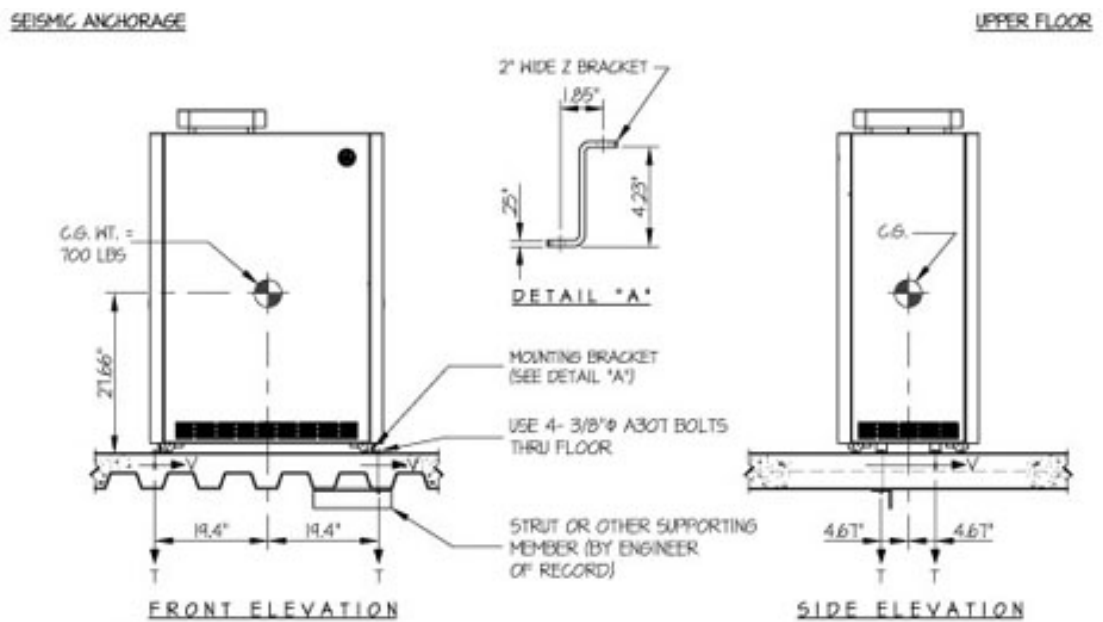
**Figure 8-14 Uninterruptible Power Supply (UPS)**



**Figure 8-15 Storage Cabinet**



**Figure 8-16 PARC on Slab**



**Figure 8-17 PARC Upper Floor**

# Chapter 9

## Environmental Requirements

Ensure the operational readiness and proper system calibration of HVAC prior to installation. Maintain the environmental conditions listed below at ALL times, including over nights, weekends, and holidays. Shut down the system if air conditioning is not working. When shutting down the system for major repair, you may also shut down the air conditioning.

### Section 1.0 Temperature and Humidity Specifications

Environmental specifications apply to the Table, Gantry, Power Distribution Unit, and Operator Console.

**NOTICE** Exceeding environmental specifications may adversely affect system operation and image quality.

#### 1.1 Temperature (Scan and Control Rooms)

|   |               |
|---|---------------|
| Maximum allowable ambient room temperature: | 26° C (79° F) |
| Recommended ambient room temperature:       | 22° C (72° F) |
| Minimum allowable ambient room temperature: | 18° C (64° F) |

**Table 9-1 System Temperature Limits**

Note: Be certain to account for ANY cooling equipment cycle control range, ensuring that the maximum and minimum ambient room temperatures do not exceed those shown above during room thermal cycling. For example, if the HVAC is capable of  $\pm 2^{\circ}$  C control, then the limits would be 20° C - 24° C to maintain absolute limits.

#### 1.2 Humidity (Scan Room & Control Room)

|   |     |
|---|-----|
| Maximum allowable non-condensing relative humidity: | 60% |
| Minimum allowable non-condensing relative humidity: | 30% |

**Table 9-2 System Humidity Limits**

#### 1.3 Other Guidelines

- Accurate determination of hospital room environmental conditions may require the temporary installation of a temperature and humidity recorder near the location designated for system installation. Record temperature and humidity readings before and after installation to verify the site's true environmental conditions.
- Consider heating, ventilating, air conditioning (HVAC) needs, and redundancy (back-up). An air conditioner with two compressor units, rather than one, may prevent system downtime. A redundant (back-up) air conditioner permits system operation during an extended repair of the primary air conditioner.

## Section 2.0 Cooling Requirements

Use [Table 9-1](#) to assist in cooling requirements planning. Gantry operation will require over half of the cooling utilized by your scanner. Contact an HVAC specialist to determine optimal placement of the thermostat and all HVAC vents, bearing in mind that:

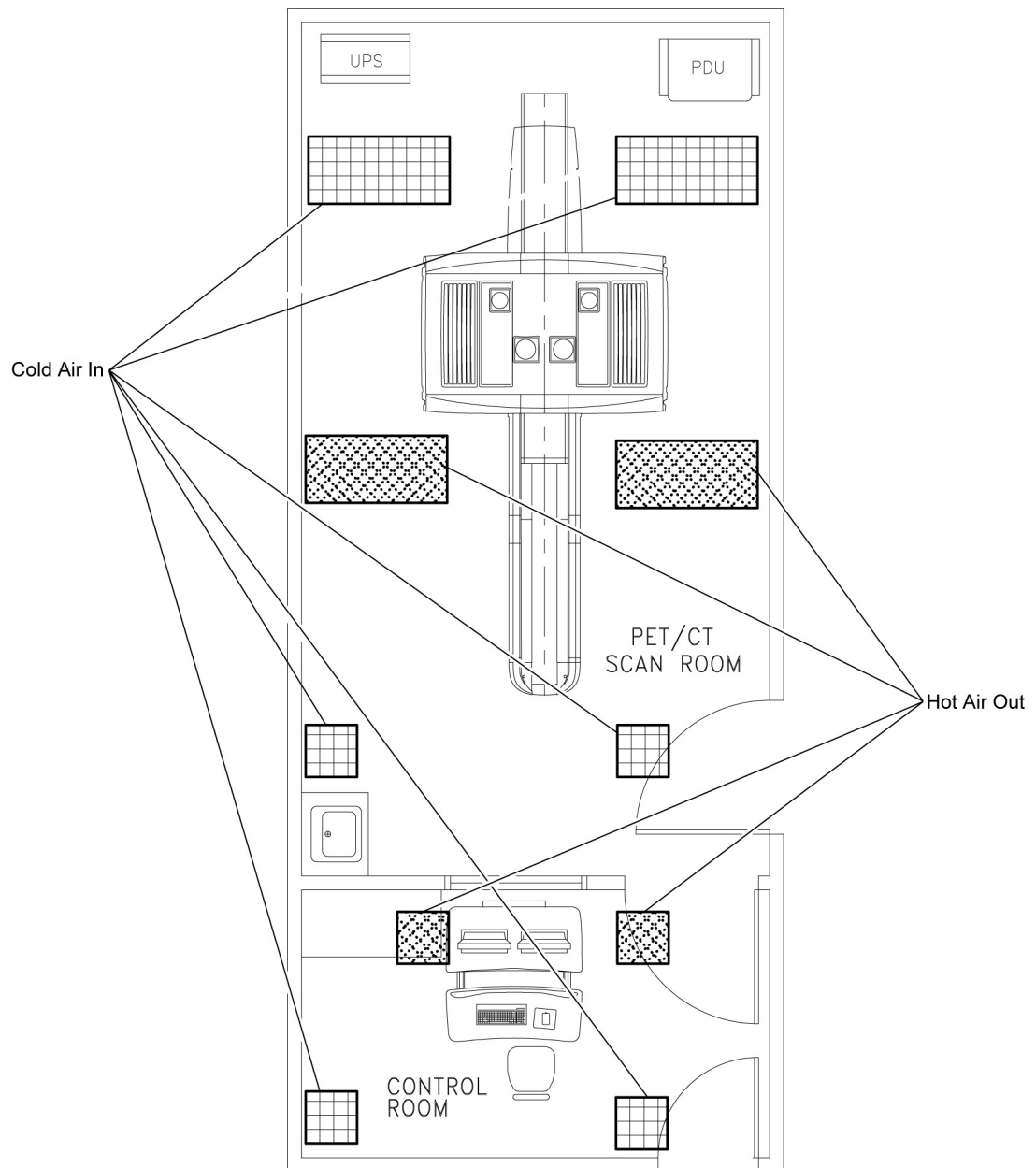
- gantry air intake occurs across the bottom of the gantry.
- gantry air exhaust occurs across the top of the gantry.



| System Component (See NOTE 3)   | BTU/HR       | Watt         |
|---|--------------|--------------|
| Scan Room:  |              |              |
| 1.) CT Gantry minimum (See NOTE 1)  | 18766        | 5500         |
| 2.) PET Gantry  | 5971         | 1750         |
| 3.) Table   | 1024         | 300          |
| 4.) Power Distribution Unit   | 3400         | 1000         |
| 5.) PARC  | 7507         | 2200         |
| <b>Recommended Scan Room Subtotal:</b>  | <b>36668</b> | <b>10750</b> |
| GOC6.5 Console:   |              |              |
| 1.) GOC6.5 Operator Console/Computer with three IG's  | 7210         | 2117         |
| 2.) LCD Monitor (2 units, 170 BTU/50 Watts each)  | 340          | 100          |
| 3.) Peripheral Media Tower (PMT)  | 425          | 125          |
| <b>Control Room Subtotal (GOC6.5 Console and 3 IG's):</b>   | <b>7975</b>  | <b>2342</b>  |
| <b>Recommended System Total (GOC6.5 Console and 3 IG's)<br/>(See NOTE 2):</b>   | <b>44643</b> | <b>13092</b> |
| True In One (TIO) Console:  |              |              |
| 1.) TIO Operator Console  | 7424         | 2175         |
| 2.) LCD Monitor (2 units, 170 BTU/50 Watts each)  | 340          | 100          |
| 3.) Peripheral Media Tower (PMT)  | 425          | 125          |
| <b>Control Room Subtotal (TIO Console):</b>   | <b>8189</b>  | <b>2400</b>  |
| <b>Recommended System Total (TIO Console)<br/>(See NOTE 2):</b>   | <b>44857</b> | <b>13150</b> |
| Additional Options to Consider: (Note: Not a complete list)   |              |              |
| Injector (Typically located in Scan Room)   | 425          | 125          |
| UPS (9355) (Typically located next to PDU)  | 2900         | 850          |
| TV camera   | 34           | 10           |
| TV monitor  | 300          | 88           |
| NOTE 1 With 75 scan rotations per patient, the recommended BTU/hour 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.                    |              |              |

**Table 9-3 Cooling Requirements (Worksheet)**

Refer to [Figure 7-3](#), [Figure 7-4](#), and [Figure 7-11](#) for component air flow requirements.



**Figure 9-1 Cooling Requirements**

## Section 3.0 Altitude

The system shall meet all functional and performance specifications when placed in a room that is at an elevation of -150 m to 2,400 m (-492 ft to 7,875 ft) above sea level.

**Note:** For sites with altitudes 2,400 m to 3,048 m (7,875 ft to 10,000 ft), you need a deviation to site a product at this altitude. Altitudes above 2,400 m (7,875 ft) require engineering approval.

## Section 4.0 Air Quality

### 4.0.1 Dust and Air Quality

Ensure that the scan suite area is free of all dust, and not subject to ANY ongoing construction, including the installation of cabinets, hanging doors, and ceiling tiles.

**NOTICE** SERVICE NOTICE: Because the system's air-intake is near the bottom of the gantry (as shown in [Figure 7-3](#)) and draws in air through a filter in the gantry heater assembly, fine dust—like that created during room construction or renovation—can clog this and other filters found on the DAS, tube, and operator console. If this occurs, dust may become deposited throughout the gantry, table, operator console, and PDU electronics. Once inside the unit, removal becomes impossible, resulting in potential DAMAGE to electronic components and EARLY SYSTEM FAILURE. Consequently, the scanner is the LAST item installed in the scan suite area.

#### TYPES OF DUST TO AVOID

Ensure that NO construction occurs in or immediately around the scan suite area that results in:

- Concrete dust
- Drywall dust
- Ceiling tile dust
- Wood sawdust or shavings
- Dust tracked into the CT suite from adjoining rooms

Failure to take appropriate precautions to protect the system against these types of dust may result in DAMAGE to the system and early SYSTEM FAILURE.

### 4.0.2 Environmental Influences Considered

CT and PET systems are designed with commercial components that are sensitive to air contaminants like sulfide, chloride and nitrates. It is the responsibility of the purchaser to ensure that the levels of these contaminants are low (Class 1). See IEC60654-4 for air quality guidelines.

## 4.1 Chemical Contamination

Never install wet film processors in the same room as the scanner, as this may result in possible contamination of Lightspeed Series components. Chemicals utilized by such processors can contribute to increased equipment failures and downtime, and decreased reliability.

When siting this equipment, consider the effects that contact with these chemicals and the resulting fumes might have on human subjects in proximity to them. In addition, film processor equipment installation must meet all manufacturer requirements (e.g. ventilation specifications) as well as all applicable local, state, and national codes.

**Note:** The full list of customer responsibilities detailed above also exists as an e-Doc checklist.

## Section 5.0 Electro-Magnetic Interference (EMI)

### 5.1 Gantry

Locate the gantry in ambient static magnetic fields of less than  $10^{-4}$  tesla (1000 milligauss) to guarantee the specified imaging performance. Ambient AC magnetic fields must measure below  $10^{-6}$  tesla (10 milligauss) peak.

### 5.2 Console / Computer Equipment

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

### 5.3 PDU

The PDU produces an electromagnetic field that radiates outward from its cabinet in all directions. Do not place sensitive electronics (e.g. the operator console or computer equipment) within 1.0 m (3.28 ft) (measured from the center) of the Power Distribution Unit in any direction, including above or below it. The PDU shall not be placed within 1.5 m (4.9 ft) of the Patient Table.

Note: The classification of sensitive electronics does not include the UPS.

### 5.4 EMI Reduction

If you know of or suspect the presence of fields of excessive EMI, consult GE Healthcare Sales & Service for recommendations. Consider the following when attempting to reduce EMI:

- External field strength decreases rapidly with distance from source of the magnetic field.
- External leakage magnetic field of a three-phase transformer measures much less than that of a bank of three single-phase transformers of an equivalent power rating.
- Large electric motors constitute a source of substantial EMI.
- High-powered radio signals constitute a source of EMI.
- Maintain good screening of cables and cabinets.
- Consider and measure EMI fields of sites with main facility power running UNDER the floor or WITHIN the walls or ceilings of the scan room.
- Pay special attention to power substations and high-voltage power lines in proximity to the scan facility.
- If any concerns remain regarding excessive EMI fields, be sure to measure to confirm that your site meets all required specifications.

## Section 6.0 Electro-Magnetic Compatibility (EMC)

### 6.1 General Scope

This equipment complies with IEC60601-1-2 Edition 3 (2007) EMC standard for medical devices.

The PET/CT system 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 9-4](#)).
- Immunity Compliance level and recommendations to maintain equipment clinical utility ([Table 9-5](#) and [Table 9-6](#)).

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

### 6.2 Electromagnetic Emission

The PET/CT system is intended for use in the electromagnetic environment specified below. The customer or the user of the PET/CT system should assure that it is used in such an environment.

| EMISSIONS TEST  | COMPLIANCE   | ELECTROMAGNETIC ENVIRONMENT GUIDANCE  |
|---|--------------|---|
| RF emissions<br>CISPR 11                                    | Group 1      | The PET/CT system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.  |
| RF emissions<br>CISPR 11                                    | Class A + 12 | <i>Warning:</i> 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<br>IEC 61000-3-2                         | N/A          | When installed in such a shielded location, the PET/CT system is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. |
| Voltage fluctuations/<br>flicker emissions<br>IEC 61000-3-3 | N/A          |   |

**Table 9-4 Electromagnetic Emissions**

## 6.3 Electromagnetic Immunity

The PET/CT system is intended for use in the electromagnetic environment specified below. The customer or the user of the PET/CT system should assure that it is used in such an environment.


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

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

**LIMITATIONS MANAGEMENT:** Adhering to the distance separation recommended in [Table 9-6](#), 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.

| IMMUNITY TEST  | EC 60601-1-2 TEST LEVEL  | COMPLIANCE LEVEL   | Electromagnetic Environment Guidance   |
|--|--|--|--|
| Electrostatic discharge (ESD)<br>IEC 61000-4-2   | ± 6 kV contact<br>± 8 kV air                                   | ± 6 kV contact<br>± 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<br>IEC 61000-4-4   | ± 2 kV for power supply lines<br>± 1 kV for input/output lines | ± 2 kV for power supply lines<br>± 1 kV for input/output lines | Mains power quality should be that of a typical commercial or hospital environment   |
| Surge<br>IEC 61000-4-5   | ± 1 kV differential mode<br>± 2 kV common mode                 | ± 1 kV differential mode<br>± 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<br>IEC 61000-4-11 | < 5 % $U_T$<br>(> 95 % dip in $U_T$ ) for 5 sec                | < 5 % $U_T$<br>(> 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 PET/CT system requires continued operation during power mains interruptions, it is recommended that the PET/CT system be powered from an uninterruptible power supply or a battery. |
| Power frequency (50/60 Hz) magnetic field<br>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 9-5 Electromagnetic Immunity**

| IMMUNITY TEST   | EC 60601-1-2 TEST LEVEL                    | COMPLIANCE LEVEL              | Electromagnetic Environment Guidance  |
|---|--|-------------------------------|---|
| Conducted RF<br>IEC 61000-4-6   | 3 V <sub>RMS</sub><br>150 kHz to<br>80 MHz | 3 V<br>150 kHz to<br>80 MHz   | <p>Portable and mobile RF communications equipment should be used no closer to any part of the PET/CT system, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter.</p> <p><b>Recommended Separation Distance:</b></p> $d = \left[ \frac{3,5}{3} \right] \sqrt{P}$ <p>(see <a href="#">Table 9-6</a>)</p> $d = \left[ \frac{3,5}{3} \right] \sqrt{P}$ <p>80 MHz to 800 MHz (see <a href="#">Table 9-6</a>)</p> $d = \left[ \frac{7}{3} \right] \sqrt{P}$ <p>800 MHz to 2,5 GHz (see <a href="#">Table 9-6</a>)</p> <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,<sup>a</sup> should be less than the compliance level in each frequency range.<sup>b</sup></p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p>  |
| Radiated RF<br>IEC 61000-4-3<br>(Alternative method:<br>Full range IEC 61000-4-21 test in lieu of Large, Permanently-Installed Equipment exemption) | 3 V/m<br>150 kHz to<br>80 MHz              | 3 V/m<br>150 kHz to<br>80 MHz |   |

<sup>a</sup> 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 PET/CT system is used exceeds the applicable RF compliance level above, the PET/CT system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the PET/CT system.

<sup>b</sup> 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<sub>T</sub> is the AC mains voltage prior to application of the test level.

**Table 9-5 Electromagnetic Immunity**

| Rated Maximum<br>Output Power (P)<br>of Transmitter<br>Watts (W) | Separation Distance (Meters)             |  |  |
|--|--|--|--|
|  | by Frequency of Transmitter              |  |  |
|  | 150 kHz<br>to 80 MHz                     | 80 MHz<br>to 800 MHz                     | 800 MHz<br>to 2.5 GHz                  |
|  | $d = \left[\frac{3,5}{3}\right]\sqrt{P}$ | $d = \left[\frac{3,5}{3}\right]\sqrt{P}$ | $d = \left[\frac{7}{3}\right]\sqrt{P}$ |
| 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.

**Table 9-6 Recommended Separation Distances**

## 6.4 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 PET/CT system. For additional compatible accessories, consult the *GE Healthcare* Sales and Service representative.

- UPS
- Enhanced PET Recon Option
- Cardiac Gating Option Kit
- Respiratory Option Kit
- SmartStep



## 6.5 Installation Requirements and Environment Control

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

### 6.5.1 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.

### 6.5.2 Environment Control

This product complies with the radiated emission as per CISPR11 Group1 Class A + 12 limits. The PET/CT 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 using 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.

### 6.5.3 Power Supply Distribution for Accessories and Subsystems

All components, accessories, subsystems and systems which are electrically connected to the PET/CT system must have all AC power supplied by the same power distribution panel and line.

### 6.5.4 Stacked Components and Equipment

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



# **Chapter 10**

## **System Options**

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### **Section 1.0 Option Catalog Numbers**

*Contact your local GE Healthcare sales representative for a complete list of all system options or visit us at <http://www.gehealthcare.com>. Refer to the instruction manual supplied with each option for respective details.*



# Chapter 11

## Radiation Protection Requirements

### Section 1.0 Shielding Requirements

**NOTICE** Engage a QUALIFIED RADIOLOGICAL HEALTH PHYSICIST to review your scan room shielding requirements, taking into consideration:

- Scatter radiation levels within the scanning room. (See [Figure 11-2](#).)
- At 40mm aperture, scan times of typical 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.

The four scatter surveys 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 11-1](#) 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" (127 cm) away from the scan plane is:  $10.4 \mu\text{Gy}$  (from [Figure 11-4](#))  $\times$  0.71 (from [Table 11-1](#))  $\times$  800/100 (from [Table 11-1](#)) =  $59.1 \mu\text{Gy}$ .

**Note:** Actual measurements can vary. Expected deviation equals  $\pm 15\%$ , 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  $\pm 40\%$ . Isocurves already include the deviation margins.

| Changed Parameter | Multiplication Factor |
|-------------------|-----------------------|
| mAs               | new mAs/100           |
| 80 kV             | 0.24                  |
| 100 kV            | 0.45                  |
| 120 kV            | 0.71                  |
| 140 kV            | 1.00                  |
| 1.25 mm aperture  | 0.20                  |
| 2.5 mm aperture   | 0.22                  |
| 5 mm aperture     | 0.27                  |
| 10 mm aperture    | 0.38                  |

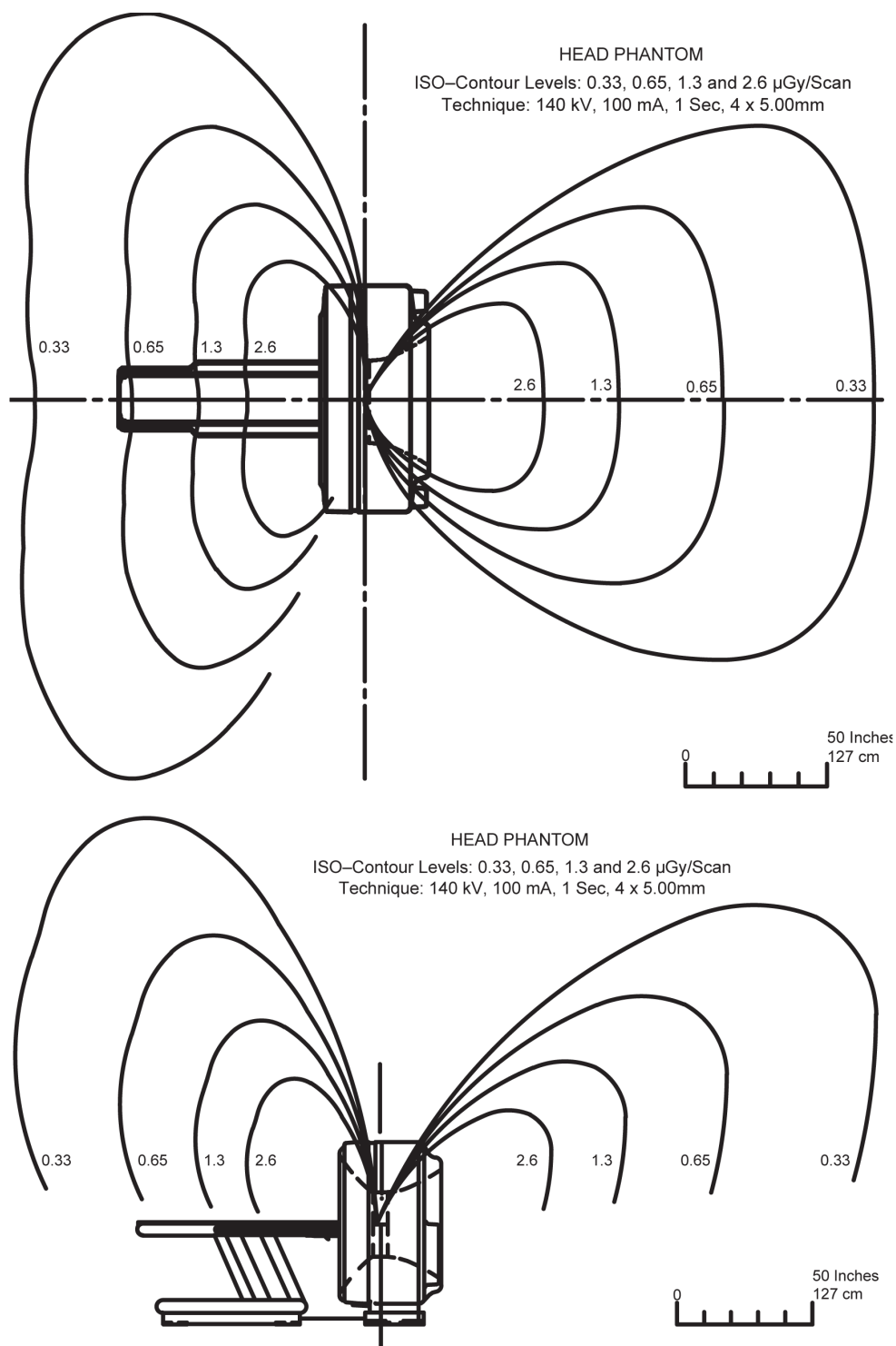
**Table 11-1 Shielding Requirements Scaling**

| Changed Parameter | Multiplication Factor |
|-------------------|-----------------------|
| 20 mm aperture    | 0.59                  |
| 40 mm aperture    | 1.00                  |

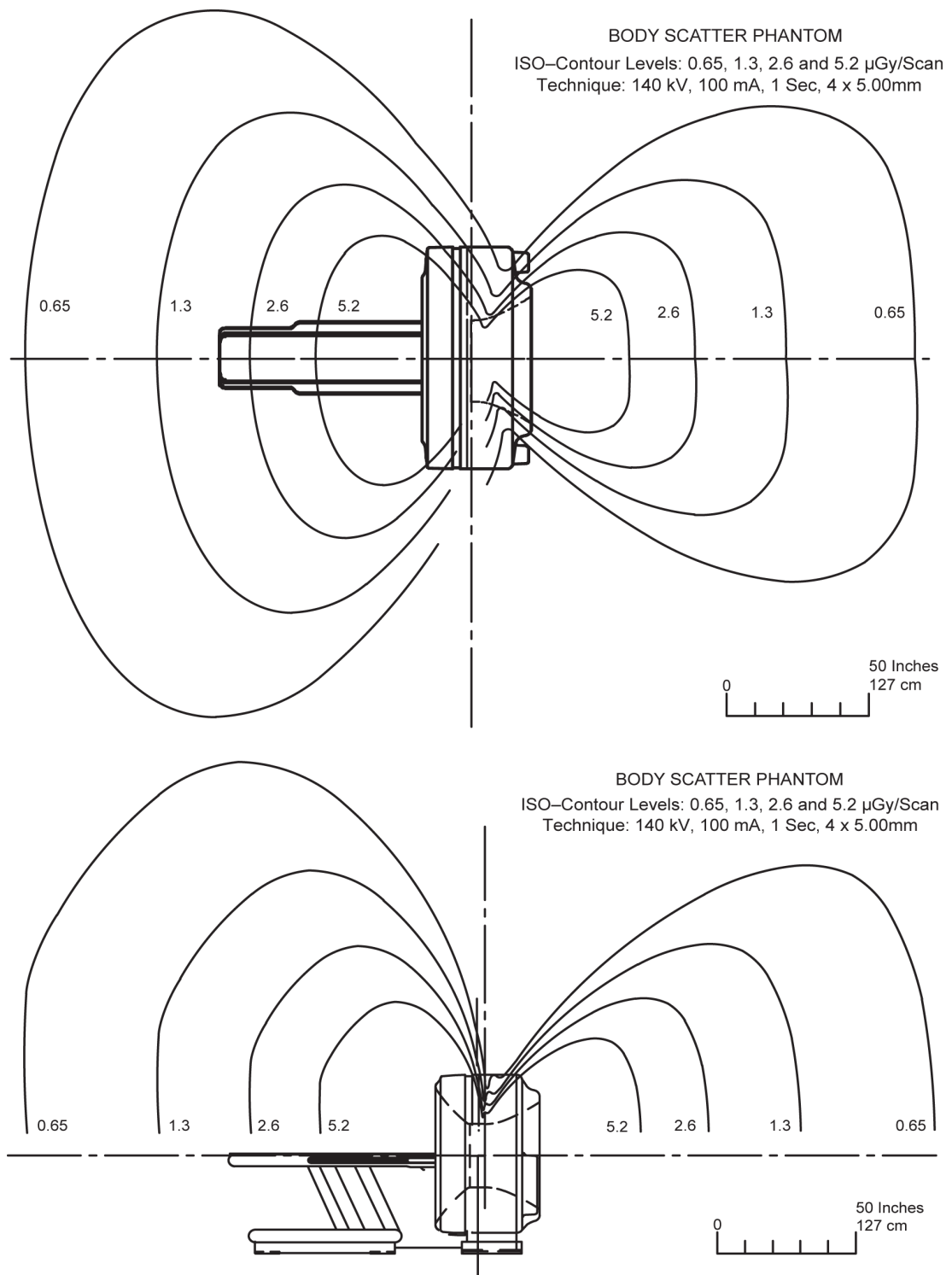
***Table 11-1 Shielding Requirements Scaling***

**NOTICE** This publication uses micrograys to measure radiation levels. The conversion factor is: 1 milliroentgen = 8.69 micrograys.

**Note:** Data in the figures included in this chapter may change prior to product release.

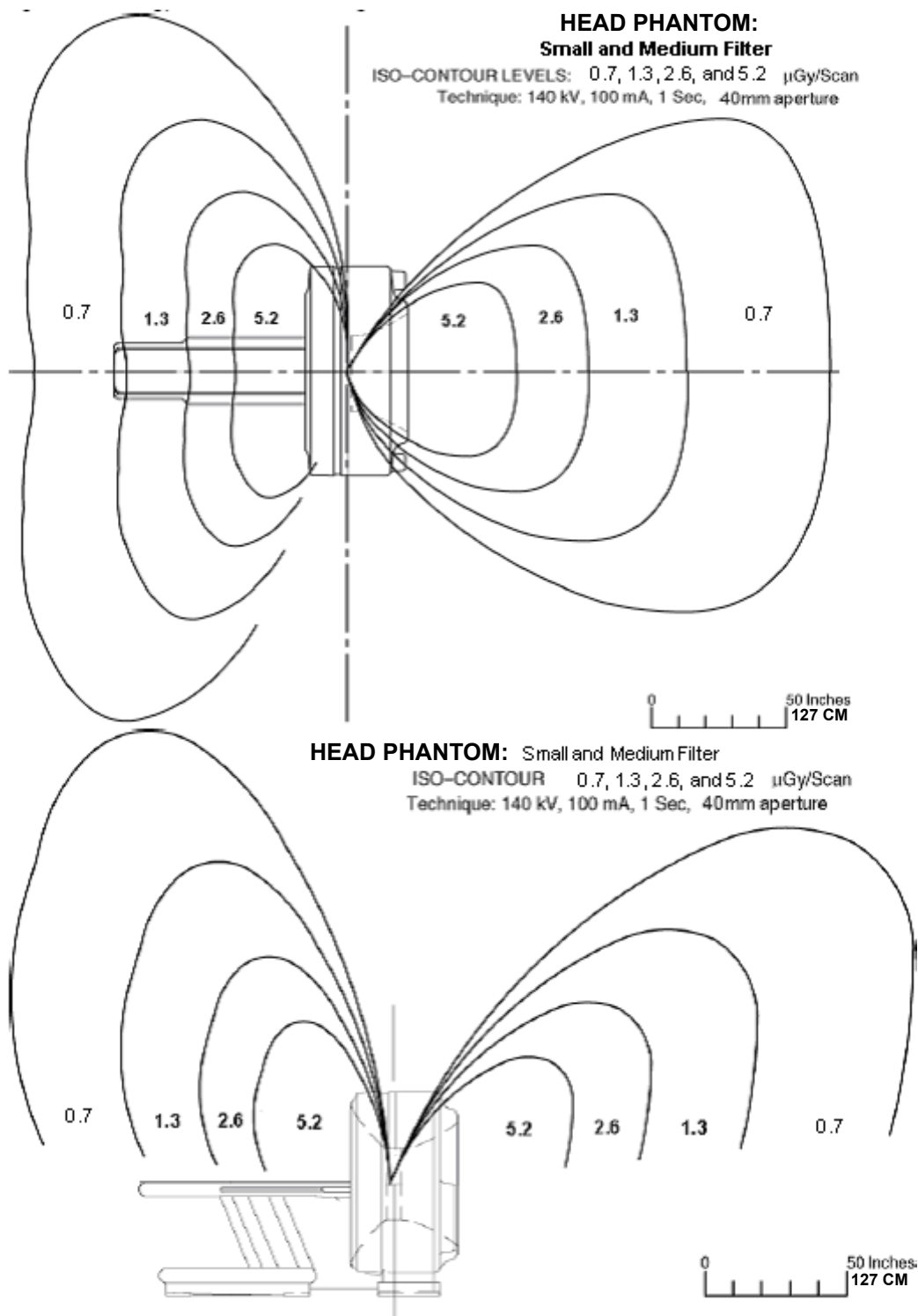


**Figure 11-1 Typical Scatter Survey (Small and Medium Filter) (Optima 560, D600, D690 Elite)**

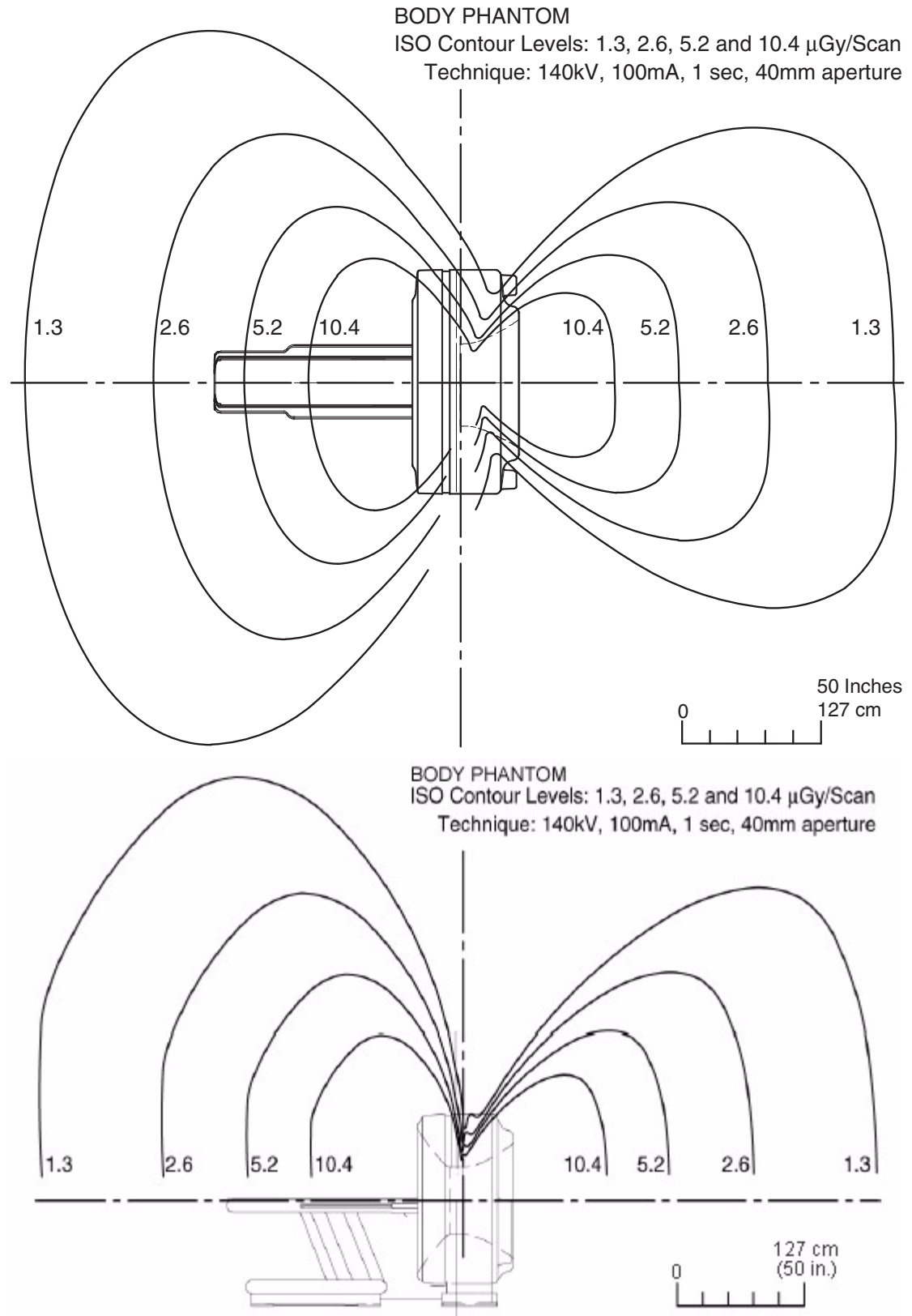


**Figure 11-2 Typical Scatter Survey (Large Filter) (Optima 560, D600, D690 Elite)**





**Figure 11-3 Typical Scatter Survey (Small and Medium Filter) (D690 VCT, Discovery Elite)**



**Figure 11-4 Typical Scatter Survey (Large Filter) (D690 VCT, Discovery Elite)**

## 1.1 Dose Rate from Radioactive Pin Source

The PET/CT 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*.

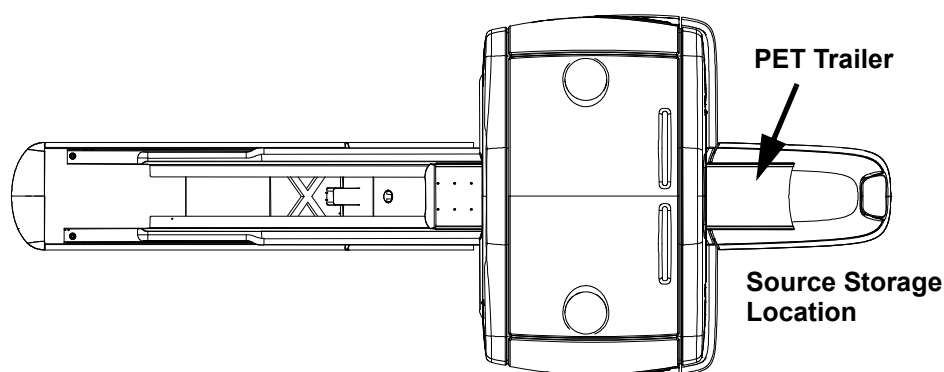
PET images are generated by measuring radiation resulting from electron positron annihilation events within the patient. No external radiation source is required to generate this data. The pin radiation source is never used during a patient scan.

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  $\text{Ge}^{68}$ , 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 10MBq (0.27mCi)  $\pm$  20% for Optima 560 and Discovery 600, and 18.5MBq (0.5mCi)  $\pm$  20% for Discovery 600 with Explorer Technology Option, Discovery 690 Elite, Discovery 690 VCT, and Discovery Elite.

Refer to [Figure 11-5](#). During normal system operation, the radioactive source pin resides in a storage container, located inside the PET Trailer, at the rear of the PET/CT gantry.



**Figure 11-5 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.

1.2 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 PET/CT system are directly over the source loader. The PET/CT system uses one pin with an initial activity level of 10MBq (0.27mCi) ± 20% or less for Optima 560 and Discovery 600, and 18.5MBq (0.5mCi) ± 20% or less for Discovery 600 with Explorer Technology Option, Discovery 690 Elite, Discovery 690 VCT, and Discovery Elite. The exposure rate at the cover is specified to equal 2mR/hr or less.

1.2.1 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 11-2](#). (Distances are measured from the frontmost imaging slice; positive distance is in the direction towards the scanner table.)

| Distances                   | +3m  | +2m  | +1m  | Front Slice | -1m  | -2m  |
|-----------------------------|------|------|------|-------------|------|------|
| Dose rate per mCi mR/hr/mCi | 0.07 | 0.14 | 0.75 | 5.46        | 0.68 | 0.68 |

Table 11-2 Dose Rate at Specified Distances

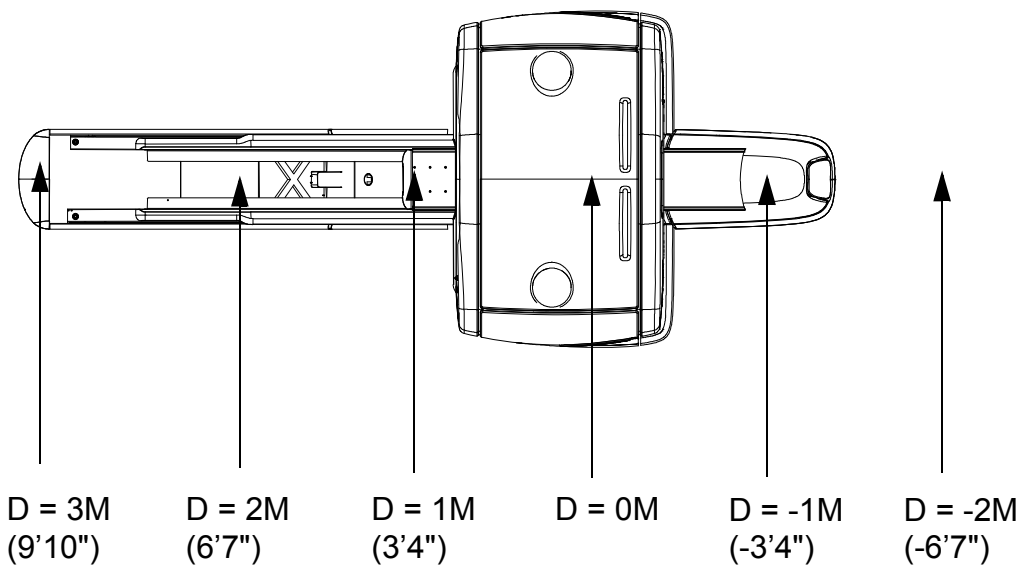


Figure 11-6 Distance Measurement Location

## 1.3 Gamma Ray Protection

A number of radioactive substances, of various levels of stability are used by the PET unit of the PET/CT 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 PET/CT system). 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.

## 1.4 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 PET/CT 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.

## 1.5 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.

## 1.6 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.

## **1.7 Sources of Radiation**

A number of common radio nuclides are used in the PET/CT 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.) and as such decay to benign levels fairly quickly. Typical positron emitting isotopes include: Carbon-11, Nitrogen-13, Oxygen-15, and Fluorine-18.

# Chapter 12

## Network Requirements

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### Section 1.0 Network Connections

The network requirements listed in this chapter should allow you to connect the system to:

- Hospital/facility networks
- Filming Cameras
- PACS
- Workstations
- Patient Information Systems

#### 1.1 Network Type

These systems require a broad-band network connection.

#### 1.2 Network Speed

The customer and the customer's IT contact should ensure that the site provides access to broadband using one of the following interface types:

- 100BASE-TX (100 Mbit/s)
- 1000BASE-T (1000 Mbit/s [1 Gbit/s]).

#### 1.3 Network Cables

Both 100BASE-TX and 1000BASE-T require Category 5 cables. Consequently, broad-band connections at the site should use one of the Category 5 patch cables listed below in [Table 12-1](#).

| CAT Num | GE Part Num | Length (m) |
|---------|-------------|------------|
| K9000WB | 2215028-10  | 20 m       |
| K9000KP | 2215028-5   | 10 m       |
| K9000JR | 2215028-4   | 5 m        |
| K9000WA | 2215028-9   | 3 m        |

**Table 12-1 Required Network Cables**

#### 1.4 Network Cable Routing

The system connects to the facility's network through the console. To enable proper network cabling, the customer and the customer's IT contact should:

- Provide an RJ45 wall outlet within 2 m (79 in.) of the console location.
- Provide a patch cable, not to exceed 3.05 m (10 ft), to connect the operator console to a wall box. (See Notes on [Figure 14-2](#))
- Complete any cable duct-work or conduit installation that the customer site-unit might require

to route connecting network cables to the workstation, camera, and operator console.

- Ensure that the run from the hospital/facility switch to the wall outlet does not exceed 88 m (290 ft). Bandwidth performance degrades significantly when the length exceeds 91 m (300 ft).

## **Section 2.0 Customer Broad-Band Responsibilities**

### **2.1 Contact GE to Find Zone Broad-band Specialist**

Contact your GE PMI to obtain the name of the zone broad-band specialist who will:

- Work with the Customer Champion to complete any identified infrastructure changes.
- Provide IP addresses for new equipment.
- Provide a VPN compatible appliance that will support the IPSec tunneling protocol and 3DES data encryption.
- Utilize an Internet Service Provider that supports static routing.

### **2.2 Provide GE with IT Contact Information for the Site**

Provide your GE PMI with an accurate site address, telephone number, contact name, and e-mail address for the customer IT contact who will:

- Coordinate VPN activities between Radiology/Cardiology and the Information Technology (IT) departments.
- Act as a focal point in assuring site broad-band infrastructure meets GE Healthcare requirements for connection as determined by a mutual assessment with the GE Healthcare Connectivity team.
- Complete an equipment assessment with the GE Healthcare Connectivity team to determine site readiness for broad-band.

## **Section 3.0 Phone Line for Optional Modem**

If intending to incorporate the optional modem, install two (2) phone lines at or near the Operator Console and verify the operational status of these lines prior to installation. One (1) of these lines will function for voice line use, and one (1) will function as an analog line for modem use.



# Chapter 13

## Power Requirements

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Be sure to communicate all necessary information in this chapter to the electrical contractor employed at the installation site.

### Section 1.0 Discovery 690 VCT, Discovery Elite

The Power Distribution Unit (PDU) supplied with the system transforms and distributes power to all system components. The PDU constitutes the only power entry point required to operate the system. To minimize voltage regulation effects, keep power wiring between the facility main distribution panel and the PDU as short as possible.

When routing the power wiring, all three-phase stranded copper wires and ground must run in the same conduit or raceway duct. Route power wires separate from the system control and signal cables, using a separate conduit or trough in a raceway duct. You may use a metallic conduit, floor duct, or surface raceway for running cables, depending upon local codes and practices. However, ensure that cable passageways are large enough to install additional cables with all other cables already installed. The use of non-metallic conduit is not recommended.

#### 1.1 System Input Power

##### 1.1.1 Power Source Configuration

The Discover 690 VCT and Discovery Elite scanners operate on a three-phase, solidly grounded four-wire wye or Delta power source. The neutral wire does not need to run to the system, i.e., four-wire connection. If running a NEUTRAL wire, terminate it in the A1 box.

A dedicated feeder from the nearest Main Distribution Panel (MDP) should supply power to the scanner. In accordance with the National Electric Code (U.S.) and similar applicable national and local codes, the site MUST provide a protective disconnect device with LOCK-OUT and TAG-OUT provisions in the power line supplying the PDU, and MUST locate the protective disconnect device within 10 m (32 ft) of the PDU, visible to PDU service personnel. The disconnect device appears as A1 in the interconnection schematic diagrams.

##### 1.1.2 Rating

The system operates on three-phase power that meets the following specifications:

- Voltage: 380 to 480 VAC
- Capacity: 150 kVA
- Frequency: 50 or 60 Hz  $\pm$  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 = 30 kVA.

The A1 disconnect device referenced above must provide overcurrent protection for the system and have at least one *Emergency Off* switch within the scan suite, near the console. The preferred disconnect utilizes undervoltage release control, rather than shunt trip devices. The rating of the A1 disconnect device depends on the nominal line voltage at the site. Refer to [1.2, Recommended Power Distribution System](#) for minimum rating requirements and suggested disconnect devices.

**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.**

### 1.1.3 Regulation

Total load regulation as measured at the PDU input terminals must not exceed 6%. The capacity of the facility transformer and size and length of feeder wires directly affect the load regulation presented to the system. Refer to [1.2, Recommended Power Distribution System](#), for recommended single-unit installation specifics.

### 1.1.4 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.

### 1.1.5 Sags, Surges & Transients

Sags and surges of the power line must not exceed the absolute range limits shown in Table 13-1. Maximum transient voltages should be limited to 1500 V peak.

### 1.1.6 Grounding

The customer electrician should bond metal conduit, raceway, or the armor of armored cable used to power the system to the PDU cabinet and to the A1 Disconnect. In addition to such mechanical grounding, the electrician should run a dedicated 1/0 (55 mm<sup>2</sup>) or larger insulated copper ground wire from the main distribution panel to the PDU with the phase wires. The electrician should run the ground wire with the three phase wires from the power source to the A1 Disconnect and from A1 Disconnect to the PDU. Grounding will not require a neutral wire.

Note: The shield or armor of armored cable ALONE will NOT provide sufficient grounding.

Bond the ground wire to the 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.

## 1.2 Recommended Power Distribution System

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

**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 INTERRUPTION 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.**

### 1.2.1 Using a Dedicated Distribution Transformer (Recommended)

The recommended power distribution system for a scanner consists of a dedicated feeder run from the facility main isolation transformer. The minimum recommended transformer size for a dedicated distribution transformer provided for the scanner is 225 kVA, rated 2.4% regulation at unity power factor. Table 13-2 shows the minimum recommended feeder size and overcurrent protection device based on line voltage for this configuration.

## 1.2.2 Using an Existing Distribution Transformer

If it proves necessary to power the scanner from an existing distribution transformer and secondary feeder, such as the equipment distribution panel of an X-ray department, avoid installation with other X-Ray equipment that uses rapid film changers. These changers use a large number of high powered, closely-spaced exposures, which may coincide with the CT scan and produce image artifacts.

## 1.2.3 System Power Requirements

Be sure that the site can meet all of the minimum power requirements listed below before installing the system:

- Maximum power demand = 150kVA @ 0.85 PF: at a Selected Technique of 140 kV, 715 mA.
- Continuous (average) power demand at maximum duty cycle = 30 kVA.
- Maximum allowable total source regulation is 10%.
- Minimum recommended transformer size: 225 kVA, with 2.4% rated regulation at unity power factor. Resultant maximum allowable feeder regulation is 3.4%.

### NOMINAL LINE VOLTAGE MUST FALL WITHIN ONE OF THESE RANGES.

| Nominal Line Voltage                          | 380 | 400 | 420 | 440 | 460 | 480 |
|---|-----|-----|-----|-----|-----|-----|
| Hi-Line Limit, +10%                           | 418 | 440 | 462 | 484 | 506 | 528 |
| Lo-Line Limit, -10%                           | 342 | 360 | 378 | 396 | 414 | 432 |
| Continuous Line Current                       | 38  | 36  | 34  | 33  | 31  | 30  |
| Momentary Line Current                        | 228 | 217 | 206 | 197 | 188 | 180 |
| Maximum Line Current                          | 253 | 241 | 229 | 219 | 209 | 200 |
| Minimum Recommended Circuit Protection Rating | 150 | 150 | 150 | 125 | 125 | 125 |

**Table 13-1 Nominal Line Voltage Ranges (Discovery 690 VCT, Discovery Elite)**

| Feeder Length<br>(Power substation to A1 disconnect) | Minimum feeder wire size, awg or mcm (sq. mm)/ VAC |           |          |          |          |          |
|--|--|-----------|----------|----------|----------|----------|
|  | 380 VAC  | 400 VAC   | 420 VAC  | 440 VAC  | 460 VAC  | 480 VAC  |
| 15 m (50 ft)   | 1/0 (55)   | 1/0 (55)  | 1/0 (55) | 1 (45)   | 1 (45)   | 1 (45)   |
| 30 m (100 ft)  | 1/0 (55)   | 1/0 (55)  | 1/0 (55) | 1 (45)   | 1 (45)   | 1 (45)   |
| 46 m (150 ft)  | 1/0 (55)   | 1/0 (55)  | 1/0 (55) | 1 (45)   | 1 (45)   | 1 (45)   |
| 61 m (200 ft)  | 1/0 (55)   | 1/0 (55)  | 1/0 (55) | 1 (45)   | 1 (45)   | 1 (45)   |
| 76 m (250 ft)  | 2/0 (70)   | 2/0 (70)  | 1/0 (55) | 1/0 (55) | 1 (45)   | 1 (45)   |
| 91 m (300 ft)  | 3/0 (85)   | 3/0 (85)  | 2/0 (70) | 2/0 (70) | 1/0 (55) | 1/0 (55) |
| 107 m (350 ft)                                       | 4/0 (100)  | 3/0 (85)  | 3/0 (85) | 2/0 (70) | 2/0 (70) | 1/0 (55) |
| 122 m (400 ft)                                       | 250 (125)  | 4/0 (100) | 3/0 (85) | 3/0 (85) | 3/0 (85) | 2/0 (70) |

**Table 13-2 Minimum Feeder Wire Size (Discovery 690 VCT, Discovery Elite)**

Note: In all cases the recommended ground wire is a 55 sq. mm (1/0) ground wire.

| Sub-feeder length<br>(A1 to PDU) | Minimum sub-feeder wire, awg or mcm (sq. mm) |          |          |        |        |        |
|----------------------------------|--|----------|----------|--------|--------|--------|
|                                  | 380 VAC                                      | 400 VAC  | 420 VAC  | 440VAC | 460VAC | 480VAC |
| 9.7536 m (32 ft)                 | 1/0 (55)                                     | 1/0 (55) | 1/0 (55) | 1 (45) | 1 (45) | 1 (45) |

**Table 13-3 Minimum Sub-Feeder Wire Size (Discovery 690 VCT, Discovery Elite)**

The information in [Table 13-1](#), [Table 13-2](#), and [Table 13-3](#) (above) assumes the use of copper wire, rated 75 C and run in steel conduit. All ampacity determined in accordance with the National Electrical Code (NFPA 70), Table 310-16 (2002). The ampacity of the circuit protection device listed above determines the minimum feeder size, except where total source regulation limits require a larger size.

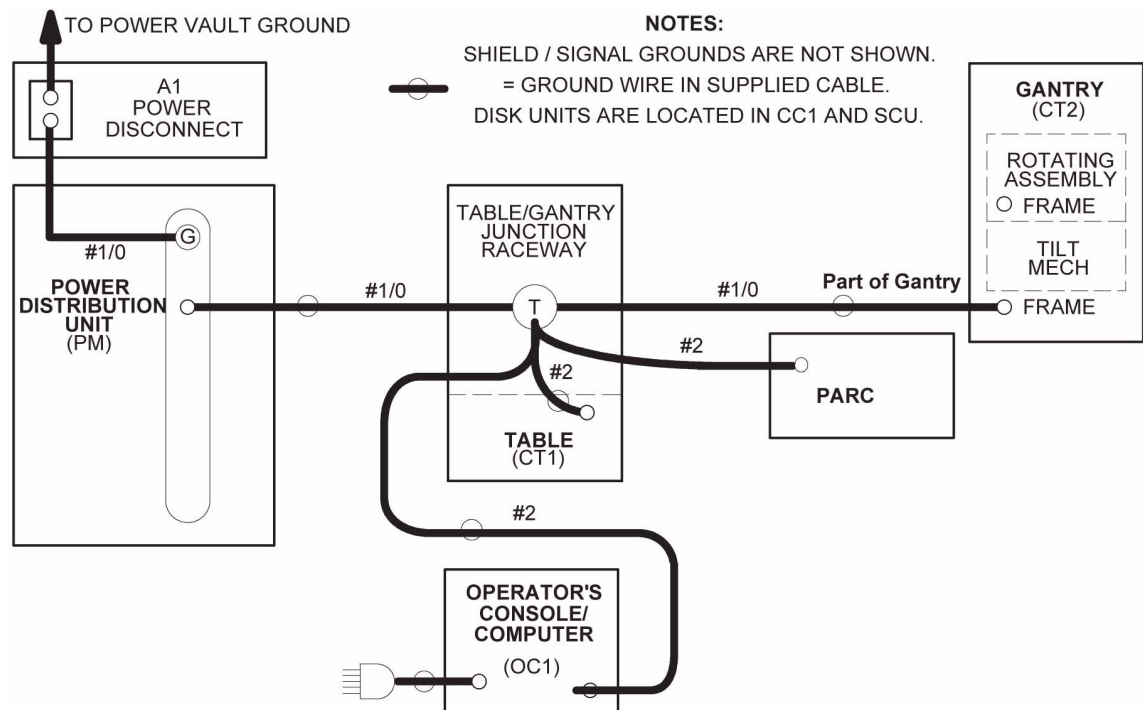
**NOTICE** Power feeders running under the scan room floor as well as power vault substations under the floor, above the scan suite, or in adjacent rooms may cause excessive EMI fields. The responsibility for meeting all site EMI requirements rests with the customer.

## 1.3 Ground System

The scanner has been designed to use an equal potential grounding system. [Figure 13-1](#) shows the required ground system. Three primary grounding points exist, and include:

- A system power ground point located in the PDU.
- A reference ground point located between gantry and table base.
- A patient ground point located at the front of the table base.

The customer electrician should ground ALL patient-touchable metal surfaces to the same potential as the A1 Disconnect.



**Figure 13-1 System Ground Map**

## Section 2.0 Optima 560, Discovery 600, Discovery 690 Elite

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

To minimize voltage regulation effects, keep power wiring between the facility main distribution panel and the PDU as short as possible.

When routing the power wiring, all three-phase wires and ground must 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.

Metallic conduit, floor duct, or surface raceway may be used for running cables, depending upon local codes and practices. However, cable passageways should be large enough to install any cable with all other cables already installed. The use of non-metallic conduit is not recommended.

### 2.1 System Input Power

#### 2.1.1 Power Source Configuration

The Optima 560, Discovery 600, and Discovery 690 Elite scanners are designed to operate on a three-phase, four-wire wye power source. A solidly grounded wye source is preferred. The neutral wire does not need to be run to the system, i.e., four-wire connection. If a neutral wire is run, then it should be terminated in the A1 box.

A dedicated feeder from the nearest Main Distribution Panel (MDP) should supply power to the scanner. In accordance with the National Electric Code (U.S.) and similar applicable national and local codes, a protective disconnect device must be provided in the power supplying the PDU. It must be located within 10 m (32 ft) of the PDU, visible to PDU service personnel, and must have LOCK-OUT and TAG-OUT provisions. The disconnect device appears as A1 in the interconnection schematic diagrams.

#### 2.1.2 Rating

The system operates on three-phase power that meets the following specifications:

- Voltage: 200/220/240 VAC; 380-480 VAC
- Capacity: 90 kVA
- Frequency: 50 or 60 Hz  $\pm$  3 Hz
- Maximum power demand = 90 kVA @ 0.85 PF at a selected technique of 140 kV, 380 mA.
- Average (continuous) power demand at maximum duty cycle = 20 kVA.

The A1 disconnect device referenced above must provide overcurrent protection for the system and facilitate multi-point remote *Emergency Off* control of system power. A disconnect utilizing undervoltage release control is preferred over shunt trip devices. The rating of the A1 disconnect device depends on the nominal line voltage at the site. Refer to [2.2, Recommended Power Distribution System](#) for minimum rating requirements and suggested disconnect devices.

**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.

**NOTICE** The electrical rating is described on the system rating label attached on the gantry; not on the PDU.

### 2.1.3 Regulation

Total load regulation as measured at the PDU input terminals must not exceed 6%. The capacity of the facility transformer and size and length of feeder wires directly affect the load regulation presented to the system. Refer to [2.2, Recommended Power Distribution System](#), for recommended single-unit installation specifics.

### 2.1.4 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.

### 2.1.5 Sags, Surges & Transients

Sags and surges of the power line must not exceed the absolute range limits shown in Table 13-1. Maximum transient voltages should be limited to 1500 V peak.

### 2.1.6 Grounding

The customer electrician should bond metal conduit, raceway, or the armor of armored cable used to power the system to the PDU cabinet and to the A1 Disconnect. In addition to such mechanical grounding, the electrician should run a dedicated 1/0 (55 mm<sup>2</sup>) or larger insulated copper ground wire from the main distribution panel to the PDU with the phase wires. The electrician should run the ground wire with the three phase wires from the power source to the A1 Disconnect and from A1 Disconnect to the PDU. Grounding will not require a neutral wire.

Note: The shield or armor of armored cable ALONE will NOT provide sufficient grounding.

Bond the ground wire to the 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.

## 2.2 Recommended Power Distribution System

### 2.2.1 Dedicated Distribution Transformer

A dedicated feeder run from the facility main isolation transformer is recommended to power the Optima 560, Discovery 600, and Discovery 690 Elite scanners. If the scanner must be powered from an existing distribution transformer and secondary feeder, such as equipment distribution panel of an X-Ray department, installation with other X-Ray equipment that use 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 INTERRUPTION 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 112.5 kVA, rated 2.4% regulation at unity power factor. For this configuration, the minimum recommended feeder size and overcurrent protection device on line voltage is shown in Table 13-6 Minimum Feeder Wire Size.

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

## 2.2.2 System Power Requirements

Be sure that the site can meet all of the minimum power requirements listed below before installing the system:

Note: (xxx): the value in the brackets is for 75kVA.

- Maximum power demand = 90kVA @ 0.85 PF: at a Selected Technique of 140 kV, 380 mA (300mA).
- Continuous (average) power demand at maximum duty cycle = 20 kVA (16.7kVA).
- Maximum allowable total source regulation is 6%.
- Minimum recommended transformer size: 112.5 kVA (93.75kVA), with 2.4% rated regulation at unity power factor. Resultant maximum allowable feeder regulation is 3.4%.

### NOMINAL LINE VOLTAGE MUST FALL WITHIN ONE OF THESE RANGES.

| Nominal Line Voltage                          | 200 | 220 | 240 | 380 | 400 | 420 | 440 | 460 | 480 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Hi-Line Limit, +10%                           | 220 | 242 | 264 | 418 | 440 | 462 | 484 | 506 | 528 |
| Lo-Line Limit, -10%                           | 180 | 198 | 216 | 342 | 360 | 378 | 396 | 414 | 434 |
| Continuous Line Current                       | 58  | 52  | 48  | 30  | 29  | 27  | 26  | 25  | 24  |
| Momentary Line Current                        | 260 | 236 | 217 | 137 | 130 | 124 | 118 | 113 | 108 |
| Maximum Line Current                          | 289 | 262 | 241 | 152 | 144 | 137 | 131 | 126 | 120 |
| Minimum Recommended Circuit Protection Rating | 150 | 150 | 150 | 110 | 110 | 100 | 100 | 90  | 90  |

**Table 13-4 Nominal Line Voltage Ranges (Optima 560, D600, D690 Elite)**

| Option                | CAT Number |
|-----------------------|------------|
| 225 kVA Transformer   | E4500AW    |
| Isolation Transformer | E4500BC    |

**Table 13-5 Purchasable Options**

| Feeder Length<br>(Power substation to A1 disconnect) | Minimum feeder wire size, awg or mcm (sq. mm) |           |           |          |          |          |          |          |         |
|--|---|-----------|-----------|----------|----------|----------|----------|----------|---------|
|  | 200 VAC                                       | 220 VAC   | 240 VAC   | 380 VAC  | 400 VAC  | 420 VAC  | 440 VAC  | 460 VAC  | 480 VAC |
| 15 m (50 ft)   | 1/0 (55)                                      | 1/0 (55)  | 1/0 (55)  | 2 (35)   | 2 (35)   | 3 (30)   | 3 (30)   | 3 (30)   | 3 (30)  |
| 30 m (100 ft)  | 2/0 (70)                                      | 1/0 (55)  | 1/0 (55)  | 2 (35)   | 2 (35)   | 3 (30)   | 3 (30)   | 3 (30)   | 3 (30)  |
| 46 m (150 ft)  | 4/0 (100)                                     | 3/0 (85)  | 2/0 (70)  | 2 (35)   | 2 (35)   | 3 (30)   | 3 (30)   | 3 (30)   | 3 (30)  |
| 61 m (200 ft)  | 5/0 (125)                                     | 4/0 (100) | 4/0 (100) | 2 (35)   | 2 (35)   | 3 (30)   | 3 (30)   | 3 (30)   | 3 (30)  |
| 76 m (250 ft)  | 6/0 (170)                                     | 5/0 (125) | 5/0 (125) | 1 (45)   | 1 (45)   | 2 (35)   | 2 (35)   | 2 (35)   | 3 (30)  |
| 91 m (300 ft)  | 7/0 (215)                                     | 6/0 (170) | 5/0 (125) | 1/0 (55) | 1/0 (55) | 1 (45)   | 1 (45)   | 2 (35)   | 2 (35)  |
| 107 m (350 ft)                                       | 8/0 (275)                                     | 7/0 (215) | 6/0 (170) | 2/0 (70) | 1/0 (55) | 1/0 (55) | 1 (45)   | 1 (45)   | 1 (45)  |
| 122 m (400 ft)                                       | 8/0 (275)                                     | 7/0 (215) | 7/0 (215) | 2/0 (70) | 2/0 (70) | 1/0 (55) | 1/0 (55) | 1/0 (55) | 1 (45)  |

**Table 13-6 Minimum Feeder Wire Size (Optima 560, D600, D690 Elite)**



| Sub Feeder Length<br>(A1 to PDU) | Minimum feeder wire size, awg or mcm (sq. mm) |          |          |         |         |         |         |         |         |
|----------------------------------|---|----------|----------|---------|---------|---------|---------|---------|---------|
|                                  | 200 VAC                                       | 220 VAC  | 240 VAC  | 380 VAC | 400 VAC | 420 VAC | 440 VAC | 460 VAC | 480 VAC |
| 9.7536 m (32 ft)                 | 1/0 (55)                                      | 1/0 (55) | 1/0 (55) | 2 (35)  | 2 (35)  | 3 (30)  | 3 (30)  | 3 (30)  | 3 (30)  |

**Table 13-7 Minimum Feeder Wire Size (Optima 560, D600, D690 Elite)**

The information in [Table 13-4](#), [Table 13-6](#), and [Table 13-7](#) (above) assumes the use of copper wire, rated 75 C and run in steel conduit. All ampacity determined in accordance with the National Electrical Code (NFPA 70), Table 310-16 (2002). The ampacity of the circuit protection device listed above determines the minimum feeder size, except where total source regulation limits require a larger size.

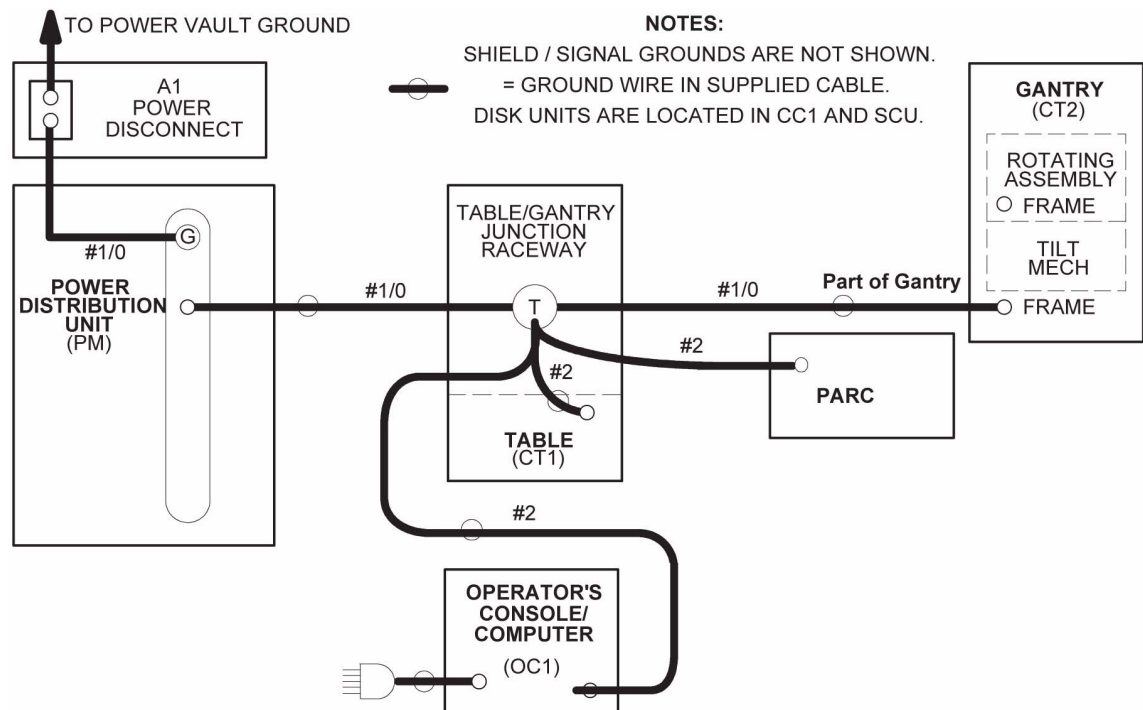
**NOTICE** Power feeders running under the scan room floor as well as power vault substations under the floor, above the scan suite, or in adjacent rooms may cause excessive EMI fields. The responsibility for meeting all site EMI requirements rests with the customer.

## 2.3 Ground System

The scanner has been designed to use an equal potential grounding system. The required ground system is shown in [Figure 13-2](#). Three primary grounding points exist, and include:

- A system power ground point located in the PDU.
- A reference ground point located between gantry and table base.
- A patient ground point located at the front of the table base.

The customer electrician should ground ALL patient-touchable metal surfaces to the same potential as the A1 Disconnect.



**Figure 13-2 System Ground Map**



# Chapter 14

## Interconnection Data

### Section 1.0 Introduction

The customer and the customer's electrical contractor should refer to the information in this section when establishing network and power interconnections for the system. Please note the following:

- [Figure 14-2](#) shows interconnection runs for a 50/60 Hz system.
- [Table 14-1](#) shows component designators for supplied equipment and options and wall power outlets.
- [Table 14-6](#) lists 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 the equipment. Cable diameters and sizes of connectors are provided to aid in sizing conduit and access plates.
- [Table 14-1](#) and [Table 14-2](#) list details for connection to scanning equipment using standard (short) length and non-standard (long) length cables, respectively. Details appear for the following types of runs, when appropriate:
  - Flush-floor duct
  - Computer floor
  - Through-wall bushing
  - Junction box
  - Surface floor duct
  - Through-floor duct
  - Wall duct
  - Conduit
- To minimize the need for additional junction boxes, use either a cable raceway system or a raised computer floor. These systems use prefabricated cables with large plugs. Therefore, try to avoid conduit or pipe for cable runs.

### Section 2.0 Component Designators

| Designator | Applies to                    | Source                     |
|------------|-------------------------------|----------------------------|
| A1         | Primary power disconnect      | <b>Contractor-supplied</b> |
| CT1        | Patient table                 | System                     |
| CT2        | Gantry                        | System                     |
| ITL        | InSite telephone lines        | <b>Contractor-supplied</b> |
| OC1        | Operator console/computer     | System                     |
| PDU        | Power Distribution Unit       | System                     |
| SEO        | System emergency off          | <b>Contractor-supplied</b> |
| SM         | Slave monitor                 | Option                     |
| WL         | "X-ray on" warning light      | <b>Contractor-supplied</b> |
| DS         | Door Interlock Switch         | <b>Contractor-supplied</b> |
| BBNC       | Broad-band network connection | <b>Contractor-supplied</b> |

**Table 14-1 Component Designators**

## Section 3.0 Interconnect Runs, Wiring, and Cables

### 3.1 GE Healthcare-supplied Cables

#### 3.1.1 GE Healthcare-supplied Cables for PET/CT System

| Run #         | Length, Actual<br>m (ft)<br>[Usable] | Part Number                 |                               | Description                                | UL Cable Information |                        |                   |                   |                     |                   |           |             | Pull Size<br>mm (inches)           |
|---------------|--------------------------------------|-----------------------------|-------------------------------|--|----------------------|------------------------|-------------------|-------------------|---------------------|-------------------|-----------|-------------|------------------------------------|
|               |                                      | Standard                    | Long                          |  | UL Style             | Flammability<br>Rating | Voltage<br>Rating | Voltage<br>Actual | Temp.<br>Rating (C) | Dia.<br>mm (inch) | # of Cond | Size<br>AWG |                                    |
|               |                                      | KIT<br>5491000<br>(P5051TA) | KIT<br>5491000-2<br>(P5051TB) |  |                      |                        |                   |                   |                     |                   |           |             |                                    |
|               |                                      | 5485380                     | 5485380                       | PET Gantry to Console                      |                      |                        |                   |                   |                     |                   |           |             |                                    |
| 56            | 25.5 (87.3)<br>[22.1 (73)]           | 5339979-3                   | 5339979-3                     | Console GND to Raceway GND                 | 1238                 | VW-1<br>(FT-1)         | 600               | 0                 | 105                 | 11.9<br>(0.47)    | 1         | 2           | 12.2 (0.5)                         |
| 102           | 26.4 (86.6)<br>[22.9 (75)]           | 2373436-2                   | 2373436-2                     | Gantry to Console LAN                      | RG-22                | FT-4                   | 1900              | <30 VDC           |                     | 5.9<br>(0.23)     | 8         | 24          | 15 (0.6)                           |
| 101           | 26.4 (86.6)<br>[22.9 (75)]           | 5120645                     | 5120645                       | Console to MSUB J9                         | RG-22                | FT-4                   | 300               | <30 VDC           | 80                  | 11.2<br>(0.44)    | 25        | 22          | 17x58 (0.7x2.3)<br>19x51 (0.7x2.0) |
| 103<br>Note1  | 24.6 (80.7)<br>[21.6 (71)]           | 5125259                     | 5125259                       | Fiber Optic - Console to Gantry            |                      |                        | NA                | NA                |                     |                   | 1         | NA          |                                    |
| 103<br>Note 2 | 25 (82)<br>[21.9 (72)]               | 2117848-2                   | 2117848-2                     | Fiber Optic - Console to Gantry            |                      |                        | NA                | NA                |                     |                   | 1         | NA          | 10 (0.4)                           |
| XX<br>Note 3  | 25 (82)<br>[21.9 (72)]               | 5432019                     | 5432019                       | Fiber Optic - Gantry to Console (Not Used) |                      |                        | NA                | NA                |                     |                   | 1         | NA          |                                    |
| 200           | 30.5 (100)<br>[22.9 (75)]            | 5313938-6                   | 5313938-6                     | J7 to Console, Respiratory                 | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.8<br>(0.26)     | 4 pair    | 24          | 13 (0.5)                           |
| XX            | 28.2 (92.5)<br>[24.8 (82)]           | 5193969-4                   | 5193969-4                     | Cable - LAN                                | UL                   | FT-4                   |                   |                   | 60                  |                   |           | 24          | 40 (1.5)                           |
| XX            | 30.5 (100)<br>[27.7 (91)]            | 5169456                     | 5169456                       | Gantry to Injector                         | 2464                 | FT-4                   | 300               |                   | 80                  | 6.6<br>(0.26)     |           | 22          | 40 (1.5)                           |
| XX            | 30.5 (100)<br>[7.6 (25)]             | 5199717                     | 5199717                       | Gantry to RPM Unit                         | UL                   | FT-4                   | 300               | <15 VDC           |                     | 5.9<br>(0.23)     | 4         | 22          | 15 (0.5)                           |
|               |                                      | 5485383                     | 5485382                       | PET Gantry to PDU                          |                      |                        |                   |                   |                     |                   |           |             |                                    |
| 52A           | 8.6 (28.2)<br>[6.1 (20)]             | 2343528-2                   |                               | PDU to Gantry 120VAC                       | 2587                 | FT-4                   | 600               | 208Y/120          | 90                  | 13.8<br>(0.54)    | 5         | 8           | 56.4 (2.2)                         |

Table 14-2 GE Healthcare-Supplied Cables for PET/CT System

| Run # | Length, Actual<br>m (ft)<br>[Usable] | Part Number                 |                               | Description                        | UL Cable Information |                        |                   |                   |                     |                   |           |                | Pull Size<br>mm (inches)           |
|-------|--------------------------------------|-----------------------------|-------------------------------|------------------------------------|----------------------|------------------------|-------------------|-------------------|---------------------|-------------------|-----------|----------------|------------------------------------|
|       |                                      | Standard                    | Long                          |                                    | UL Style             | Flammability<br>Rating | Voltage<br>Rating | Voltage<br>Actual | Temp.<br>Rating (C) | Dia.<br>mm (inch) | # of Cond | Size AWG       |                                    |
|       |                                      | KIT<br>5491000<br>(P5051TA) | KIT<br>5491000-2<br>(P5051TB) |                                    |                      |                        |                   |                   |                     |                   |           |                |                                    |
| 52    | 19.4 (63.6)<br>[17.2 (56)]           |                             | 2343528                       | PDU to Gantry<br>120VAC            | 2587                 | FT-4                   | 600               | 208Y/120          | 90                  | 13.8<br>(0.54)    | 5         | 8              | 56.4 (2.2)                         |
| 50A   | 8.6 (28.2)<br>[6.1 (20)]             | 2343529-2                   |                               | HVDC from PDU to<br>Gantry         | 2587                 | FT-4                   | 600               | 350 VDC           | 90                  | 19<br>(0.75)      | 3         | (2) 4<br>(1) 8 | 22 (0.9)                           |
| 50    | 19.4 (63.6)<br>[17.2 (56)]           |                             | 2343529                       | HVDC from PDU to<br>Gantry         | 2587                 | FT-4                   | 600               | 350 VDC           | 90                  | 19<br>(0.75)      | 3         | (2) 4<br>(1) 8 | 22 (0.9)                           |
| 51A   | 8.6 (28.2)<br>[6.1 (20)]             | 2343530-2                   |                               | Axial Drive Power<br>PDU to Gantry | 2587                 | FT-4                   | 600               | 440Y/254          | 90                  | 12.3<br>(0.48)    | 4         | 14             |                                    |
| 51    | 19.4 (63.6)<br>[17.2 (56)]           |                             | 2343530                       | Axial Drive Power<br>PDU to Gantry | 2587                 | FT-4                   | 600               | 440Y/254          | 90                  | 12.3<br>(0.48)    | 4         | 14             |                                    |
| 55A   | 8.6 (28.2)<br>[4.3 (14)]             | 5339979-2                   |                               | Raceway GND to PDU<br>- GND        | 1238                 | VW-1<br>(FT-1)         | 600               | 0                 | 105                 | 11.9<br>(0.47)    | 1         | 2              | 12.2 (0.5)                         |
| 55    | 19.4 (63.6)<br>[15.1 (50)]           |                             | 5339979                       | Raceway GND to PDU<br>- GND        | 1238                 | VW-1<br>(FT-1)         | 600               | 0                 | 105                 | 11.9<br>(0.47)    | 1         | 2              | 12.2 (0.5)                         |
| 100A  | 9.9 (32.5)<br>[6.1 (20)]             | 5120646-2                   |                               | PDU to MSUB J11                    |                      | FT-4                   | 300               | <30 VDC           | 80                  | 11.2<br>(0.44)    | 25        | 22             | 17x58 (0.7x2.3)<br>19x51 (0.7x2.0) |
| 100   | 21.4 (70.2)<br>[18.9 (62)]           |                             | 5120646                       | PDU to MSUB J11                    |                      | FT-4                   | 300               | <30 VDC           | 80                  | 11.2<br>(0.44)    | 25        | 22             | 17x58 (0.7x2.3)<br>19x51 (0.7x2.0) |
|       |                                      | 5485385                     | 5485384                       | PET Gantry to PARC                 |                      |                        |                   |                   |                     |                   |           |                |                                    |
| 209A  | 13 (42.6)<br>[9.6 (32)]              | 5339979-6                   |                               | PARC GND to<br>Raceway GND         | 1238                 | VW-1<br>(FT-1)         | 600               | 0                 | 105                 | 11.9<br>(0.47)    | 1         | 2              | 12.2 (0.5)                         |
| 209   | 25.5 (83.6)<br>[22.1 (73)]           |                             | 5339979-5                     | PARC GND to<br>Raceway GND         | 1238                 | VW-1<br>(FT-1)         | 600               | 0                 | 105                 | 11.9<br>(0.47)    | 1         | 2              | 12.2 (0.5)                         |
| 203   | 13 (42.6)<br>[9.9 (33)]              | 5313938-7                   |                               | SBA J7 to PARC J6                  | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.6<br>(0.26)     | 4<br>pair | 24             | 13 (0.5)                           |
| 203   | 30.5 (100)<br>[27.4 (90)]            |                             | 5313938                       | SBA J7 to PARC J6                  | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.6<br>(0.26)     | 4<br>pair | 24             | 13 (0.5)                           |
| 201   | 13 (42.6)<br>[8.4 (28)]              | 5313938-8                   |                               | PARC J4 to Switch<br>Port 5        | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.6<br>(0.26)     | 4<br>pair | 24             | 13 (0.5)                           |
| 201   | 30.5 (100)<br>[25.9 (85)]            |                             | 5313938-2                     | PARC J4 to Switch<br>Port 5        | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.6<br>(0.26)     | 4<br>pair | 24             | 13 (0.5)                           |

**Table 14-2 GE Healthcare-Supplied Cables for PET/CT System (Continued)**

| Run #   | Length, Actual<br>m (ft)<br>[Usable] | Part Number                 |                               | Description                            | UL Cable Information |                        |                   |                   |                     |                   |           |          | Pull Size<br>mm (inches) |
|---|--------------------------------------|-----------------------------|-------------------------------|--|----------------------|------------------------|-------------------|-------------------|---------------------|-------------------|-----------|----------|--------------------------|
|   |                                      | Standard                    | Long                          |  | UL Style             | Flammability<br>Rating | Voltage<br>Rating | Voltage<br>Actual | Temp.<br>Rating (C) | Dia.<br>mm (inch) | # of Cond | Size AWG |                          |
|   |                                      | KIT<br>5491000<br>(P5051TA) | KIT<br>5491000-2<br>(P5051TB) |  |                      |                        |                   |                   |                     |                   |           |          |                          |
| 202   | 13 (42.6)<br>[8.4 (28)]              | 5313938-9                   |                               | PARC J5 to Switch<br>Port 7 (Not Used) | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.6<br>(0.26)     | 4<br>pair | 24       | 13 (0.5)                 |
| 202   | 30.5 (100)<br>[25.9 (85)]            |                             | 5313938-3                     | PARC J5 to Switch<br>Port 7 (Not Used) | UL                   | FT-4                   | 300               | <30 VDC           | 60                  | 6.6<br>(0.26)     | 4<br>pair | 24       | 13 (0.5)                 |
| 203   | 13 (42.6)<br>[9.6 (32)]              | 5313941-2                   |                               | PDU TS5 to PARC<br>Bulkhead            | 2587                 | FT-4                   | 600               | 208Y/120          | 60                  | 19<br>(0.75)      | 5         | 10       | 25 (1.0)                 |
| 203   | 19.4 (63.6)<br>[15.8 (52)]           |                             | 5313941                       | PDU TS5 to PARC<br>Bulkhead            | 2587                 | FT-4                   | 600               | 208Y/120          | 60                  | 19<br>(0.75)      | 5         | 10       | 25 (1.0)                 |
| 203<br>Note3  | 13 (42.6)<br>[9.6 (32)]              | 2343531-4                   |                               | Q.Core Power from<br>PDU (Not Used)    | 2587                 | FT-4                   | 600               | 120 VAC           | 90                  | 11.7<br>(0.46)    | 3         | 10       | 56.4 (2.2)               |
| 203<br>Note3  | 19.4 (63.6)<br>[15.8 (52)]           |                             | 2343531-3                     | Q.Core Power from<br>PDU (Not Used)    | 2587                 | FT-4                   | 600               | 120 VAC           | 90                  | 11.7<br>(0.46)    | 3         | 10       | 56.4 (2.2)               |
| 053A<br>Note2   | 19.9 (65.3)<br>[16.6 (54)]           | 2343531-2                   |                               | PDU TS5 to Console<br>Power)           | 2587                 | FT-4                   | 600               | 120 VAC           | 90                  | 12.2<br>(0.48)    | 3         | 10       | 56.4 (2.2)               |
| 053<br>Note2  | 24.5 (80.4)<br>[21.2 (69)]           |                             | 2343531                       | PDU TS5 to Console<br>Power            | 2587                 | FT-4                   | 600               | 120 VAC           | 90                  | 12.2<br>(0.48)    | 3         | 10       | 56.4 (2.2)               |
| 053A<br>Note1   | 19.9 (65.3)<br>[16.6 (54)]           | 5121809-2                   |                               | PDU TS5 to Console<br>Power            | 2587                 | FT-4                   | 600               | 208Y/120          | 90                  | 12.3<br>(0.48)    | 4         | 10       | 56 (2.2)                 |
| 053<br>Note1  | 24.5 (80.4)<br>[21.2 (69)]           |                             | 5121809                       | PDU TS5 to Console<br>Power (VCT)      | 2587                 | FT-4                   | 600               | 208Y/120          | 90                  | 12.3<br>(0.48)    | 4         | 10       | 56 (2.2)                 |
| Note 1: Cable used for Discovery Elite and Discovery 690 VCT systems.<br>Note 2: Cable used for Optima 560, Discovery 600, and Discovery 690 Elite systems.<br>Note 3: Extra Cable. Used only for Optima 560, Discovery 610, and Discovery 710 systems with Q.Core. |                                      |                             |                               |  |                      |                        |                   |                   |                     |                   |           |          |                          |

**Table 14-2 GE Healthcare-Supplied Cables for PET/CT System (Continued)**

### 3.1.2 UPS Wiring Cables

| Length   | Run # | Length, Actual (Usable) |           | Part #    | Description | UL Cable Information |                     |                |                |                  |                |           |          | Pull Size mm (inches) |
|----------|-------|-------------------------|-----------|-----------|-------------|----------------------|---------------------|----------------|----------------|------------------|----------------|-----------|----------|-----------------------|
|          |       |                         |           |           |             | UL Style             | Flammability Rating | Voltage Rating | Voltage Actual | Temp. Rating (C) | Dia. mm (inch) | # of Cond | Size AWG |                       |
| STANDARD | 060   | 6 (5)                   | 19.7 (16) | 5125079   | PDU to UPS  | 2587                 | FT-4                | 600            | ±350V DC       | 90               | 19 (0.75)      | 5         | 8        | 22 (0.9) dia          |
|          | 061   | 6 (5)                   | 19.7 (16) | 5125079-2 | UPS to PDU  | 2587                 | FT-4                | 600            | 440Y/254       | 90               | 19 (0.75)      | 5         | 8        | 22 (0.9) dia          |
|          | 110   | 14 (13.7)               | 46 (45)   | 5169224   | A1 to UPS   | 2587                 | FT-4                | 600            | 208Y/120C      | 90               | 14 (0.54)      | 5         | 18       | 25 (1.0) dia          |

**Table 14-3 UPS Wiring Cables**

**UPS Kit B7864PZ Requires installation of one of the A1 panels listed below.**

| Max. Mom. kVA Rating | Required Main Disconnect (A1) Cat #                             |   | Optional Partial UPS Kit Cat #  |
|----------------------|---|---|---|
|                      | Europe & Asia (380-400V or 420V)                                | North America (440V or 460-480V)                                |   |
| 150kVA               | E4502AF (150A)<br>(incl. Auto Restart & Integrated UPS Control) | E4502AE (125A)<br>(incl. Auto Restart & Integrated UPS Control) | B7864PZ<br>PowerWare<br>9355-15-14GE<br>(14.4kVa - 40A)<br>Requires one of the A1 panels shown at left, or equal. |

**Table 14-4 Partial UPS Back-up Options**

### 3.1.3 PARC

| 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 |                       |
|       | 80 (74)                 | 24.4 (22) | 5313941   | Cable ASM, PDU-RRR Power                                    | 2587                 | FT-4                | 600            | 208Y/120       | 60               | 19 (.751)      | 5         | 10       | 25 (1.0) dia          |
| 056   | 80 (74)                 | 24.4 (22) | 2371450-3 | Console to Raceway GND-LONG                                 | 1283                 | VW-1 FT-1           | 600            | 0              | 105              | 11.9 (.467)    | 1         | 2        | 12 (0.48) dia         |
| 203   | 80 (74)                 | 24.4 (22) | 5313938   | Cable ASM, Ethernet, Coin Link, SBA J7 to RRR J6            | UL                   | FT-4                | 300            | Less than 30DC | 60               | 6.6 (0.26)     | 4 pair    | 24       | 13 (0.5) dia          |
| 201   | 80 (74)                 | 24.4 (22) | 5313938-2 | LAN Cable ASM, Ethernet, Coin Link, RRR J4 to Switch port 5 | UL                   | FT-4                | 300            | Less than 30DC | 60               | 6.6 (0.26)     | 4 pair    | 24       | 13 (0.5) dia          |
| 202   | 80 (74)                 | 24.4 (22) | 5313938-3 | LAN Cable ASM, Ethernet, Coin Link, RRR J5 to Switch port 7 | UL                   | FT-4                | 300            | Less than 30DC | 60               | 6.6 (0.26)     | 4 pair    | 24       | 13 (0.5) dia          |

**Table 14-5 Parc Wiring Cables**

### 3.2 Contractor/Customer-supplied

| Customer Installed wiring   |  | Description  | Cables Supplied |                 |              | Plug Pulling Dimensions |    | Wire and Cable Pigtails ft. (M.) |       |
|---|--|--|-----------------|-----------------|--------------|-------------------------|----|----------------------------------|-------|
| Qty   | Size AWG (mm <sup>2</sup> )                              |  | Part No         | Length ft. (M.) | Dia. in (mm) | From                    | To | From                             | To    |
| RUN NO. 1 FROM PRIMARY POWER SOURCE TO FACILITY DISCONNECT (POWER SOURCE - A1)    |  |  |                 |                 |              |                         |    |                                  |       |
| Maximum Run Length *  |  |  |                 |                 |              |                         |    |                                  |       |
| 3   | *  | POWER  |                 |                 |              |                         |    | 3 (1)                            | 3(1)  |
| 1   | 1/0 (50)   | GROUND   |                 |                 |              |                         |    | 3 (1)                            | 3 (1) |
| RUN NO. 2 FROM FACILITY DISCONNECT TO POWER DISTRIBUTION UNIT (A1 - PM)           |  |  |                 |                 |              |                         |    |                                  |       |
| Maximum Run Length *  |  |  |                 |                 |              |                         |    |                                  |       |
| 3   | *  | POWER  |                 |                 |              |                         |    | 3 (1)                            | 3(1)  |
| 1   | 1/0 (50)   | GROUND   |                 |                 |              |                         |    | 3 (1)                            | 3 (1) |
| -   | -  | NEUTRAL -- Not Required  |                 |                 |              |                         |    | 3 (1)                            | 3 (1) |
| RUN NO. 3 FROM FACILITY DISCONNECT TO SYSTEM EMERGENCY OFF (A1 - SEO)             |  |  |                 |                 |              |                         |    |                                  |       |
| 2   | 14 (2)   | POWER  |                 |                 |              |                         |    | 6 (2)                            | 6 (2) |
| 1   | 14 (2)   | GROUND   |                 |                 |              |                         |    | 6 (2)                            | 6 (2) |
| RUN NO. 4 POWER DISTRIBUTION UNIT TO WARNING LIGHT CONTROL (PDU - WL)             |  |  |                 |                 |              |                         |    |                                  |       |
| 2   | 14 (2)   | WARNING LIGHT 24 VOLT CONTROL TS6 1, 2, 3, 4, 5, 6, 7, 8                                   |                 |                 |              |                         |    |                                  |       |
| RUN NO. 5 POWER DISTRIBUTION UNIT TO SCAN ROOM DOOR INTERLOCK (PDU - DOOR SWITCH) |  |  |                 |                 |              |                         |    |                                  |       |
| 2   | 14 (2)   | SCAN ROOM DOOR INTER LOCK TS6 9, 10  |                 |                 |              |                         |    |                                  |       |
| *   | REFER TO Table 13-2 on page 99 FOR AWG (MM2) WIRE SIZES. |  |                 |                 |              |                         |    |                                  |       |
| RUN NO. n/a BBNC  |  |  |                 |                 |              |                         |    |                                  |       |
| 1   | customer determined                                      | Hospital Broad-band Network Connection (Wall Jack: Placed on the wall behind the console.) |                 |                 |              |                         |    |                                  |       |

**Table 14-6 Runs 1, 2, 3, 4, and 5 Connections**

## Section 4.0 Contractor-supplied Components (D690 VCT, Discovery Elite)

| Reference                    | Associated Equipment                    | Material/Labor Supplied by Customer Contractor   | USA Vendor / CAT No. GE Catalog   |
|------------------------------|---|--|---|
| A1<br>380 - 480V<br>50/60 Hz | Circuit Breaker with Magnetic Contactor | Three Pole, 380V - 480V, Combination breaker with magnetic contactor. Includes control transformer, optional UPS interface, On/Off controls and auto-restart feature, if GE-supplied.  | Recommend*:<br><ul style="list-style-type: none"> <li>E4502AE (125A)</li> <li>E4502AF (150A)</li> </ul> Optional remote operator control available from GE Supply, Cat # GESCTR0CS1 |
| BBNC (required)              | Broad-band Network Connection           | Broad-Band network connection wall jack, located within 1m (39inches) of Operator Console location, for internal hospital networking and InSite Broad-Band connectivity.<br><br>Cabling to conform to facility's IT standards. |   |
| ITL (optional)               | In-Suite Telephone Lines                | Supply two (2) voice-grade telephone lines. One line must be a direct number from outside the facility – do not route this line through a telephone switchboard. Telephone line operating charges are paid by customer.        |   |
|                              | System Components                       | Reference the system installation drawings supplied by Installation Support Services within your geographic area.  |   |
|                              |   | Room Warning Light Controller  | E4500AM   |

\*Refer to Table 14-6 on page 111.

**Table 14-7 Contractor-supplied Components**



## Section 5.0 Contractor-supplied Components (Optima 560, D600, D690 Elite)

| Reference                    | Associated Equipment                    | Material/Labor Supplied by Customer Contractor   | USA Vendor / CAT No. GE Catalog  |
|------------------------------|---|--|--|
| A1<br>380 - 480V<br>50/60 Hz | Circuit Breaker with Magnetic Contactor | Three Pole, 380V - 480V, Combination breaker with magnetic contactor. Includes control transformer, optional UPS interface, On/Off controls and auto-restart feature, if GE-supplied.  | Recommend*:<br><ul style="list-style-type: none"> <li>E4502AC (110A)</li> <li>E4502AB (90A)</li> </ul> |
| BBNC (required)              | Broad-band Network Connection           | Broad-Band network connection wall jack, located within 1m (39inches) of Operator Console location, for internal hospital networking and InSite Broad-Band connectivity.<br><br>Cabling to conform to facility's IT standards. |  |
| ITL (optional)               | In-Suite Telephone Lines                | Supply two (2) voice-grade telephone lines. One line must be a direct number from outside the facility – do not route this line through a telephone switchboard. Telephone line operating charges are paid by customer.        |  |
|                              | System Components                       | Reference the system installation drawings supplied by Installation Support Services within your geographic area.  |  |

\*Refer to Table 14-6 on page 111.

**Table 14-8 Contractor-supplied Components**

## Section 6.0 Typical Customer-supplied Wiring (U.S.)

The following illustrations represent typical disconnects that you may see at your site.

### 6.1 Primary Power Disconnect

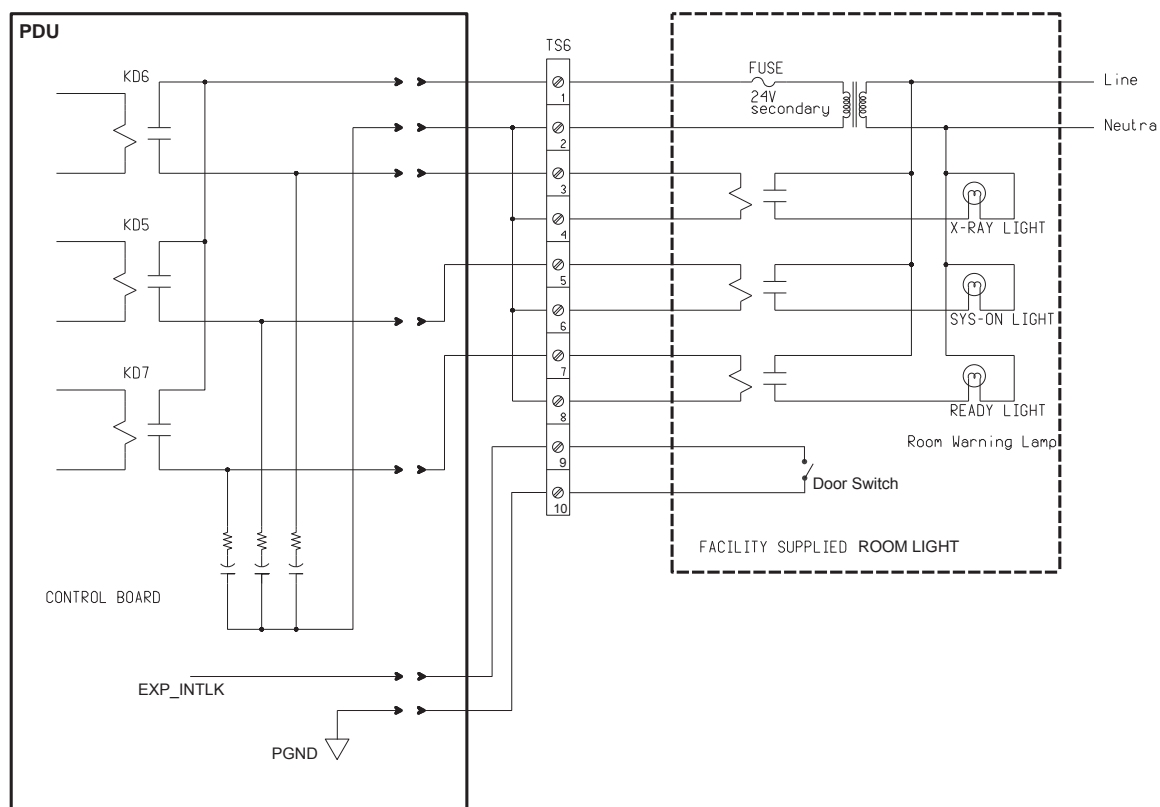


*Figure 14-1 Primary Power Disconnect (A1)*

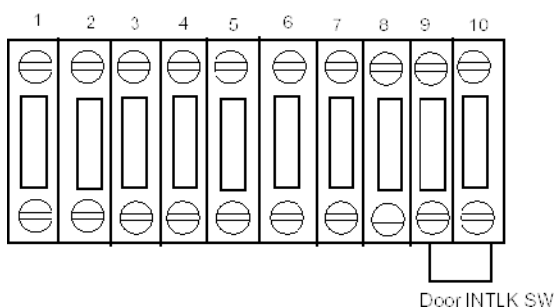
**WARNING** DO NOT USE [Figure 14-2](#) ON THE FOLLOWING PAGE FOR INSTALLATION PURPOSES!



## 6.2 Scan Room Warning Light and Door Interlock

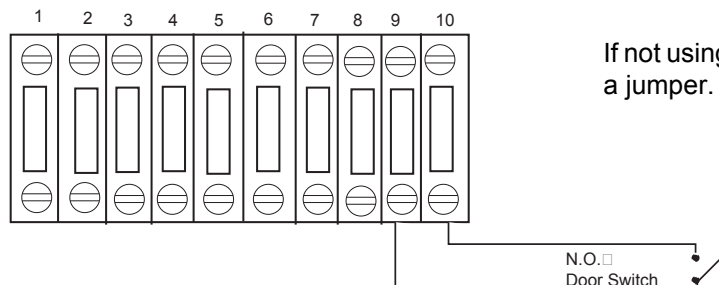


**Figure 14-3 TS6 X-Ray Warning Light Connections**



Without jumper in place, exposures will not occur. Check this jumper if you get scan interlock errors.

**Figure 14-4 TS6 Room Door Interlock Connections - Without Door Interlock**



If not using a door switch, add a jumper.

**Figure 14-5 TS6 Room Door Interlock Connections - with Door Interlock**

| Wire Size AWG | Driver               | Bolt/Hex       |
|---------------|----------------------|----------------|
| #18 - 16      | 1.67 ft-lb (2.3 N-m) | 6.25 (8.5 N-m) |
| #14 - 8       | 1.67 ft-lb (2.3 N-m) | 6.25 (8.5 N-m) |
| #6 - 4        | 3.0 ft-lb (4.1 N-m)  | 12.5 (17 N-m)  |
| #0 - 2/0      | 29 ft-lb (39.3 N-m)  |                |

**Table 14-9 Power Wire Torque Values**

| Wire Size AWG | Driver               | Bolt/Hex       |
|---------------|----------------------|----------------|
| #14 - 8       | 1.67 ft-lb (2.3 N-m) | 6.25 (8.5 N-m) |
| #6 - 4        | 3.0 ft-lb (4.1 N-m)  | 12.5 (17 N-m)  |
| #3 - 1        | 21 ft-lb (28.5 N-m)  |                |
| #0 - 2/0      | 29 ft-lb (39.3 N-m)  |                |

**Table 14-10 Ground Buss Bar Torque Values**

Note: A1 and PDU feeder connections and torque supplied by electrician or electrical contractor.



# Chapter 15

## Delivery and Storage Requirements

This chapter provides the information necessary for planning the safe and successful delivery of the system from GE Healthcare to the receiving area of the installation site, and from the receiving area of that facility to the scan suite.

### Section 1.0 Delivery to the Facility

Your Project Manager of Installation will determine the most appropriate means of transporting the system to your facility. However, the type of receiving area at the facility where the installation will occur determines, to a large extent, the method used to transport the system to that facility. When planning for delivery, facilities tend to fall into two general categories, those with a loading dock and those without a loading dock.

#### 1.1 Loading Dock Deliveries

Facilities with a loading dock in their receiving area can generally accommodate delivery of the system by van. This is the preferred method of transporting the system to the installation site, as dock-to-dock shipment by van minimizes the possibility of dropping the Gantry, and packing the system for van shipment involves minimum tear-down of components. The packed system consists of approximately 20 shipping containers, which include dollies, skids, and boxes without skids.

| Item   | Length<br>in (mm) | Width<br>in (mm) | Height<br>in (mm) | Weight<br>lb (kg) | Liftable<br>(Optional) | Riggers<br>to Move | Construction<br>Package<br>(Optional) |
|--|-------------------|------------------|-------------------|-------------------|------------------------|--------------------|---------------------------------------|
| D690 VCT, Discovery<br>Elite CT Gantry             | 114 (2896)        | 51 (1295)        | 77 (1955)         | 4260 (1932)       | Yes                    | Yes                | Yes                                   |
| Optima 560, D600,<br>D690 Elite CT Gantry          | 111 (2810)        | 51 (1290)        | 79 (2000)         | 4399 (1995)       | Yes                    | Yes                | Yes                                   |
| PET Source Ring and<br>Trailer with Dollies        | 96 (2438)         | 44 (1118)        | 43 (1092)         | 1340 (608)        | Yes                    | Yes                | Yes                                   |
| PET Image Ring with<br>Dollies                     | 110 (2794)        | 44 (1118)        | 74 (1880)         | 3205 (1454)       | Yes                    | Yes                | Yes                                   |
| PET Base and<br>Retractor Assembly<br>with Dollies | 96 (2438)         | 41.5<br>(1054)   | 39 (990)          | 1495 (678)        | Yes                    | Yes                | Yes                                   |
| PARC   | 32 (816)          | 40 (1020)        | 60 (1522)         | 900 (408)         | Yes                    | Yes                | Yes                                   |
| Table (with<br>accessories)                        | 161 (4089)        | 34 (864)         | 55.5 (1410)       | 2856 (1295)       | Yes                    | Yes                | Yes                                   |
| Power Distribution<br>Unit                         | 30 (762)          | 23 (584)         | 43 (1092)         | 910 (413)         | Yes                    | Yes                | Yes                                   |

**Table 15-1 Estimated Loading Dock Delivery Sizes and Weights**

| Item              | Length<br>in (mm) | Width<br>in (mm) | Height<br>in (mm) | Weight<br>lb (kg) | Liftable<br>(Optional) | Riggers<br>to Move | Construction<br>Package<br>(Optional) |
|-------------------|-------------------|------------------|-------------------|-------------------|------------------------|--------------------|---------------------------------------|
| Skid with Console | 54 (1372)         | 46 (1168)        | 43 (1092)         | 560 (254)         | Yes                    | Yes                | Yes                                   |

**Table 15-1 Estimated Loading Dock Delivery Sizes and Weights**

## 1.2 Ground (Non-loading Dock) Deliveries

Facilities without a loading dock usually require ground delivery by either liftgate or tiltbed truck. Such deliveries involve unloading the system components from the truck and then rolling them across smooth sidewalks or other paved surfaces into the facility.

### 1.2.1 Tiltbed Truck

Delivery of the system by tiltbed truck also requires an appropriate capacity truck, capable of lifting 3 tons. Safe transport of the system by tiltbed truck requires securing the components to the truck to prevent damage during transportation. To avoid damage to the Gantry or dolly when removing the Gantry from a tiltbed truck, the Project Manager of Installation should direct the driver to attach straps to the lowest possible point on the dolly and lower the gantry at the slowest reasonable rate.

Note: See Sections 4, 5, and 6.

### 1.2.2 Forklift usage

The lifting option must be ordered if delivery of the system requires the use of a forklift to remove the system from the truck.

### 1.2.3 Lean Packaging

Do not unpack these carts on the truck. Do not recycle or dispose of cardboard in these carts. Packing list is included in each cart and can be used to inventory system. There are three lean carts for storage space reference they are 60 in (mm) H x 31 in (mm) D x 83 in (mm) W

## Section 2.0 Delivery to the Scan Suite

Once at the installation site, conveyance of the system into the scan suite may involve special considerations, such as vertical lifting, or transportation through stairwells, which will involve additional planning by the Project Manager of Installation (PMI). The PMI must notify the delivery team of the intended delivery type.

## 2.1 Lifting

Both vertical and horizontal lifting require professional riggers. The PMI should always notify MI&CT engineering before attempting either lifting procedure and should make sure that the order includes the necessary lifting fixtures, as both vertical and horizontal fixtures must appear on the order for them to ship with the system.

### 2.1.1 Stairway Deliveries

Stairways at angles at or less than 45 degrees can accommodate delivery of system components. If the site requires delivery through stairwells, the PMI will add the appropriate identifier to the order



to ensure proper packaging of the system, and will notify MI&CT engineering before attempting the procedure. The components ship attached to special lifting skids with lifting instruction for riggers.

## 2.2 Floor Protection

GE recommends floor protection along the delivery path from the dock/receiving area to scan room.

# Section 3.0 Dollies

## 3.1 Installations Within the United States

Typically, domestic shipments (shipments within the United States) involve the use of dollies for moving the gantry, table, and operator console. Upon completion of gantry, table, and operator console installation, return the dollies to GE using the shipping document found in Box #1.

### 3.1.1 Zero Clearance Dollies (Mini) (For CT Gantrys only)

Deliveries involving small elevators with a depth of at least 2692 mm (106 in.) require zero clearance dollies. Zero clearance dollies allow movement of the gantry in tight areas; avoid using them for normal dock or van deliveries. To order zero clearance dollies, go to:

<http://www.umi-dollyshop.com>.

### 3.1.2 Tilting Table Dollies

Deliveries involving small elevators with a depth of at least 2438 mm (105 in.) require tilting table dollies. If storing the system prior to installation, avoid ordering tilt dollies. A limited number of tilt dollies exist for U.S. deliveries. To order tilt dollies, go to: <http://www.umi-dollyshop.com>.

## 3.2 Installations Outside the United States

Dollies (P5064ZZ ) are shipped with the system. After removing the system from the crates, DO NOT return dollies shipped outside of the US to GE Healthcare in Milwaukee, WI, USA. Instead, forward them to the local GE office or warehouse.

### 3.2.1 International Installations

Dollies (P5064ZZ ) are shipped with the system 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
- PET Trailer dolly
- PET Image Ring dolly
- CT Gantry dollies
- Table dollies

### 3.2.2 Zero Clearance Dollies

International customers can purchase zero clearance dollies as required by going to: <http://www.umi-dollyshop.com>

### 3.2.3 Tilting Table Dollies

International customers can purchase tilt dollies as required by going to:  
<http://www.umi-dollyshop.com>.

## Section 4.0 Gantry/Table Considerations

The following PET/CT Gantry components ship on individual sets of dollies:

- The CT Gantry: [Figure 15-1](#)
- The PET Base and Retractor Assembly: [Figure 15-2](#)
- The PET Image Ring: [Figure 15-3](#)
- The PET Trailer: [Figure 15-4](#)



**Figure 15-1 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 15-1](#).

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 15-2](#). The minimum hallway and door size for the CT Gantry with covers and dollies attached, but side rails removed, is 42 inches (1067 mm).

| Configuration                  | Length<br>IN (MM) | Width<br>IN (MM) | Height<br>IN (MM) | VCT Weight<br>lb (kg) | BrightSpeed<br>Weight<br>lb (kg) |
|--------------------------------|-------------------|------------------|-------------------|-----------------------|----------------------------------|
| Dollies On, Side Rails On      | 114 (2896)        | 51 (1295)        | 77 (1955)         | 4260 (1932)*          | 3899 (1770)*                     |
| Dollies On, Side Rails Removed | 114 (2896)        | 42 (1067)        | 77 (1955)         | 4220 (1914)           | 3870 (1755)                      |
| * Floor protection required    |                   |                  |                   |                       |                                  |

**Table 15-2 CT Gantry and Dollies Dimensions, with and without Side Rails**

## Section 5.0 PET Delivery Components

The PET gantry consists of:

- PET base and Retractor Assembly ([Figure 15-2](#))
- PET image ring ([Figure 15-3](#))
- PET trailer/retractor ([Figure 15-4](#))

Refer to [Figure 15-2](#). The PET base dollies have a center stabilizing frame to protect the exposed components.

| Configuration                                   | Length<br>in (mm) | Width<br>in (mm) | Height<br>in (mm) | Weight<br>lb (kg) |
|---|-------------------|------------------|-------------------|-------------------|
| PET Base and Retractor Assembly<br>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 Image Ring without Dollies                  | 76 (1931)         | 28 (720)         | 72 (1819)         | 2485 (1127)       |
| PET Image Ring Dolly                            | 110 (2794)        | 44 (1118)        | --                | 720 (327)         |
| PET Source Ring and Trailer with<br>Dollies     | 96 (2438)         | 44 (1118)        | 43 (1092)         | 1340 (608)        |

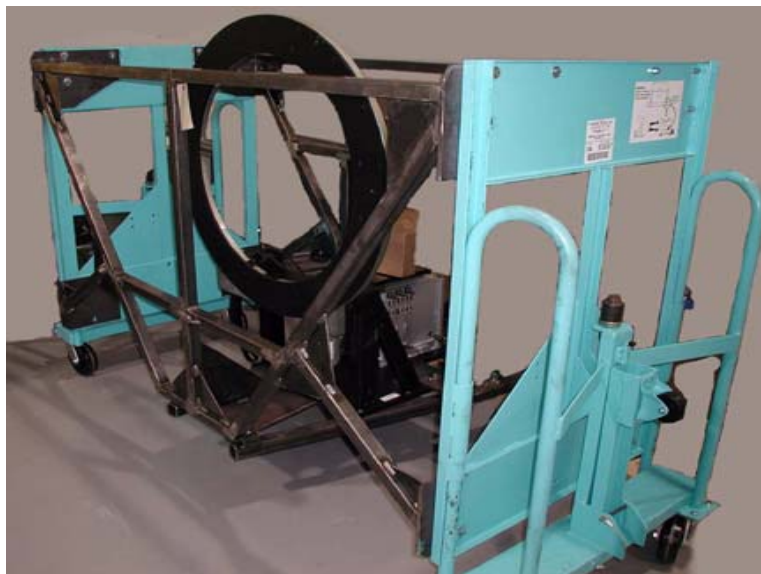
**Table 15-3 PET Gantry Dimensions with Dollies**



**Figure 15-2 PET Base and Retractor Assembly, with Shipping Dollies**



**Figure 15-3 PET Gantry Image Ring, with Shipping Dollies and Side Rails**



***Figure 15-4 PET Source Ring and Trailer, with Shipping Dollies and Side Rails***

## Section 6.0 Patient Table

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 15-5](#). The secondary base covers ship separately. The dimensions in [Table 15-4](#) do not include shipping crates or packaging materials.

Refer to [Figure 15-5](#). The patient table ships to domestic (North American) installations on a set of dollies with stabilizing side rails.

Refer to [Figure 15-5](#) and [Figure 15-6](#). 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 15-5 Patient Table with Shipping Dollies**



**Figure 15-6 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.



| Configuration                       | Length<br>in. (mm)    | Width<br>in. (mm) | Shipping Height<br>in. (mm) | Weight<br>lb. (kg) |
|-------------------------------------|-----------------------|-------------------|-----------------------------|--------------------|
| Blue Dollies Off,<br>Red Castors On | 120 (3048)            | 40 (1016)         | 55.5 (1410) nominal         | 2856 (1295)        |
| Blue Dollies On                     | 151 (3836)            | 34 (864))         | 55.5 (1410) nominal         | 2736 (1241)        |
| Tilting                             | 98-115<br>(2489-2921) | 26 (660)          | 70-80<br>(1778-2032)        | 100 (636)          |

**Table 15-4 Table Dimensions with Dollies**

## Section 7.0 PARC

- The PARC is shipped in a crate equipped with a ramp for unloading.
- Do not remove the PARC from the crate until it is in the room ready for installation.



**Figure 15-7 PARC Shipping Crate**

| Configuration       | Length<br>in (mm) | Width<br>in (mm) | Height<br>in (mm) | Weight<br>lb (kg) |
|---------------------|-------------------|------------------|-------------------|-------------------|
| PARC Shipping Crate | 32 (181)          | 50 (127)         | 60 (170)          | 900 (408)         |

**Table 15-5 PARC Shipping Crate Dimensions**

## Section 8.0 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.

| Configuration                      | Length<br>in (mm) | Width<br>in (mm) | Height<br>in (mm) | Weight<br>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)          |
| Skid with TIO Console & Components | 34 (860)          | 25 (630)         | 42 (1050)         | 192 (87)          |

**Table 15-6 Console Shipping Dimensions**



Packed for Shipment



Ready to be Unloaded  
from Shipping Skid

**Figure 15-8 Operator Console on Shipping Skid**



## Section 9.0 Doors and Elevators

### 9.1 Door Openings

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

### 9.2 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.

## Section 10.0 Storage Requirements

**NOTICE** Failure to adhere to storage requirements will likely result in equipment damage.

### 10.1 Short-term Storage (Less than Six Months)

If storing the system before installation for less than six months, store it in a temperature- and humidity-controlled warehouse. Protect it from weather, dirt, and dust.

Meeting the following requirements prevents rust and corrosion from forming on bearing surfaces due to condensation:

- Storage temperature should not exceed 0° to 30° C (40° to 80° F).
- Maintain relative humidity (non-condensing) up to 70%.

Do not install a machine that has been stored longer than 6 months at a non GE facility.

**NOTICE** Between delivery qualifies as short-term storage. Van storage must meet the same specifications listed above.

Approximate storage space is 12' x 20' for a PET/CT system.

## 10.2 Construction-Site Storage

When storing the system at a construction site be sure to adhere to the following storage requirements:

- Do not damage or puncture the shipping crate.
- Do not remove packaging until the completion of all construction at the site and the removal of all dust created by the construction.
- Maintain a storage temperature within the range of 0° to 30° C (40° to 80° F).
- Maintain relative humidity (non-condensing) up to 70%.

A required Construction Site Package must be purchased separately.

## Section 11.0 Extreme Temperature Delivery and Storage

**NOTICE** Failure to adhere to extreme temperature requirements during delivery and storage will likely result in equipment damage.

Avoid extreme temperatures during system transportation and delivery.

**When transporting the system, prevent extended exposure of the system (maximum two weeks) to temperatures or humidity outside of the following specifications:**

- **Temperature:** -40° to +50° C (-40° to +122° F)
- **Humidity:** 5% to 95%

**NOTICE** Component freezing occurs when exposing the system to temperatures below -18° C (0° F) for a period longer than two (2) days. Allow a minimum of 12 hours for the system to adjust to ambient room temperature prior to installation.

# Chapter 16

## Handling Requirements

---

Communicate the information in this chapter to any personnel who will transport, move, or otherwise handle the system components during transportation and delivery of the system.

### Section 1.0 Transportation

To avoid dropping the gantry, the recommended means of transporting the system from GE Healthcare to the facility housing the installation site consists of dock-to-dock shipment by van. However, facilities without a loading dock may require transportation using liftgate or flatbed trucks, provided that no dropping or mishandling of the system occurs. These methods involve unloading system components from the truck and then rolling them across smooth sidewalks or other paved surfaces.

### Section 2.0 Handling Requirements

The design of the system will not tolerate excessive mishandling, including dropping, shock, vibration, tipping, or hoisting. Subsequently, be sure to communicate these handling requirements to all parties involved in transporting, moving, and handling system components.

#### 2.1 Avoid Dropping

Never drop the gantry, console, table or PDU. A drop from a height greater than 13 mm (0.5 in.) may cause structural damage to the frame or other major components. Damage resulting from a drop (e.g., bent frame, misalignment) may not become apparent until after the completion of system installation.

#### 2.2 Avoid Shocks and Vibrations

The design of the system, including the gantry, console, table and PDU, will also not tolerate the excessive shock or vibration that may occur during unloading. For example, rolling the console across a “washboard” style ramp may vibrate components, causing loose or broken connections. Damage resulting from shock or vibration (e.g., monitor, CD-ROM, hard-drive, or octane failure) may not become evident until after the completion of system installation.

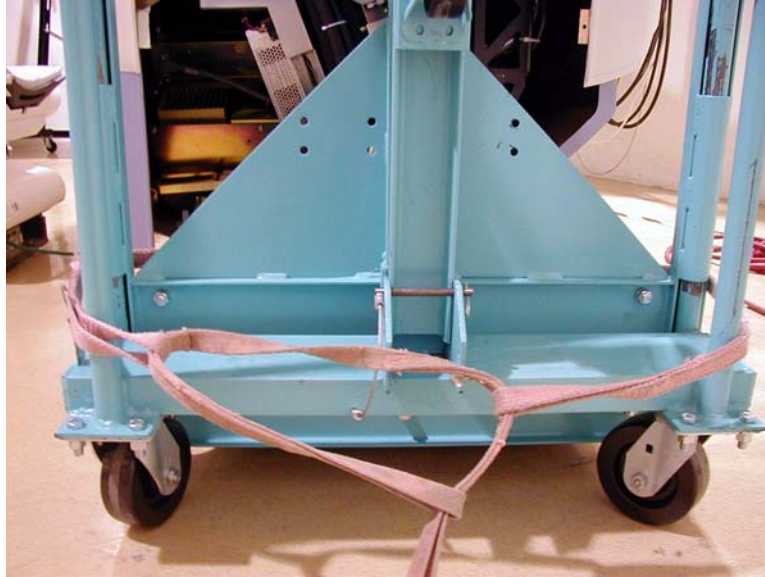
#### 2.3 Avoid Tipping

All system components must remain upright at all times; avoid tipping them. Move the gantry by rolling it on its dollies only, do not hoist it. Furthermore, avoid tipping or lifting the gantry when moving it through hallways, doorways, elevators, etc.

**NOTICE**    **Never lift the gantry using a forklift under the gantry frame.**

## 2.4 Inclines and Flatbed Truck Removal

When moving the gantry down steep inclines, including when removing the gantry from a flatbed wrecker, attach the straps to the lowest possible point on the dolly, and lower the gantry at the slowest reasonable rate. See [Figure 16-1](#).



*Figure 16-1 Proper Gantry Strap Location*

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



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