

GE Healthcare

Senographe DS

Pre-Installation Manual
PIM

CE 0459



2385057-10-8EN
Revision 1



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CHAPTER 1 SAFETY

This chapter contains information and warnings related to safety.

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Language Warning

<p>ПРЕДУПРЕЖДЕНИЕ (BG)</p>	<p>Това упътване за работа е налично само на английски език.</p> <ul style="list-style-type: none"> • Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод. • Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа. • Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.
<p>警告 (ZH-CN)</p>	<p>本维修手册仅提供英文版本。</p> <ul style="list-style-type: none"> • 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。 • 未详细阅读和完全理解本维修手册之前，不得进行维修。 • 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。
<p>警告 (ZH-HK)</p>	<p>本服務手冊僅提供英文版本。</p> <ul style="list-style-type: none"> • 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。 • 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。 • 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他危險。
<p>警告 (ZH-TW)</p>	<p>本維修手冊僅有英文版。</p> <ul style="list-style-type: none"> • 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。 • 請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。 • 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。
<p>UPOZORENJE (HR)</p>	<p>Ovaj servisni priručnik dostupan je na engleskom jeziku.</p> <ul style="list-style-type: none"> • Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod. • Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik. • Zanimarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.

Language Warning

<p>VÝSTRAHA (CS)</p>	<p>Tento provozní návod existuje pouze v anglickém jazyce.</p> <ul style="list-style-type: none"> • V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka. • Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah. • V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.
<p>ADVARSEL (DA)</p>	<p>Denne servicemanual findes kun på engelsk.</p> <ul style="list-style-type: none"> • Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse. • Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.
<p>WAARSCHUWING (NL)</p>	<p>Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar.</p> <ul style="list-style-type: none"> • Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is. • Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.
<p>WARNING (EN)</p>	<p>This service manual is available in English only.</p> <ul style="list-style-type: none"> • If a customer's service provider requires a language other than english, it is the customer's responsibility to provide translation services. • Do not attempt to service the equipment unless this service manual has been consulted and is understood. • Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.
<p>HOIATUS (ET)</p>	<p>See teenindusjuhend on saadaval ainult inglise keeles</p> <ul style="list-style-type: none"> • Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest. • Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist. • Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.

<p>VAROITUS (FI)</p>	<p>Tämä huolto-ohje on saatavilla vain englanniksi.</p> <ul style="list-style-type: none"> • Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla. • Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen. • Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.
<p>ATTENTION (FR)</p>	<p>Ce manuel d'installation et de maintenance est disponible uniquement en anglais.</p> <ul style="list-style-type: none"> • Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire. • Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris. • Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.
<p>WARNUNG (DE)</p>	<p>Diese Serviceanleitung existiert nur in englischer Sprache.</p> <ul style="list-style-type: none"> • Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen. • Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben. • Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.
<p>ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)</p>	<p>Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά.</p> <ul style="list-style-type: none"> • Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης. • Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις. • Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.
<p>FIGYELMEZTETÉS (HU)</p>	<p>Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.</p> <ul style="list-style-type: none"> • Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése. • Ne próbálja elkezdni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték. • Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.

Language Warning

<p>AÐVÖRUN (IS)</p>	<p>Þessi þjónustuhandbók er aðeins fáanleg á ensku.</p> <ul style="list-style-type: none"> • Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálþjónustu. • Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin. • Brot á sinna þessari aðvörðun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.
<p>AVVERTENZA (IT)</p>	<p>Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.</p> <ul style="list-style-type: none"> • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.
<p>警告 (JA)</p>	<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"> • サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。 • このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。 • この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。
<p>경고 (KO)</p>	<p>본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다 .</p> <ul style="list-style-type: none"> • 고객님의 서비스 제공자가 영어 이외의 언어를 요구할 경우 , 번역 서비스를 제공하는 것은 고객님의 책임입니다 . • 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오 . • 본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자 , 사용자 또는 환자에게 부상을 입힐 수 있습니다 .
<p>BRDINJUMS (LV)</p>	<p>Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.</p> <ul style="list-style-type: none"> • Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu. • Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas. • Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.
<p>ĮSPĖJIMAS (LT)</p>	<p>Šis eksploataavimo vadovas yra tik anglų kalba.</p> <ul style="list-style-type: none"> • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas. • Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploataavimo vadovo. • Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.

<p>ADVARSEL (NO)</p>	<p>Denne servicehåndboken finnes bare på engelsk.</p> <ul style="list-style-type: none"> • Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse. • Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått. • Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.
<p>OSTRZEŻENIE (PL)</p>	<p>Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.</p> <ul style="list-style-type: none"> • Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go. • Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.
<p>ATENÇÃO (PT-BR)</p>	<p>Este manual de assistência técnica encontra-se disponível unicamente em inglês.</p> <ul style="list-style-type: none"> • Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.
<p>ATENÇÃO (PT-PT)</p>	<p>Este manual de assistência técnica só se encontra disponível em inglês.</p> <ul style="list-style-type: none"> • Se qualquer outro serviço de assistência técnica solicitar este manual noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.
<p>ATENȚIE (RO)</p>	<p>Acest manual de service este disponibil doar în limba engleză.</p> <ul style="list-style-type: none"> • Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere. • Nu încercați să reparați echipamentul decât ulterior consultării și înțelegerii acestui manual de service. • Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.

Language Warning

<p>ОСТОРОЖНО! (RU)</p>	<p>Данное руководство по техническому обслуживанию представлено только на английском языке.</p> <ul style="list-style-type: none"> • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод. • Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.
<p>UPOZORENJE (SR)</p>	<p>Ovo servisno uputstvo je dostupno samo na engleskom jeziku.</p> <ul style="list-style-type: none"> • Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge. • Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo. • Zanemarivanje ovog upozorenja može dovesti do povređivanja serviser, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.
<p>UPOZORNENIE (SK)</p>	<p>Tento návod na obsluhu je k dispozícii len v angličtine.</p> <ul style="list-style-type: none"> • Ak zákazníkovi poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka. • Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obsluhu a neporozumiete mu. • Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.
<p>ATENCION (ES)</p>	<p>Este manual de servicio sólo existe en inglés.</p> <ul style="list-style-type: none"> • Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual. • No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio. • La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.
<p>VARNING (SV)</p>	<p>Den här servicehandboken finns bara tillgänglig på engelska. .</p> <ul style="list-style-type: none"> • Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster. • Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken. • Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.

<p>OPOZORILO (SL)</p>	<p>Ta servisni priročnik je na voljo samo v angleškem jeziku.</p> <ul style="list-style-type: none"> • Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod. • Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli. • Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.
<p>DIKKAT (TR)</p>	<p>Bu servis kılavuzunun sadece ingilizcesi mevcuttur.</p> <ul style="list-style-type: none"> • Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer. • Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz. • Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

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X-ray Warning

ATTENTION

Les appareils à rayons X sont dangereux à la fois pour le patient et pour le manipulateur si les mesures de protection ne sont pas strictement appliquées

Bien que cet appareil soit construit selon les normes de sécurité les plus sévères, la source de rayonnement X représente un danger lorsque le manipulateur est non qualifié ou non averti. Une exposition excessive au rayonnement X entraîne des dommages à l'organisme.

Par conséquent, toutes les précautions doivent être prises pour éviter que les personnes non autorisées ou non qualifiées utilisent cet appareil créant ainsi un danger pour les autres et pour elles-mêmes.

Avant chaque manipulation, les personnes qualifiées et autorisées à se servir de cet appareil doivent se renseigner sur les mesures de protection établies par la Commission Internationale de la Protection Radiologique, Annales 60 : Recommandations de la Commission Internationale sur la Protection Radiologique et les normes nationales en vigueur. Elles doivent également avoir reçu une formation sur l'utilisation de ce matériel.

WARNING

X-ray equipment is dangerous to both patient and operator unless measures of protection are strictly observed

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful X-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator. Excessive exposure to x-radiation causes damage to human tissue.

Therefore, adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation.

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 60 of the ICRP, and with applicable national standards and should have been trained in use of the equipment.

ATENCIÓN

Los aparatos de rayos X son peligrosos para el paciente y el manipulador cuando las normas de protección no están observadas

Aunque este aparato está construido según las normas de seguridad más estrictas, la radiación X constituye un peligro al ser manipulado por personas no autorizadas o incompetentes. Una exposición excesiva a la radiación X puede causar daños al organismo.

Por consiguiente, se deberán tomar todas las precauciones necesarias para evitar que las personas incompetentes o no autorizadas utilicen este aparato, lo que sería un peligro para los demás y para sí mismas.

Antes de efectuar las manipulaciones, las personas habilitadas y competentes en el uso de este aparato, deberán informarse sobre las normas de protección fijadas por la Comisión Internacional de la Protección Radiológica, Anales No 60: Recomendaciones de la Comisión Internacional sobre la Protección Radiológica y normas nacionales y deben haber sido formados en el uso de este equipo.

ACHTUNG

Röntgenapparate sind eine Gefahr für Patienten sowie Bedienungspersonal, wenn die geltenden Sicherheitsvorkehrungen nicht genau beachtet werden

Dieser Apparat entspricht in seiner Bauweise strengsten elektrischen und mechanischen Sicherheitsnormen, doch in den Händen unbefugter oder unqualifizierter Personen wird er zu einer Gefahrenquelle. Übermäßige Röntgenbestrahlung ist für den menschlichen Organismus schädlich.

Deswegen sind hinreichende Vorsichtsmaßnahmen erforderlich, um zu verhindern, daß unbefugte oder unqualifizierte Personen solche Geräte bedienen oder sich selbst und andere Personen deren Bestrahlung aussetzen können.

Vor Inbetriebnahme dieses Apparats sollte sich das qualifizierte und befugte Bedienungspersonal mit den geltenden Kriterien für den gefahrlosen Strahleneinsatz durch sorgfältiges Studium des Hefts Nr. 60 der Internationalen Kommission für Strahlenschutz (ICRP) vertraut machen: Empfehlungen der Internationalen Kommission für Strahlenschutz und anderer nationaler Normenbehörden.

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Definition of Warnings and Notes



Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

**Notice:**

Used for instructions to the Operator to prevent damage to property.

Note:

Used to draw attention to information that is important for the Operator to know.

*Definition of Warnings and Notes***Meaning of Symbols**

The following symbols may appear on parts of the Senographe System.



Alternating current



Earth (ground)



Dangerous voltage



Type B equipment



This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.



Name and address of manufacturer



Date of manufacture



Medical device catalogue number



Medical device serial number



Consult instructions for use



Caution
-or-
Attention, consult accompanying documents

CHAPTER 2 PUBLICATION PRESENTATION

1. APPLICABILITY

This publication provides information for planning and carrying out the installation of a Senographe DS. Installation of other equipment mentioned, such as the Review Workstation, is described in other publications.

2. HOW TO READ THIS DOCUMENT

The contents fall into two main categories *Descriptive* and *Procedural*.

- *Descriptive content.*

Chapter 3 *System Description* describes the main operational characteristics of the equipment.

Chapter 4 *Pre-Installation System Requirements* describes the main physical characteristics of system components, environmental and other requirements which must be taken into account when planning and carrying out an installation.

- *Procedural content:*

Chapter 5 *Pre-Installation Procedures* includes steering guides outlining the various steps which should be followed when planning and carrying out an installation

A summary of changes to the publication is given in the *Revision History* section in this chapter.

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Acronyms Glossary

A

AC	Alternating Current
ADS	Appollo Digital System
AET	Application Entity Title
ARC	Analog Readout Chip
ASIS	Application Specific Integrated Circuit
AWS	Acquisition Workstation
AW	Advantage Window
A/D	Analog to Digital

C

CAN	Controller Area Network
CF	Conversion Factor
CL	Central Listing
CM	Corrective Maintenance
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit

D

DC	Direct Current
DCB	Differential Circuit Breaker
DICOM	Digital Imaging and Communications in Medicine
DLC	Data Length Code (CANopen protocol)
DMPU	Digital Mammography Processing Unit
DMR	Dual Molybdenum Rhodium — A legacy term which in some cases represents a product such as Senographe DMR, and in other cases represents the Generator. Typically system error messages that include DMR in the message are actually referring to the Generator.
DQE	Defective Quantum Efficiency
DSP	Digital Signal Processor
DRC	Digital Readout Chip
DPS	Detector Power Supply
D/R	Disassemble and Reassemble

E

EMC	Electromagnetic Compatibility
ESD	ElectroStatic Discharge

F

FAU	Field Adjustable Unit
-----	-----------------------

Acronyms Glossary

FD	Functional Diagram
FDA	Food and Drug Administration
FE	Field Engineer
FET	Field Effect Transistor
FFDM	Full Field Digital Mammography
FMI	Field Modification Instruction
FOV	Field Of View
FPGA	Field Programmable Gate Array
FRU	Field Replacable Unit
FSB	Front System Bus
FW	Firmware or Feeder Wire

G

GLI	Grid Line Interference
Gnd	Ground

H

HIS	Hospital Information System
HNS	Hospital Network Service OR Health Net Services
HV	High Voltage
HVL	Half Value Layer
HT	High Tension

I

IPMS	Isis Positioner Motion Software (old definition that covers the whole Gantry) or Interrupt Pipes Management System (low-level processor activity)
IP	Internet Protocol
IIP	Insite Interactive Platform
IOD	Information Object Definition
IDC	Image Detection Controller
I/F	Interface

J

JC	Job Card
----	----------

L

LFOV	Large Field Of View
LMP	Lamp
LSL	Lower Specification Limit
LUT	Look Up Table
LV	Low Voltage

M

MC	Main Contactor
MCU	Micro Controller Unit (usually refers to the HC12 chip on the Gantry nodes)
MCM	Multichip Module
MDR	Main Distribution Rack
MFU	Main Functional Unit
MQSA	Mammography Quality Standards Act
MTF	Modulation Transfer Function

N

NPS	Noise Power Spectrum
-----	----------------------

O

OLC	OnLine Center
-----	---------------

P

PB	Push Button
PDB	Power Distribution Board
PDI	Product Delivery Instructions
PDO	Process Data object (CANOpen protocol)
PDU	Power Distribution Unit
PI	Part Identity
PPP	Point-to-Point Protocol
PPS	Performed Procedure Step
PWA	Printed Wiring Assembly
PM	Planned Maintenance
PTB	Positioner Tracking Board (main Gantry control board called Roadrunner that has Poseidon SW on it)

Q

QAP	Quality Assurance Procedures OR Quality Assurance Program
Q/R	Query Retrieve

R

RF	Radio Frequency
r.h.	Relative Humidity
RIS	Radiology Information System
RNU	Resolution Non-Uniformity
ROI	Region Of Interest
RWS	Review Workstation
RT	Real Time

Acronyms Glossary

S

SBC	Single Board Computer
SC	Scenario Categories
SCP	Service Class Provider
SCU	Service Class User
SDD	Source to Dosimeter Distance
SEL	Select
SID	Source to Image Distance
SIP	Service Information and Procedures
SLDU	Second Look Digital Unit
SM	Service Manual
SOP	Service Object Pair

T

TEC	ThermoElectric Cooler
TFT	Thin Film Transistor
TP	Twisted Pair

U

UBC	Universal Builders Code
USL	Upper Specification Limit

V

VOI	Volume Of Interest
-----	--------------------

W

WL	Window Level
WW	Window Width

Revision History

Note for the Technical Writer:

This publication is contained in a multibook Master folder. It is a slave publication. To maintain this publication it is mandatory to use "Master Folder" 2396423-x-8EN as the Frame Maker source.

The "Master Folder" contains a "Read me" which explains how to proceed.

Date	Reference	Main reason for change
August 2011	2385057-10-8EN Rev 1	Updates for Pixel Spacing Kit and IB Release
June 2010	2385057-9-8EN Rev 1	Updates for LFOV2 (Nephtys M415)

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CHAPTER 3 SYSTEM DESCRIPTION

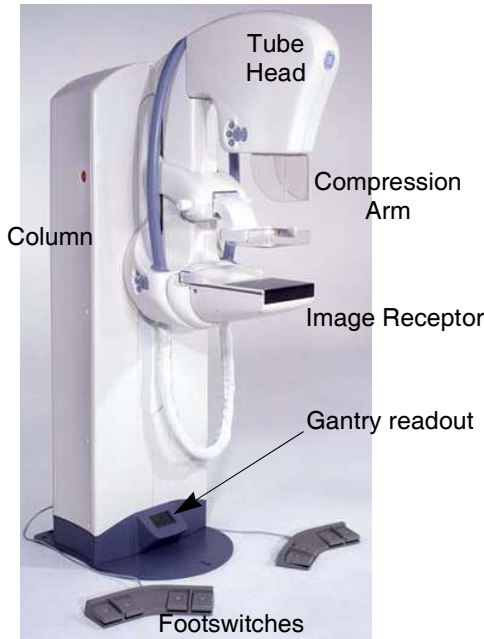
This chapter contains descriptive information for the Senographe system.

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Sub-Systems and Components

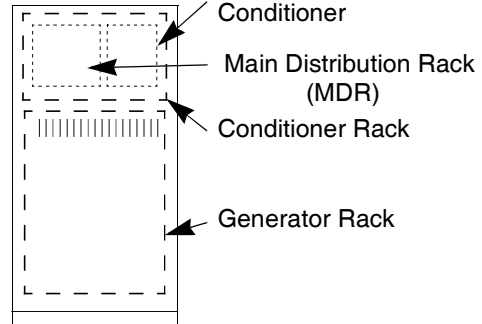
Senographe Acquisition System:

Gantry

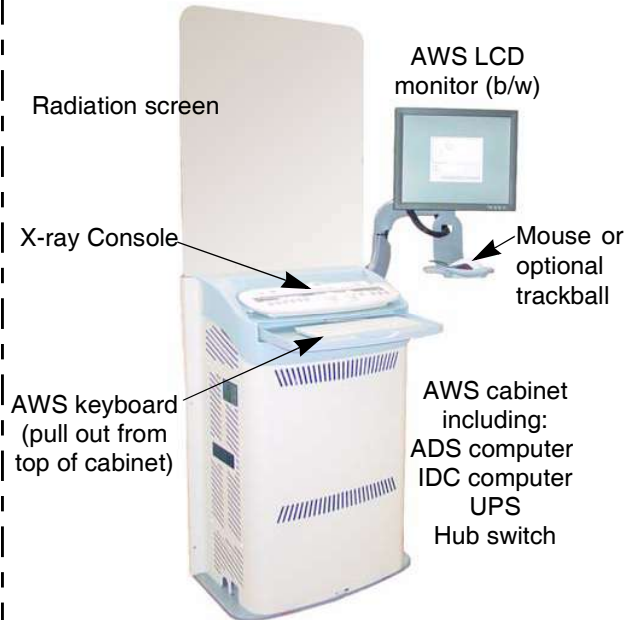


Definitions:
 Gantry = Arm + Column + Image Receptor
 Arm = Tube Head + Compression Arm
 Image receptor = Digital Detector + Bucky or Mag Stand or Stereotactic Positioner

Generator Cabinet



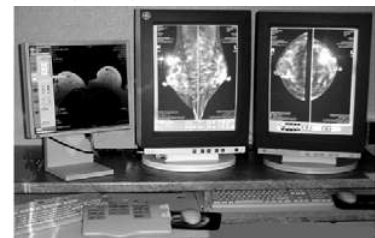
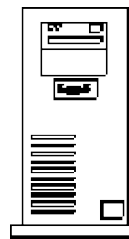
Control Station



Review options:

Seno Advantage Review Workstation

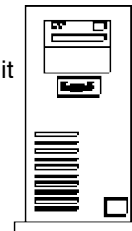
AW 4.2 Processor unit	AW 4.2 LCD monitor (color)	LCD or CRT Diagnostic monitors
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keypad keyboard

CAD: R2 Image Checker or SLDC

CAD Processor unit



1. SYSTEM FEATURES

Senographe DS is one of the latest Digital Mammography Systems from GE Medical Systems. It has been designed to perform Screening examinations as well as Diagnostic Views (including Spot compression, Magnified and/or Coned views). It is a *modular* system that eliminates the need for film cassettes. It takes advantage of digital technology, including on-screen image display, Networking, Filming, and Archiving.

The Senographe system is equipped with a dual track X-ray tube (molybdenum/rhodium) and a digital detector. The Digital Detector is a flat panel of amorphous silicon on which cesium iodide is deposited to maximize detection of X-rays. The X-ray Console controls the X-ray exposure parameters and controls the power to all parts of the Senographe system. The Arm control keypads control the positioning operations of the Tube Head.

- It offers the capability to acquire images in near real time, process images, and manipulate images with the ability to vary brightness and contrast levels.
- It also offers high examination productivity as compared with screen film, and introduces new applications such as Networking and Archiving.
- It is built on a new platform, designed for superior Image Quality. The Rhodium spectrum of the X-ray tube is adapted to Digital Imaging.

The Control Station includes an *Acquisition Workstation (AWS)* with monitor, keyboard, and mouse or trackball, computer, electronics, and Uninterruptible Power Supply (UPS). The AWS is used for image acquisition, processing, and display. The AWS can also be used for database management, and can send images to archive, review, or filming.

- The Acquisition Workstation displays acquired images in the room, allowing immediate evaluation of breast positioning and possible motion blur, or adjustment of brightness and contrast.

Archiving, Networking, and Filming are all possible from the Acquisition Workstation, which can produce any number of equally high quality film copies as needed.

A hardcopy laser-film printer can be used for image interpretation. Printer window width and window level are set automatically, based on the image content. Images are displayed per film 1 on 1.

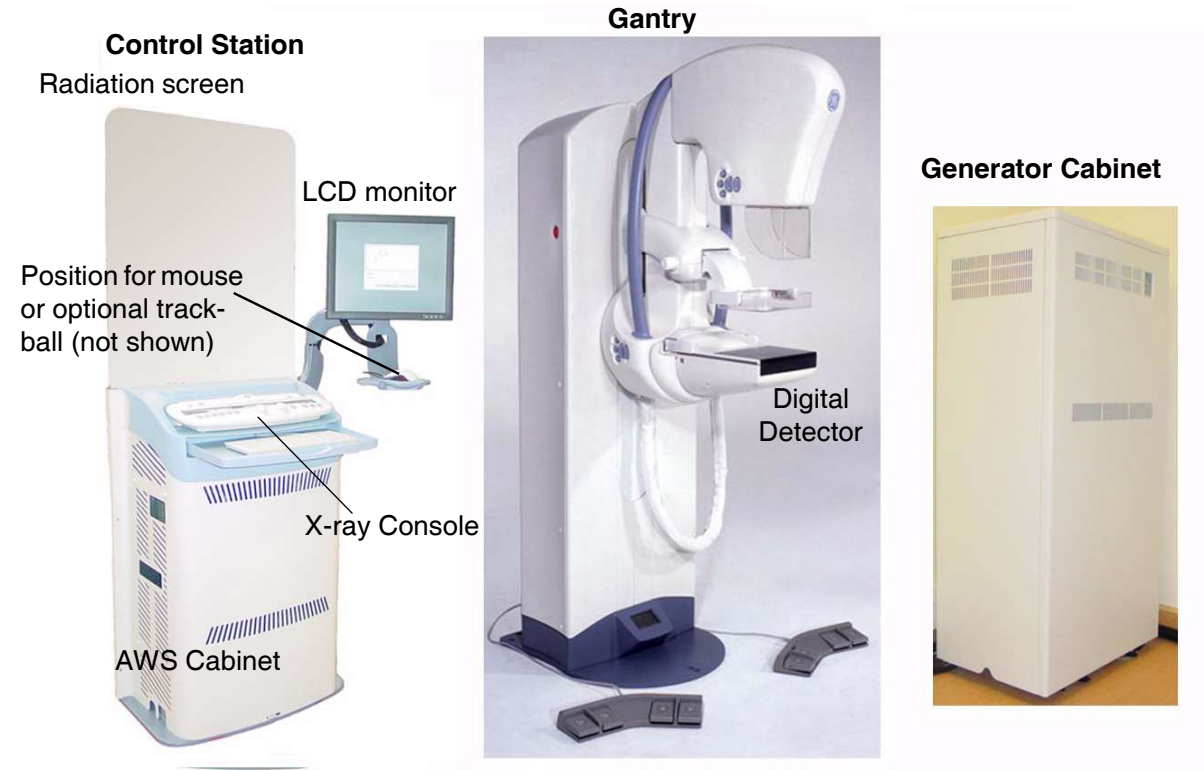
The Acquisition Workstation can also display and print SCPT (Secondary Capture) images (if they have the modality MG). This allows the Operator to view images which have been reviewed and annotated on a review workstation (such as the Review Workstation or the SenoAdvantage).

Several options are available for use with the Senographe system. These options include a review workstation, a mass archiving system, a laser camera, networking capabilities, and CD-ROM interchange media.

- The optional Review Workstation is a stand-alone workstation, with its own dedicated computer and image database. It is connected to the Acquisition Workstation (AWS) by a high speed link. It supports image display and manipulation.

This powerful computer is equipped with two dedicated, high resolution monochrome monitors and a dedicated keypad. Networking is possible from this workstation, as well as printing and receiving images from an archive device.

2. SYSTEM COMPONENT DESCRIPTION



2-1. Overview

The following pages describe the main system components:

1. The Gantry is equipped with a Digital Detector for efficient creation of X-ray images. The X-ray Console controls Gantry operations, X-ray exposures, and power to all parts of the Senographe system. The X-ray Console is normally mounted on the Control Station.
2. The Control Station includes the Acquisition Workstation (AWS) Cabinet, an LCD monitor, a keyboard and mouse (or optional trackball), and a radiation screen. The AWS Cabinet houses the workstation electronics and a UPS (Uninterruptable Power Supply).
3. Accessories (standard and optional).

Mandatory marking labels such as CE marking, UL Listing labels, and FDA labels are located on the bottom left-hand side of the Generator Cabinet.

2-2. Senographe X-ray System

The Senographe is equipped with a dual track X-ray tube (molybdenum/rhodium) and a Digital Detector. Mammographic examinations can be made with standing, sitting, or recumbent patients; both contact and magnification views are available.

Images are acquired by direct digitization; they are displayed immediately on the LCD monitor and are stored for later diagnostic review. They can be processed and/or filmed.

AOP (Automatic Optimization of Parameters) and manual setting modes are provided for control of the X-ray parameters; the system provides auto-collimation.

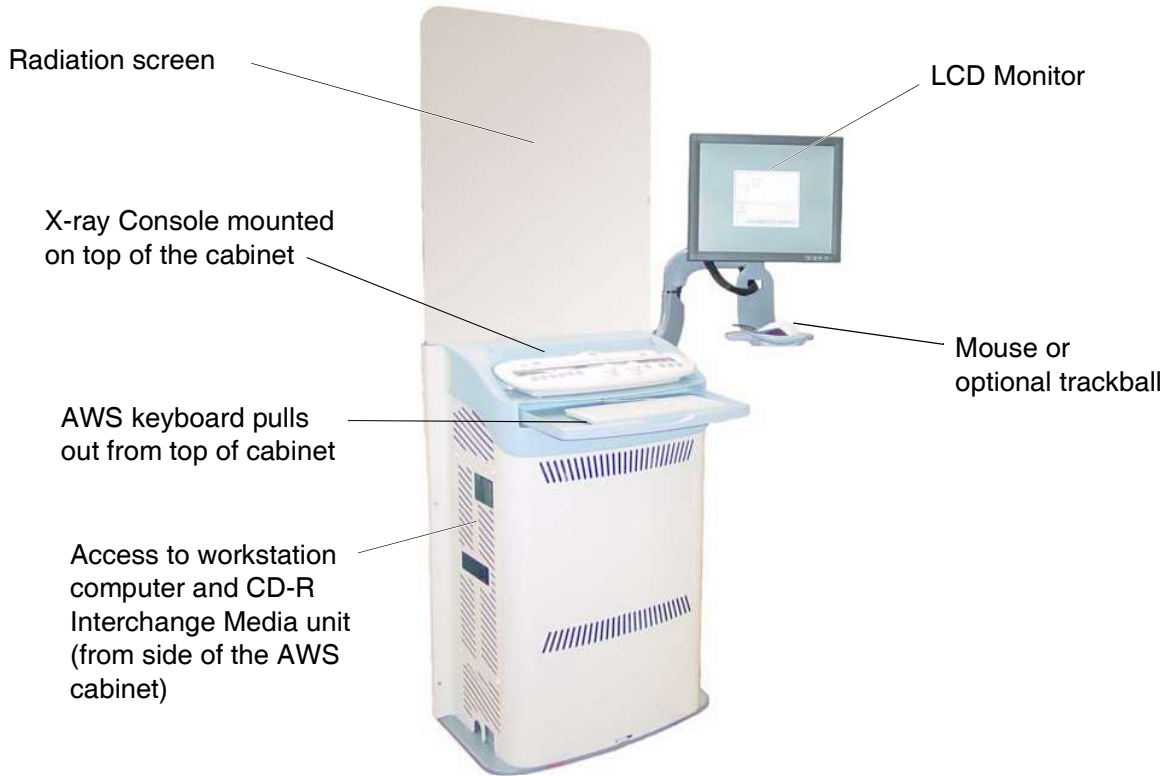
2-3. Digital Detector and Image Receptor

The Digital Detector is built into the Image Receptor, shown below. It is a flat panel of amorphous silicon on which cesium iodide is deposited to maximize detection of X-Rays and transmission of light photons. The high definition digital images produced are sent to the Acquisition Workstation for visualization and processing.

A removable grid (Bucky) plugs into the Arm above the Image Receptor. For magnification views, Mag Stands providing magnifications of 1.5 or 1.8 are used instead of the Bucky. The presence of the Bucky or the Mag Stand is recognized automatically.



2-4. Control Station



2-4-1. Overview

The Control Station is used for image acquisition and display, database management, and to send images to archive, review or filming.

It includes the Acquisition Workstation (AWS) Cabinet, which accommodates the following:

- the workstation electronics (ADS computer, Image Detection Controller (IDC) computer)
- the Uninterruptible Power Supply (UPS)
- an integrated CD-R unit for interchange purposes

The AWS Cabinet supports the LCD monitor used for control and display, a pointing device (trackball or mouse), and a radiation screen.

2-4-2. Uninterruptible Power Supply (UPS)

To assure system safety in the event of disturbances in the mains power supply, the Senographe system incorporates a UPS, housed in the Control Station cabinet.

During power fluctuations or brief interruptions, the UPS assures a continuous supply to the workstation and the acquisition system. The UPS prevents mains disturbances from being transmitted to the system. When a power failure occurs the UPS continues to supply power to the workstation until it has shut down safely.

2-4-3. External Connections

One Ethernet cable connection to the local hospital network is connected at the rear of the cabinet for external communications (such as Insite connection):

3. ACCESSORIES

3-1. Senographe DS Accessories

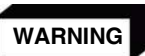
- The Senographe DS is delivered with a standard 19 x 23 paddle for use with the Bucky. The following accessories may be standard or optional according to country:
 - 19 x 23 cm standard magnification paddle.
 - Round spot paddle.
 - Round spot magnification paddle.
 - Square spot paddle.
 - Square magnification paddle.
 - 2D large localization paddle.
 - 2D large spot paddle.
 - Phlexis paddle.
 - Axillary compression paddle.
- Paddles supplied for use with the Stereotaxy option:
 - Biopsy paddle for vertical approach (with aperture).
 - Biopsy paddle for lateral approach (no aperture).
- Optional accessories available for the Gantry include:
 - Optical localizer (consisting of cross hair and biopsy paddle) for 2D biopsy.
 - Examination chair.
 - Remote handswitch.
 - Bar code scanner.



Only Senographe DS recommended accessories must be used with this equipment. Failure to heed this warning can cause unexpected results and possible data loss.
System Options

System options available include:

- **Review workstation.**
- **Mass Archiving System.** When installed and connected to the Senographe system, acquired images can be sent to the mass archiving device for permanent storage, either automatically or on request. A list of all patients ever imaged on the Senographe system can be kept on the mass archiving device, making future retrievals fast and easy.
- **Laser Camera.** To provide “hard copies” of images, the Senographe system can be connected to a high resolution DICOM MG compatible laser camera for film printing.



ONLY IMAGES PRODUCED BY GE-RECOMMENDED LASER CAMERAS CAN BE USED FOR FINAL INTERPRETATION OF EXAMINATIONS. FOR COMPATIBLE PRINTERS SEE THE LATEST PRODUCT DATA SHEETS FOR THIS SYSTEM, WHICH MAY BE OBTAINED FROM YOUR LOCAL GE SALES REPRESENTATIVE.

- **Networking.** The Senographe is DICOM compliant, allowing it to be connected in a network with

Sub-Systems and Components

other compliant devices for the exchange of images. Networking allows transmission of images acquired with the Senographe system to other DICOM-compatible review workstations, using the “Network Push” function of the AWS Browser. In some cases, detailed evaluations are needed for the implementation of customized connections. DICOM conformance statements can be accessed at <http://www.gehealthcare.com/usen/interoperability/dicom/index.html>.

- **CD-R Interchange Media.** For older systems an external CD-R (CD-Recordable) unit is installed in the AWS cabinet. On newer systems an internal CD-RW (CD-Rewriter) unit exists in the ADS computer. This allows selected sets of images to be saved on CD-ROMs for communication purposes (e.g., recording images for referring physicians, training, personal image library, etc.). It is not recommended for permanent archiving.

See your General Electric Medical Systems Representative for more information on accessories and options.

CHAPTER 4 PRE-INSTALLATION SYSTEM REQUIREMENTS

The following pages give information required for the planning and preparation of a Senographe system installation.

1. ENVIRONMENTAL REQUIREMENTS

1-1. Atmospheric Pressure Limits (Storage and Operational)

Atmospheric pressure (operation, storage and transportation*)		Altitude (from sea level)	
Min.	Max.	Min.	Max.
700 hPa	1060 hPa	0 m	3000 m
		0 ft	9840 ft

* - During transportation a pressurized environment must be used to maintain the atmospheric pressure limits.

1-2. Preventing Thermal Shock to the Detector

To prevent thermal shock to the detector, the ambient temperature gradient must not exceed the values as specified below.

Temperature range	Less than 0°C	0°C to 40°C	Greater than 40°C
	Less than 32°F	32° to 104°F	Greater than 104°F
Ambient temperature gradient must not exceed	4.5°C per hour	1.5°C per minute	4.5°C per hour
	40.1°F per hour	34.7°F per minute	40.1°F per hour

1-3. Storage Requirements - temperature and humidity

1-3-1. General requirements

- The system includes a detector assembly in its casing, which is sensitive to changes in temperature and humidity, and is water-cooled when in use.
- The specified storage requirements assume that the all the equipment remains in its packaging, including the protection for the detector.

1-3-2. Before installation - short term

For short-term storage (less than 5 days), refer to the storage requirements table below.

Relative humidity (non-condensing)		Temperature	
Min.	Max.	Min.	Max.
5%	95%	-20°C	50°C
		-4°F	122°F

1-3-3. Before installation - long term

For long-term storage (more than 5 days), it is recommended that the detector assembly is kept in an area with relatively dry and low temperature, or area with air conditioning. For example, relative humidity less than 50%.

1-4. Operating Requirements - temperature and humidity

Relative humidity (non-condensing)		Temperature	
Min.	Max.	Min.	Max.
10%	80%	15°C	35°C
		59°F	95°F

1-4-1. Air conditioning

- Air conditioning must be provided where necessary to ensure that no part of the equipment (including the generator cabinet) operates in an ambient temperature exceeding 35°C (95°F).
- For patient comfort, ambient temperatures of 23°C ± 3°C (73°F ± 5°F) are recommended.

1-5. Short Term Shutdown Requirements - temperature and humidity

1-5-1. Shutdown with Conditioner on

During evenings and weekends some Operators shutdown the Senographe system via the Control Station; in that case the Conditioner remains switched on, and the environment must be within the following limits.

Relative humidity (non-condensing)		Temperature	
Min.	Max.	Min.	Max.
10%	80%	15°C	35°C
		59°F	95°F

1-5-2. Shutdown with Conditioner off

During evenings and weekends some Operators shutdown the Senographe system via the circuit breaker on the wall; in that case the Conditioner is switched off, and the environment must be within the following limits.

Relative humidity (non-condensing)		Temperature	
Min.	Max.	Min.	Max.
5%	95%	10°C	50°C
		50°F	122°F

1-5-3. Air conditioning

Air conditioning must be provided where necessary to ensure that no part of the equipment (including the generator cabinet) exists in an ambient temperature exceeding 35°C (95°F) or below 15°C (59°F).

1-6. Storage of detector after removal

- After the cooling tank has been filled at installation, serious damage will be caused if the temperature is allowed to fall below freezing point. If after installation you have to remove the detector and store it in an environment which can fall below freezing point, you must ensure that you remove all of the coolant from the detector internal tubes.
- If the detector is removed from the system and stored again in its original packaging, it can still contain traces of coolant. In this case, the coolant is the limiting factor in the detector storage requirements. It is recommended that the detector is stored between 10°C (50°F) and 40°C (104°F). The temperature is allowed to fall to a minimum of -10°C (-14°F) or rise to a maximum of 50°C (122°F), for a maximum period of one day.

1-7. Heat Output

Generator Heat output		Gantry and Control Station Heat output	
In standby	Max.	In standby	Max.
0.675 kW	0.9 kW	0.075 kW	0.1 kW
2295 BTU/h	3060 BTU/h	255 BTU/h	340 BTU/h

2. IEC60601-1-2 ELECTROMAGNETIC STANDARDS COMPLIANCE

2-1. General

This equipment complies with the IEC60601-1-2 Edition 2 EMC standard for medical devices.

The Senographe Equipment or System is suitable for use in electromagnetic environments as defined in the limits and recommendations given in the following tables:

- Emission Compliance level and limits (Table 1).
- Immunity Compliance levels and recommendations for ensuring that the equipment retains its clinical utility (Tables 2, 3, and 4).

Note:

This equipment complies with the above EMC standard when used with cables supplied by the manufacturer up to the maximum lengths permitted by the system design specifications.

2-2. Electromagnetic Emission

The Senographe system is suitable for use in the specified electromagnetic environment. The purchaser or Operator of a Senographe system must ensure that it is used in an electromagnetic environment as described below:

TABLE 1 - ELECTROMAGNETIC EMISSION

Emissions Test	Compliance	Electromagnetic Environment
Radio-Frequency Emissions CISPR11	Group1 Class A limits	The Senographe is primarily intended for use in non-domestic environments, and not connected directly to the public mains supply network. It is primarily intended for use in environments (such as hospitals) with a dedicated supply system, and in an X-ray shielded room.
	Group1 Class A limits	The Senographe uses RF energy only for its internal function. The RF emission is therefore very low, and not likely to cause any interference in nearby electronic equipment.
Harmonic emissions IEC 61000-3-2	Not applicable	The Senographe is primarily intended for use in non-domestic environments, and not connected directly to the public mains supply network.
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	The Senographe is primarily intended for use in non-domestic environments, and not connected directly to the public mains supply network.

2-3. Electromagnetic Immunity

The Senographe is suitable for use in the specified electromagnetic environment. The purchaser or Operator of the Senographe must ensure that it is used in an electromagnetic environment as described below:


TABLE 2 - ELECTROMAGNETIC IMMUNITY - PART 1

Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment
Electrostatic discharge (ESD) IEC 61000-4-2	6 kV contact 8 kV air	6 kV contact 8 kV air	Floors are wood, concrete, or ceramic tiles, or floors are covered with synthetic material and the relative humidity is at least 30 percent.
Electrical fast transient/burst IEC 61000-4-4	2 kV for power supply lines 1 kV for input/output lines	2 kV for power supply lines 1 kV for input/output lines	Mains power quality is that of a typical commercial and/or hospital environment
Surge IEC 61000-4-5	1 kV differential mode 2 kV common mode	1 kV differential mode 2 kV common mode	Mains power quality is that of a typical commercial and/or hospital environment.
Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11	0% U_n for 5 s	0% U_n for 5 s	Mains power quality is that of a typical commercial and/or hospital environment. If the Operator of the Senographe requires continued operation during mains power interruptions, it is recommended that the Senographe is powered from a UPS or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m 1 A/m	Power frequency magnetic fields are at levels characteristic of a typical location in a typical commercial and/or hospital environment. At this disturbance level, the monitor image can present some slight flicker. If this occurs, the monitor can be removed from the vicinity of the low frequency magnetic field source to improve image quality. At this disturbance level, the system is fully operational.

Note:

These are guidelines. Actual conditions can vary.

TABLE 3 - ELECTROMAGNETIC IMMUNITY - PART 2

Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment
Conducted RF IEC 61000-4-6	3 V 150 kHz to 80 MHz	[V ₁₌] 3 V	At this disturbance level, the monitor image can present some slight flicker. If this occurs, the monitor can be removed from the vicinity of the electrical field source to improve image quality.
		[V ₂₌] 0.3 V	At this disturbance level, the system is fully operational.
Radiated RF IEC 61000-4-3	3 V/m 80 kHz to 800 MHz	[E ₁₌] 3 V/m	At this disturbance level, the monitor image can present some slight flicker. If this occurs, the monitor can be removed from the vicinity of the electrical field source to improve image quality.
		[E ₂₌] 0.3 V/m	At this disturbance level, the system is fully operational.
	3 V/m 800 MHz to 2.5 GHz	[E ₃₌] 3 V/m	At this disturbance level, the monitor image can present some slight flicker. If this occurs, the monitor can be removed from the vicinity of the electrical field source to improve image quality.
		[E ₄₌] 0.3 V/m	At this disturbance level, the system is fully operational.
<ul style="list-style-type: none"> Field strengths from fixed RF transmitters must be less than the compliance level in each frequency range. At frequencies between 150 kHz to 80 MHz, field strengths must be less than [V₂] V/m. <p>Note: Field strengths from fixed transmitters, such as base stations for cellular telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be estimated accurately. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey must be performed. If the measured field strength exceeds the RF compliance level above, monitor the Senographe to check normal operation in each use location. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Senographe.</p>			
<ul style="list-style-type: none"> Interference can occur in the vicinity of equipment marked with the following symbol: . 			
<ul style="list-style-type: none"> No portable or mobile RF communications equipment can be used closer to any part of the Senographe, including cables, than the recommended separation distance calculated from the equation appropriate to the frequency of the transmitter. See Table 4. 			

Note:

These are guidelines. Actual conditions can vary.

2-4. Recommended Separation Distances for Portable and Mobile RF Communications Equipment IEC 60601-1-2

TABLE 4 - RECOMMENDED SEPARATION DISTANCES

Frequency of Transmitter	150KHz to 26 MHz	26 MHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
Equation	$d = \left[\frac{3,5}{V_2}\right]\sqrt{P}$	$d = \left[\frac{3,5}{V_2}\right]\sqrt{P}$	$d = \left[\frac{3,5}{E_2}\right]\sqrt{P}$	$d = \left[\frac{7}{E_4}\right]\sqrt{P}$
Rated Power of Transmitter (watts)	DISTANCE (meters)	DISTANCE (meters)	DISTANCE (meters)	DISTANCE (meters)
10 mW	1.2	1.2	1.2	2.3
100 mW	3.8	3.8	3.8	7.3
1	12	12	12	23(*)
10	38	38	38	73
100	120	120	120	230
<ul style="list-style-type: none"> For transmitters rated at a power not listed above, the recommended separation distance (d, in meters) can be estimated using the equation in the corresponding column. Where P is the power rating of the transmitter in watts (W) according to the transmitter manufacturer. (*) For example, a 1 W mobile phone (800 MHz to 2.5 GHz carrier frequency) must be no closer than 23 meters from the Senographe to avoid image interference risks. Using the recommended distance as determined from Table 4, between 150KHz and 2.5 GHz, some slight disturbance can be observed at image level. The disturbance to the image cannot be confused with a medical pathology, and the equipment retains its medical utility. 				

Note:

These are guidelines. Actual conditions can vary.

2-5. Use Limitation

- External components:
The use of accessories, transducers, and cables other than those specified can result in the degraded Electromagnetic compatibility of the Senographe.

2-6. Installation Requirements and Environmental Control

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

2-6-1. Cable Shielding & Grounding

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

2-6-2. Separated Power Supply Distribution Panel & Line

- This product complies with the radiated emission limits of the CISPR11 Group1 Class A standard.
- The Senographe is primarily intended for use in non-domestic environments, and not connected directly to the public mains supply network.
It is primarily intended for use in environments (such as hospitals) with a dedicated supply system, and in an X-ray shielded room.
- To avoid interference in the event that the Senographe is used in a domestic environment (in a doctors office, for example), it is recommended that it must be connected to a separate AC power distribution panel and line, and it must be installed in an X-ray shielded room.

2-6-3. Subsystem & Accessories Power Supply Distribution

- All components, accessories, subsystems, and systems which are electrically connected to the Senographe must have AC power supplied by the same power distribution panel and line.

Note:

- You can not connect together different electrical devices and supply them by different AC power distribution lines.
- In order to avoid interference, all components and accessories connected to the Senographe must be connected to the same AC power distribution panel. This AC power distribution panel which is itself supplied by a single power line.

2-6-4. Stacked Components & Equipment

- The Senographe must not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the Senographe must be monitored to ensure that normal operation occurs in the configuration in which it is used.

2-6-5. Static Magnetic Field Limits

- In order to avoid interference on the Senographe system, static field limits from the surrounding environment are specified.
- Static field is specified as less than 1 Gauss in the Examination room (Gantry room), and in the Control Area (for all Subsystems).
- Static field is specified as less than 3 Gauss in the Technical Room.

2-6-6. Electrostatic Discharge Environment & Recommendations

- In order to reduce electrostatic discharge interference, a charge dissipative floor must be installed to prevent charge accumulation.
- The dissipative floor material must be connected to the system reference ground, if applicable.
- Relative humidity must be maintained above 30 percent.

3. NOISE

60 dBA at 1 m (3'3").

4. STRUCTURAL REQUIREMENTS

4-1. Ceiling Requirements

The top of the Senographe system Tube Head can travel up to three different discrete maximum heights. The Tube Head maximum height is determined by setting one of the three discrete *Lift Travel Limit Ranges* on the Senographe system. Table 5 below summarizes the minimum ceiling height required corresponding to the three different Lift Travel Limit Ranges. Illustration 2 on [page 56](#) shows the dimensions of the Gantry.

TABLE 5 - RECOMMENDED MINIMUM CEILING HEIGHTS

Lift Travel Limit Range	Corresponding Tube Head Height	Recommended Minimum Ceiling Height *	Corresponding Bucky Plane Maximim Height
650 mm	2230 mm (87.80")	2300 mm (90.55")	1295 mm (50.98")
750 mm	2330 mm (91.73")	2400 mm (94.49")	1395 mm (54.92")
850 mm (default setting)	2430 mm (95.67")	2500 mm (98.43")	1495 mm (58.86")

* - The recommended minimum ceiling height assumes that there is a marginal gap of 70 mm between the top of the Tube Head and the ceiling.

If necessary, you can reduce the marginal gap to 10 mm. The lowest possible ceiling that can accommodate a Senographe system is therefore 2240 mm.

The distance between the plane of the Bucky and the top of the Tube Head is fixed at 935 mm (36.81 inches). Table 5 also shows the corresponding maximum Bucky plane height for each of the three different Lift Travel Limit Ranges. You must determine:

- whether the maximum Bucky plane height corresponding to your ceiling height is acceptable for your customer base
- if you have to make appropriate allowances such as the use of chairs for tall patients

4-2. Wall Requirements

The hospital must take special precautions regarding X-ray protection in the examination room walls. See [Planning for Radiation Protection on page 53](#).

4-3. Floor Requirements

The Gantry and Control Station must be anchored to the floor. The Generator cabinet is normally placed on the floor, but must be anchored in seismic areas. The floor must be stable and flat, and sufficiently strong to accept masses as defined below without distortion beyond the tolerance given:

1. Gantry:

- The worst case mass of the complete Gantry (with Stereotaxy option) is 418 kg (921.5 lbs).
- The bearing surface of the base plate is 0.42 m² (4.52 sq. ft.).
- The Gantry is provided with three or five anchoring points (refer to [Anchoring Inserts on page 68](#)).

- The floor surface must remain horizontal and flat within ± 2.5 mm per meter ($\pm 1/10$ inch in 39 inches) after installation of the Gantry.
2. Control Station:
- The worst case mass of the complete Control Station is 217 kg (478.4 lbs).
 - The bearing surface of the base plate is 0.28 m² (3 sq. ft.).
 - The Control Station is provided with four anchoring points (refer to [Anchoring Inserts on page 68.](#)).
 - The floor surface must remain horizontal and flat within ± 2.5 mm per meter ($\pm 1/10$ inch in 39 inches) after installation of the Control Station.

The customer is responsible for the structural analysis of the floor and the proposed mounting method. The customer must hire a structural engineer to design and approve the mounting method, and provide GEMS with an engineering report. If the results of the structural analysis require stronger anchoring inserts the defaults supplied in [Anchoring Inserts on page 68](#), the customer must inform GEMS.

Flooring consists of all materials above the structural floor support including subflooring and equipment support/mounting. The flooring requirements and recommendations are as follows:

- Flooring materials must support the Senographe system equipment mass, refer to [Dimensions and Masses on page 55](#).
- Floors must support the equipment and any transport device used to move the equipment.
- Flooring throughout the system including X-ray Room must be in accordance with local and national codes.

4-4. Seismic Requirements

For each unit, the unit mass and the position of the center of gravity is provided in [Dimensions and Masses on page 55](#), to allow compliance with local codes or regulations.

Sites that require seismic anchoring must have a site architect and engineer review the response spectra and/or Uniform Builders Code (UBC) for their location.

4-4-1. X-Floor Requirements When Using provided Floor Anchors

The maximum load pull tension per provided anchor was calculated assuming:

- Maximum bolt load pull tension at each bolt, refer to [Anchoring Inserts on page 68](#).
- Anchors installed to the required minimum floor thickness, refer to [Anchoring Inserts on page 68](#).

4-4-2. X-Pan Type Floor Construction Requirement

For Pan type floor construction, steel channels must be designed by a local structural engineer or architect to span floor joists.

4-4-3. Generator Cabinet

In seismic areas, provision must be made for securing the Generator to the floor, or provision must be made to secure it in place. For example, encircle the unit with a nylon belt secured to wall anchors.

4-4-4. Independent Radiation Shield

In seismic areas, if the optional independent radiation shield is present, it must be anchored to the floor, or provision must be made to secure it in place. For example, encircle the unit with a nylon belt secured to wall anchors.

4-4-5. Gantry

Two additional anchoring holes exist to improve the anchoring: refer to [Gantry Baseplate Template on page 70](#).

5. ELECTRICAL REQUIREMENTS

5-1. CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

Notice:

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

The purchaser of GE equipment must only utilize qualified personnel to perform electrical servicing on the equipment. That is GE Field Engineers, personnel of third-party service companies with equivalent training, or licensed electricians.

5-2. Room Power Supply

! Notice:

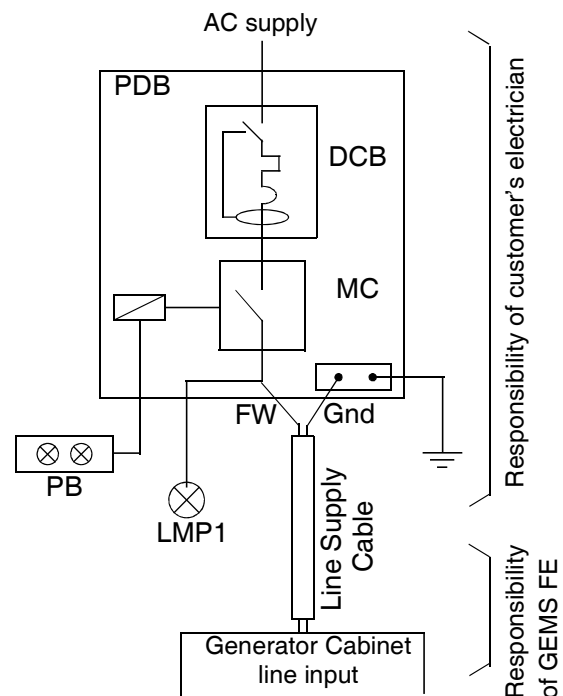
Line power to the Senographe system must be supplied through a suitable circuit breaker (see section [5-8 Main Circuit Breaker on page 51](#)).

The circuit breaker must be accessible to allow it to be opened rapidly in case of emergency. An indicator light must be provided to indicate that power is present.

The diagram given here outlines a suitable supply system and indicates items to be provided and installed by the customer electrician. Refer to the following sections for more information.

Legend:

- PDB: Power distribution box supplying AC power to the Senographe system equipment.
- DCB: Differential circuit breaker (thermomagnetic).
- MC: Main contactor. Manual switch to be accessible for emergency use.
- PB: Remote control for main contactor; ON/OFF impulse push-buttons, lockable ON/OFF, with indicator lights (Red = ON, Green = OFF). To be located near access door, 1.5 m (59 inches) above the floor.
- LMP1: Red power presence indicator light (continuous glow or flashing), located above access door; bulb 30 V, 25 W max.
- Line Supply Cable, which comprises of two supply wires (FW) and a ground cable (Gnd) — 3 x 5.32 mm².



WARNING

The Line Supply Cable from the Generator must be internally and permanently connected to the hospital power distribution box, and cannot be externally connected to the power distribution box via a plug. The internal and permanent connection must be made in a way such that the Line Supply Cable can only be disconnected by use of a tool.

- Generator Cabinet.

5-2-1. Lockable LOTO Enabled Power Sources

Lockable LOTO enabled power sources must be made available to the following:

- the Line Supply Cable going from the room Mains Distribution Panel and the Generator
- the Status Lamps power cables going from the room door to the Generator

Examples of LOTO enabled lockable power sources include those with lockable disconnecting switches (see example 1 and example 2 in Illustration 1), or lockable breakers (see example 3 in Illustration 1).

ILLUSTRATION 1 - EXAMPLES OF LOCKABLE LOTO ENABLED POWER SOURCES



Example 1



Example 2



Example 3

5-3. Line Voltage Specifications

- Single phase input voltages (phase/neutral or phase/phase): 200/208/220/240 V ($\pm 10\%$).
- Maximum line current of the system: 42 A at 180 VAC, based on maximum input voltage (30 kV) and output current (100 mA) of the tube housing assembly.

The maximum line current corresponds to the use of the technique factors 30 kV, Mo track, large focal spot and 100 mAs or more.



380 VAC or 415 VAC coupling which was possible with Senographe 2000D is not possible with the Senographe DS system.

If you choose this coupling, you will destroy the Gantry power supply.

5-4. Line Frequency Specifications

- 50 Hz or 60 Hz (± 1 Hz).

5-5. kVA Load Characteristics

- Maximum power in standby: 1.5 kVA.
- Maximum instantaneous power (during exposures, up to 6 seconds) 9 kVA.
- Power factor: 0.6.
- Line current crest factor: 1.7 at 200 V.

5-6. Line Impedance

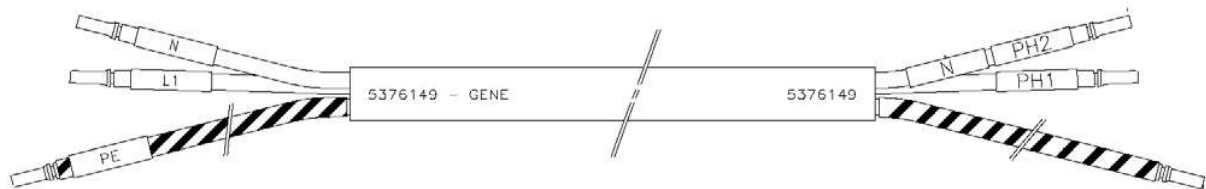
The apparent resistance of the mains supply R_L must be less than that which would cause a voltage drop of 6% at the maximum power load of 9 kVA. Refer to the table below for relevant values:

Nominal voltage (V ac)	200	208	220	240
Maximum impedance R_L (ohms)	0.28	0.30	0.34	0.40

5-7. Line Supply Cable

The Line Supply Cable provides AC power from the hospital Mains Distribution Panel to the Generator. The Line Supply Cable comprises of two supply wires (FW) and a ground cable (i.e. 3 x AWG 10 (5.32 mm²)) with the following actual/usable lengths:

- Total length = 7 m (23')
- Usable length = 6.5 m (21'-4")



5-7-1. Obtaining a Line Supply Cable

The Line Supply Cable must be ordered from the price book so that it is supplied with the Senographe System. Please note that a different price book reference exists for China and the rest of the world.

5-8. Main Circuit Breaker

Circuit breaker sizes for Europe:

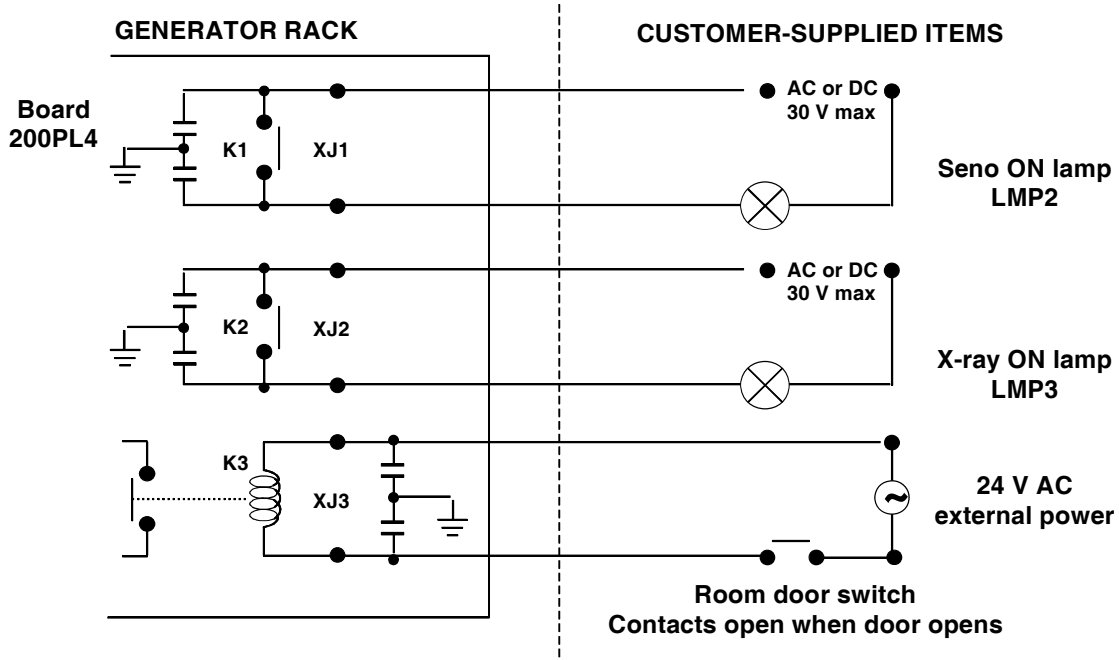
- From 200 V up to 240 V: circuit breaker: $I_n = 32 \text{ A}$ (type D) magnetic $I = 12I_n \pm 20\%$; with differential trigger: 30 mA (waveform pulsed).

For circuit breaker sizes and supply conductors for the US market, refer to Section 517-71(a) and Section 517-73(a) (Item 1, 2) of NEC-1993 (see below).

- The branch circuit used must be rated 30 A or less.
- NEC 1993 Section 517-73 (a) Item 1:
 - The current capacity of supply branch circuit conductors and the current rating of overcurrent protective devices must not be less than 50% of the momentary rating or 100% of the long-time rating, whichever is greater.
- **NEC 1993 Section 517-73 (a) Item 2:**
 - The current capacity of supply feeders and the current rating of overcurrent protective devices supplying two or more branch circuits supplying X-ray units must not be less than 50% of the momentary demand rating of the largest unit plus 25% of the momentary demand rating of the next largest unit plus 10% of the momentary demand rating of each additional unit. Where the X-ray units are used for simultaneous biplane examinations, the supply conductors and overcurrent protective devices must be 100% of the momentary demand rating of each X-ray unit.

6. DOOR LIGHTS AND SAFETY SWITCH

To meet safety and regulatory requirements, access to rooms in which X-ray equipment is installed must be controlled by warning lights and safety switches. The Generator provides facilities to meet these requirements. The diagram below shows the circuits used, and indicates items required for supply by the customer. See also section 5-2 above for the power presence indicator LMP1.



Note:

The load current ratings of relays K1 and K2 are 5 A/30 V AC or DC. For safety reasons, the electrical source for the K1 and K2 lamps (i.e. Seno ON and X-ray ON lamps) must be no more than 30 V. You **cannot** use a 250 V source under any circumstances.

The relay K3 must be supplied with 24 V ac.

7. ROOM LIGHTING

In order to obtain a room brightness value of 100 lux or less for correct viewing of monitor images, the room lights must be equipped with a dimmer switch. Shades and/or drapes must be fitted to windows.

8. PLANNING FOR RADIATION PROTECTION

8-1. Radiation Protection - General

Because the X-ray equipment produces radiation, the purchaser must take special precautions or make special site modifications. The General Electric Company does not make specific recommendations regarding radiation protection. It is the purchaser's responsibility to consult a radiation physicist for advice on radiation protection in X-ray rooms.

8-2. Radiation Shielding - Operators

Operators must remain in an area protected against radiation when X-ray exposures are made. This means that X-ray controls (X-ray Console) must be mounted in such a way that they can only be used while the Operator remains in a protected area.

To meet European Regulations (*Directive Euratom 96 29*), the limit value for the whole-body equivalent dose must not exceed 20 mSv per year. For other non-European countries, consult your local regulations for the dose limit value.

The X-ray Console must be mounted behind either an integrated radiation shield or behind a free-standing radiation shield.

- The integrated radiation shield supplied with the Senographe system is 700 mm wide, and attached directly to the Control Station. Two versions of the integrated radiation shield exist, as follows:
 - Lemerpax, which is 9 mm (0.35") thick and has a lead thickness equivalence of 0.3 mm (0.012") at 49 kV.
 - Mavig, which is 6 mm (0.24") thick and has a lead thickness equivalence of 0.5 mm (0.020") at 35 kV.

Note:

The Mavig radiation shield is not available in China.

In the case of the integrated radiation shield, the X-ray Console must be mounted on the Control Station, behind the integrated radiation shield.

- For installations that require wider shields or shields with a greater lead thickness equivalence than that provided by the integrated radiation shield, GE Healthcare provide free-standing radiation shields with widths of 705, 1470, or 2235 mm (27.76, 57.88, or 88 inches). These optional radiation shields have a lead thickness equivalence of 1 mm (0.04") (see Illustration 5 on [page 59](#)). In this case, the X-ray Console must be mounted on the framework of the free standing radiation shield, behind the radiation shield.

Other forms of protection can be used, in particular structural or custom-made shielding.

Note:

If other forms of protection are used, the Senographe system is still delivered with either an integrated or free-standing radiation screen.

Note:

Radiation Shields supplied by General Electric have toughened glass. If the customer requires a separate free-standing Radiation Shield, it must be made with toughened glass.

9. PLANNING FOR STORAGE

9-1. Temporary Storage in the Hospital

! Notice:

There is normally a short delay (e.g., overnight) between the delivery of the equipment and its installation.

If this delay is not short (more than two days), it is essential that a suitable storage room is available to receive the equipment in its crates.

Refer to section 1 *Environmental Requirements* for information on the environment required.

9-2. Packing Information

The table below lists the main dimensions and masses of shipping crates.

TABLE 6 - SHIPPING DIMENSIONS AND MASSES.

Item	Dimensions in mm (<i>inches</i>)			Mass in kg (<i>lbs</i>)
	Depth	Width	Height	
Crate1	2066 (81.34)	848 (33.39)	2292 (90.24)	641 (1410.2)
<i>Crate 1 includes the Gantry and the Generator Cabinet and the ramp for removing the Gantry, Generator and Control Station</i>				
Crate 2	1110 (43.70)	770 (30.31)	1850 (72.83)	210.5 (464.07) for truck transportation without side covers and lid 223.5 (492.73) for plane/boat transportation with side covers and lid
<i>Crate 2 includes the Control Station</i>				
Crate 3	872 (34.33)	2270 (89.37)	260 (10.24)	104.4 (229.68)
<i>Crate 3 includes the box containing the Detector. (20 kg, D=766 (30.16) , W= 840 (33.07), H =654 (25.39) and the Radiation Screen in its protective packaging</i>				
Crate 4	720 (28.35)	1300 (51.18)	1975 (77.76)	147 (323.4) *
<i>Crate 4 includes the Accessories Cabinet, which includes the LCD Monitor, X-ray Console and all the Accessories (boxed) . * - The contents can vary, and the mass can be slightly different to 147 kg.</i>				

9-3. Constraints for Moving the Equipment Into the Room

The minimum dimension of the entry door to move in the (uncrated) Gantry on its wheels with a 61.5 mm (2.40 inches) radius are:

- door opening at least 700 mm (27.6 inches) wide.
- height of 2020 mm (79.53 inches) with Gantry covers.
- height of 1897 mm (74.69 inches) without Gantry covers.

Note:

If the hospital doors are less than height of 2020 mm (79.53 inches) high, prepare time to remove the Gantry covers during the delivery of the Senographe System. You will need to remove the Gantry covers so that you can move the Gantry under the doors.

Note:

In cases where a Senographe system is not installed on the ground floor of a building, you must consider the size of the hospital elevators. In cases where hospital elevators are small, you will need to disconnect the Generator from the Gantry and move them separately. The minimum depth of hospital elevators must be slightly larger than 1273 mm (50.1 inches) in order to be able to move the Gantry.

10. ROOM LAYOUT PLANNING

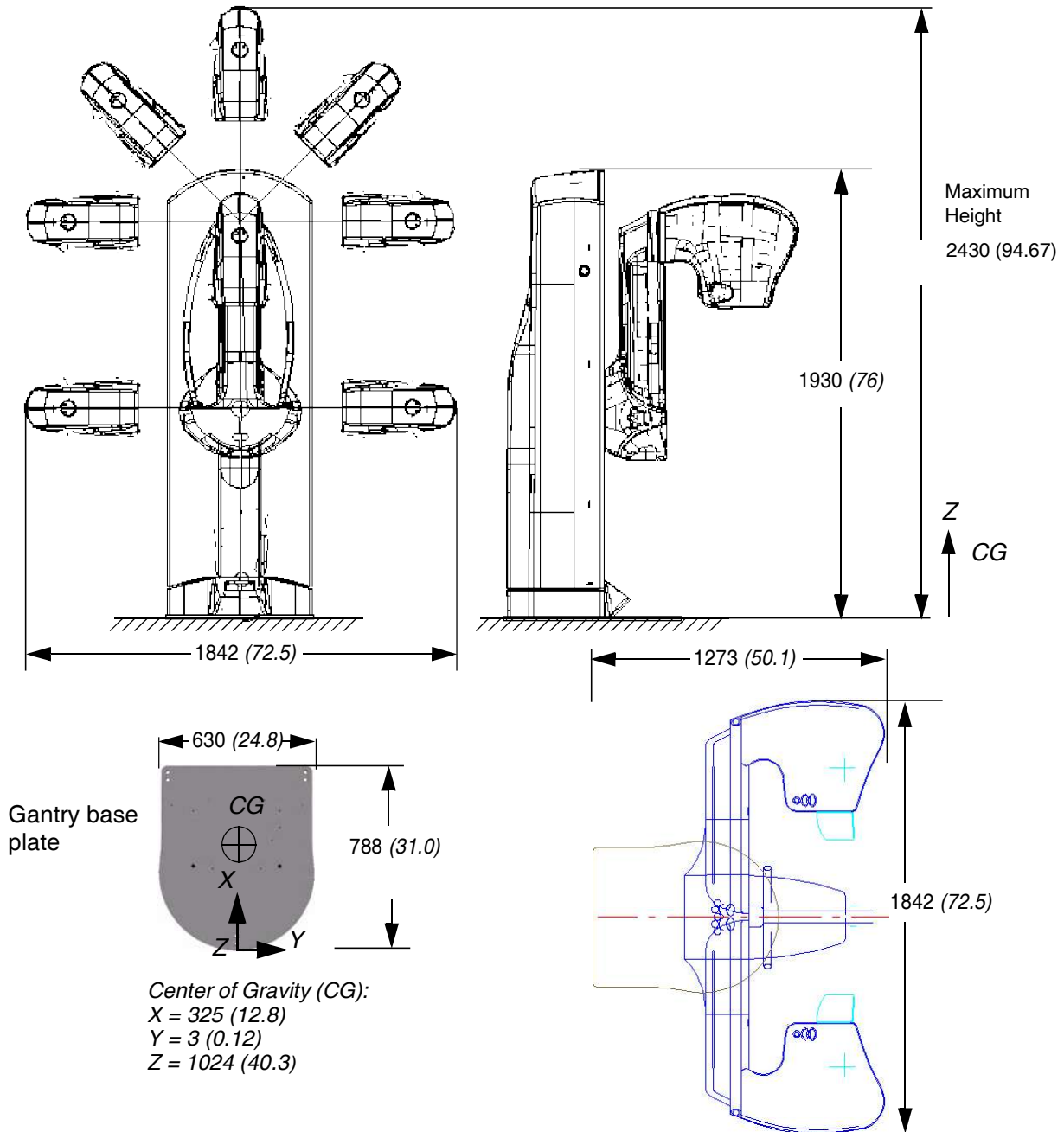
10-1. Dimensions and Masses

Refer to the following pages for more information on major components.

TABLE 7 - SYSTEM COMPONENT DIMENSIONS AND MASSES.

Component	Depth mm (inches)	Width mm (inches)	Height mm (inches)	Mass kg (lbs)
Gantry (with Stereotaxy Positioner)	1273 (50.1)	616 (245.25) <i>Required space:</i> 1842 (72.5)	1930 (76) to 2430 (95.67)	418 (921.5)
Generator Cabinet	437 (17.2)	640 (25.2)	1330 (52.5)	180 (396.8)
19" monitor (default)	98 (3.9)	410 (16.15)	340 (13.4)	8 (17.6)
3 MP 21.2" monitor (option)	97 (3.8)	500 (19.7)	376 (14.8)	7.4 (16.3)
X-ray Console	180 (7)	550 (22)	85 (3.5)	1.6 (3.5)
Radiation Shield (Lemerpax)	9 (0.35)	700 (27.5)	1479 (58.5)	26 (57.3)
Radiation Shield (Mavig)	6 (0.24)	700 (27.5)	1150 (45.3)	15 (33.1)
Control Station without radiation shield, monitor, and X-ray Console	400 (15.75)	710 (27.9)	2225 (87.5)	181.2 (399.5)

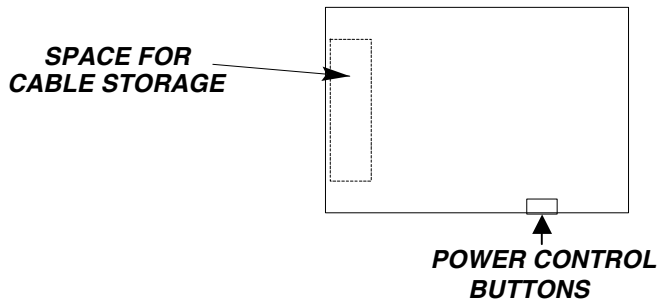
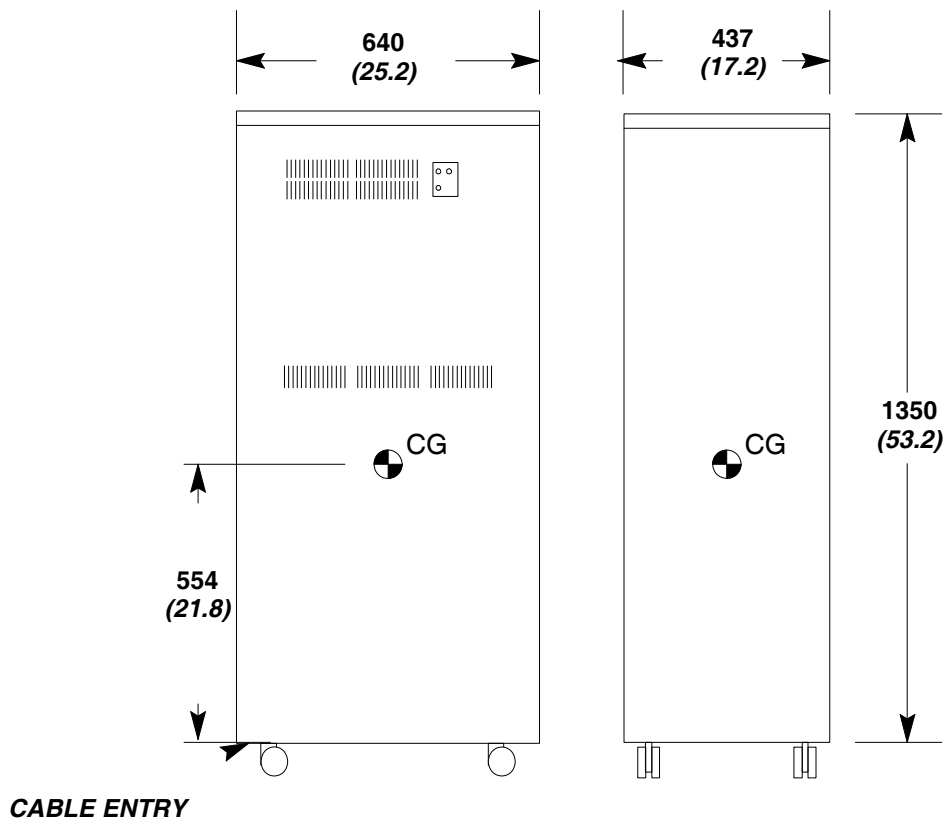
ILLUSTRATION 2 - GANTRY DIMENSIONS - MM (INCH)



All measurements shown as: mm (inches)

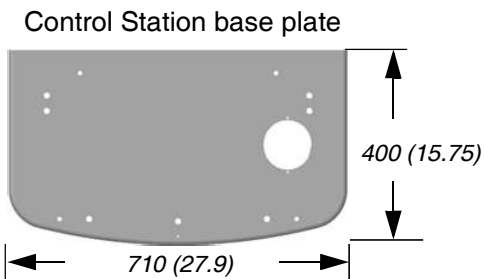
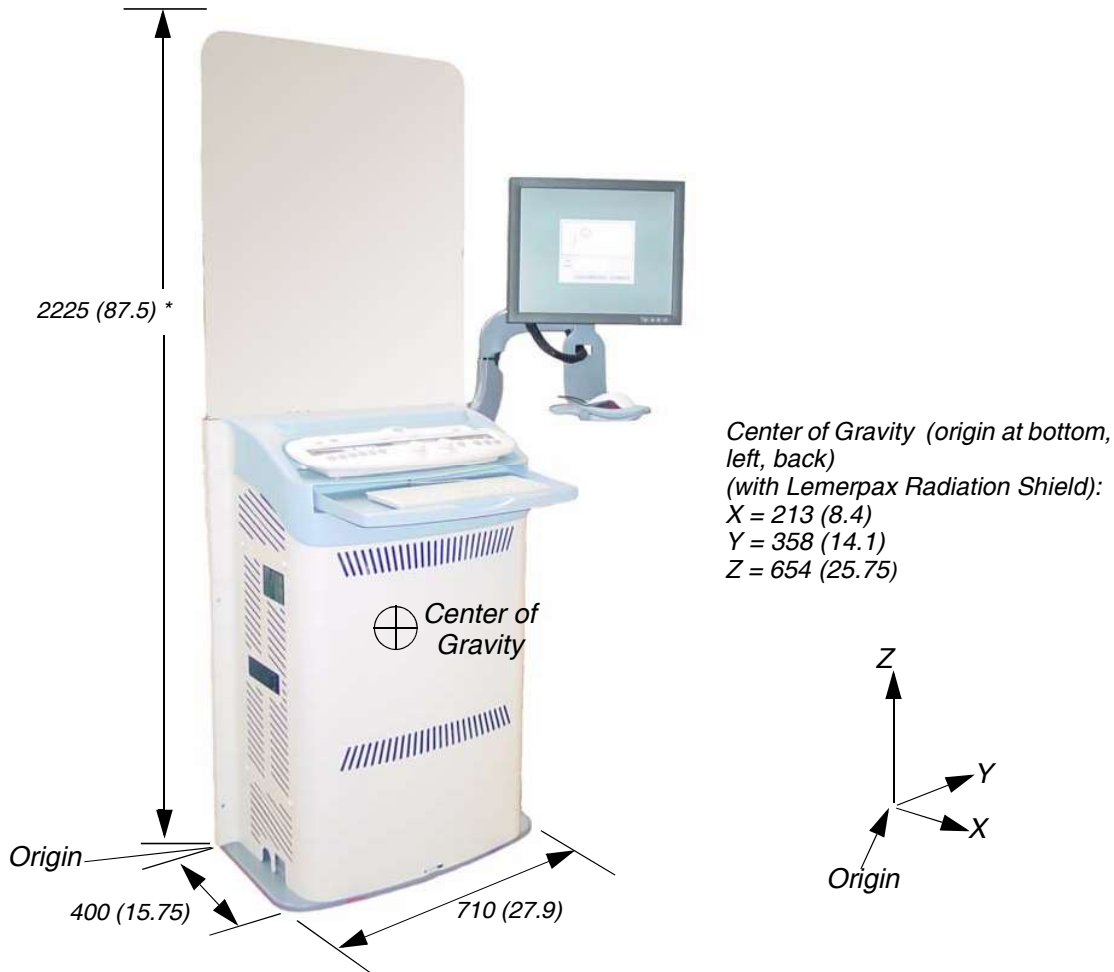
- **Anchor Points for the Gantry**
 Refer to [Anchoring Inserts on page 68](#).

ILLUSTRATION 3 - GENERATOR CABINET DIMENSIONS



All measurements shown as: mm (inches)

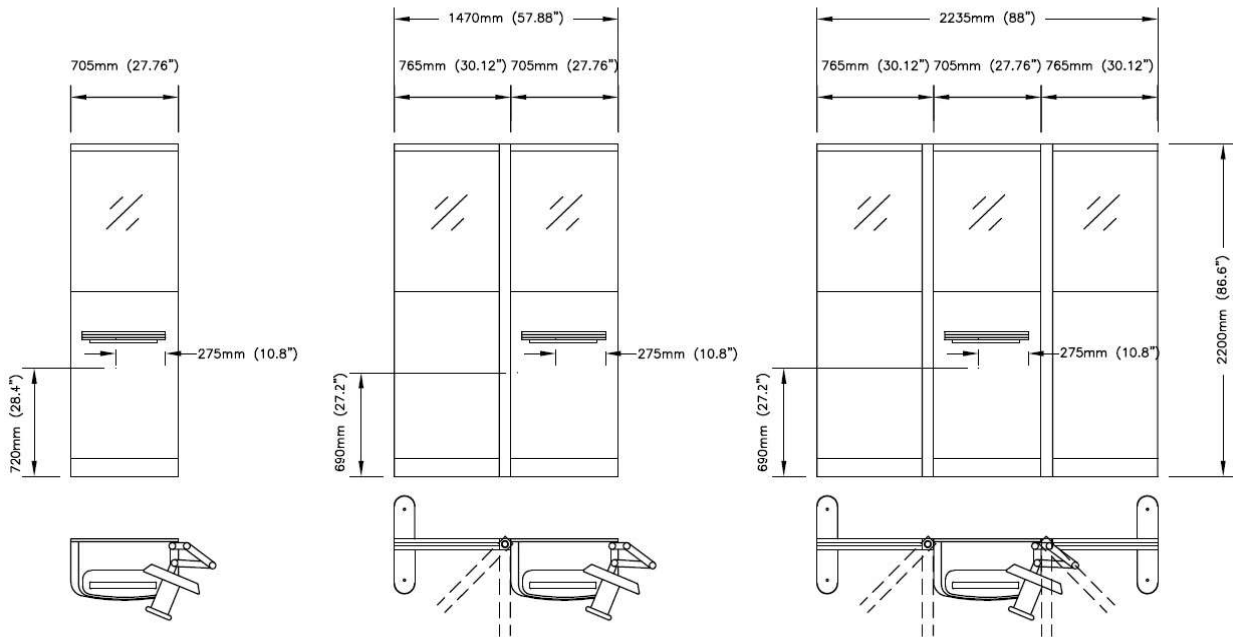
ILLUSTRATION 4 - CONTROL STATION DIMENSIONS - MM (INCHES)



* - Control Station height with:
 Mavig Radiation Shield is 1896 (74.7)
 Lempax Radiation Shield is 2225 (87.5)
 All measurements shown as: mm (inches)

- Anchor Points for the Control Station
 Refer to [Anchoring Inserts on page 68](#).

ILLUSTRATION 5 - DIMENSIONS OF OPTIONAL RADIATION SHIELDS



Single Configuration:
Optional radiation shield

Double Configuration:
Optional radiation shield plus one optional radiation screen extension on one side (left or right)

Triple Configuration:
Optional radiation shield plus one optional radiation screen extension on each side

Ordering:

- Optional radiation shield: S30321MM (2234536)
- Optional radiation shield extension (never ordered alone): S30311CW (2166641)

All measurements shown as: mm (inches)

10-2. Layout Constraints for Positioning Gantry, Generator, and Control Station

The layout and positioning of the Gantry, Generator, and Control Station depend on various factors summarized below:

- **Safety**

- **SA1:** Minimum "trapping zone" safety clearance (as defined by *CEI 60601-1 3rd Edition Trapping Zone*) around the motorized moving parts of the Gantry is 500 mm. Therefore, the minimum distance between the extreme positions of the Tube Head and any objects (e.g. wall or Generator) must be a minimum of 500 mm.
- **SA2:** The Stop motion buttons are located on both sides of the Gantry, relatively far away from the Control Station. Access to these buttons from the Control Station must be easy going around the Control Station by the left or by the right.
- **SA3:** Protection of the Operator, such that the X-ray dose level they receive is within a safe level (as defined by *Directive Euratom 96 29*). X-rays emitted from the Tube Head are attenuated to a safe level when the default radiation screen supplied with the system is at least 1000 mm from the Tube Head at an angle of 0°.

- **Serviceability**

All sides of the three components need access for servicing.

- **SE1:** Gantry: 200 mm between the rear edge of the Gantry baseplate and the wall.
- **SE2:** Generator: 100 mm on either left/right side of the Generator where the cables can exit. The two power control buttons on the front side must be facing outwards away from the wall. The Generator is on wheels, so it can easily be moved during servicing.
- **SE3:** Control Station: A clearance of 300 mm from the Control Station baseplate right edge, so access to the UPS, IDC and ADS cables are possible.

- **System Use**

- **SU1:** Generator: 100 mm at the rear side to allow uninhibited air flow.
- **SU2:** Control Station: The path of the Rotative Arm must be such that the LCD Monitor does not come into contact with the Tube Head, wall, or other objects.

- **Clinical Use**

- **CU1:** Control Station: A clearance of 700 mm from the Control Station baseplate front edge, so that the Operator has a clearance of 500 mm with a fully expanded keyboard.
- **CU2:** Control Station: A clearance of 50 mm from the Control Station baseplate left edge, so that the Operator can open the integrated CD-ROM.
- **CU3:** Easy access to the patient area. Stretchers and other mobile hospital equipment must be able to reach the table quickly.
- **CU4:** Clinicians in the patient area must be able to communicate easily with operators and others in the control area.
- **CU5:** Operators must have easy access to the X-ray Console. However, the X-ray Console and ancillary handswitches must be positioned so that the operator can only take exposures while behind the radiation shield.

Note:

The distances given above correspond to a minimum, but it remains the responsibility of the local installation services team to ensure that the country regulations are followed. For example, in the United States the Labor Occupational Safety and Health Administration (OSHA) regulations must be taken into account, such that an Egress of 28" (711 mm) is respected.

10-2-1. Ancillary Equipment

Consult hospital personnel regarding additional space requirements for hospital equipment such as storage cabinets, sinks, and crash cart.

10-2-2. Positioning of the LCD Monitor on the Control Station

By default, the rotative arm that supports the LCD monitor is installed on the right-hand side of the Control Station. This is because, for most Operators (who are right-handed), it is more convenient to have the mouse/trackball on the right-hand side.

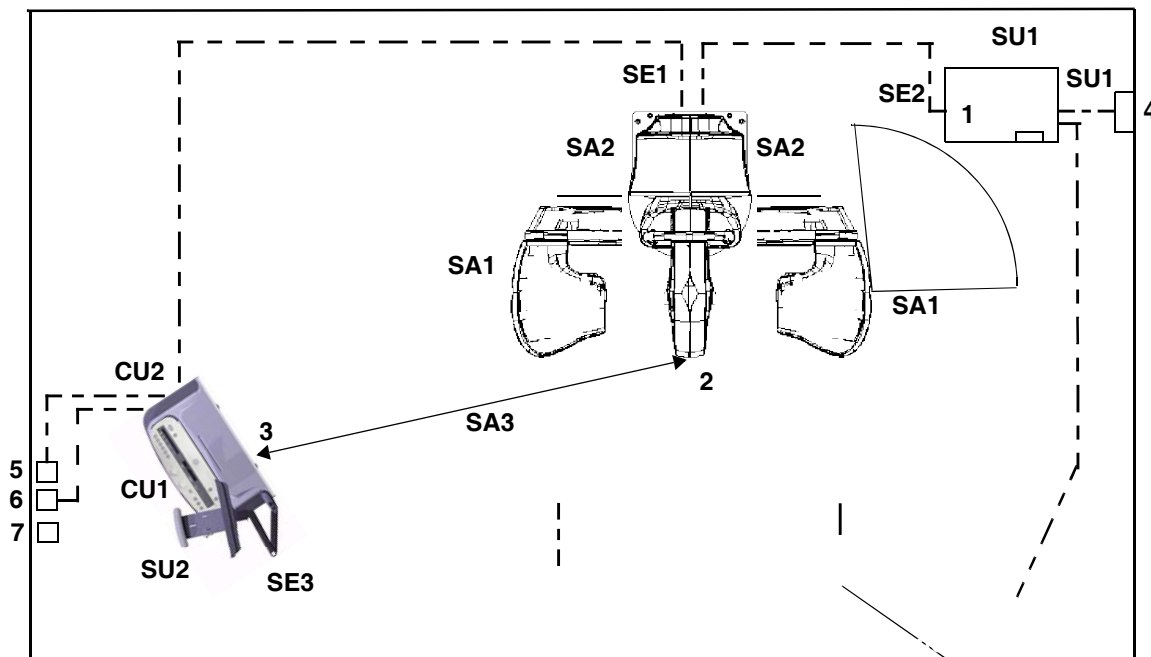
However, the following situations require the rotative arm that supports the LCD monitor to be moved on the left-hand side of the Control Station:

- the rare occasion where all or the majority of operators at the customer site are left handed, and the layout of the room allows the rotative arm to be installed on the left-hand side
- the room that hosts the Senographe system does not permit the Control Station to have the LCD monitor on the right-hand side, due to either limited space or intrusive objects such as doors or pillars

When reviewing the room that will host the Senographe system, you must determine whether the LCD monitor must be installed on the left-hand side of the Control Station.

10-2-3. Generic Constraints Overview

The diagram below generically highlights the constraints mentioned above, which you must consider when planning a room layout.



1. Generator Cabinet.
2. Gantry.
3. Control Station with Radiation Shield.
4. AC power input through power distribution box (supplied by customer).
5. Broadband connection for Insite (supplied by customer).
6. Hospital network connection (supplied by customer).
7. Telephone connection for operators.

After the room layout is decided, suitable provision (plinths, under-floor conduits, etc.) must be made for passing cables and conduits.

10-2-4. Layout Examples

The following illustrations provide some example layouts which adhere to the constraints listed above. Each layout example contains a non-USA and a USA version, where the USA versions adhere to OSHA Egress safety standard of 28" (711 mm).

Note:

Ensure that the room layout is adapted to the cable length constraints as listed in the table below and as summarized in section [10-4](#).

Cable/Harness	Length
Gantry to Control Station cables in Harness 1	4.8 m (15.75")
Gantry to Generator cables in Harness 2	3.8 m (14.9")
Generator to Control Station: X-ray Console Cable	The X-ray Console cable is integrated within the two harnesses. If the X-ray Console cable is separated from the harnesses its total usable length is 10 m (32.8").

Note:

If a separate radiation screen is used instead of the integrated radiation screen, the Control Station must be positioned so that the LCD Monitor cannot collide with the integrated radiation screen.

Note:

If the room size is small such that it restricts the positioning of the Control Station so that it is close to a wall or separate radiation screen, the Rotative Arm securing the LCD Monitor can be adjusted so that it does not move.

ILLUSTRATION 6 - NON RECUMBENT PATIENTS, LCD ON THE LEFT (NON USA)

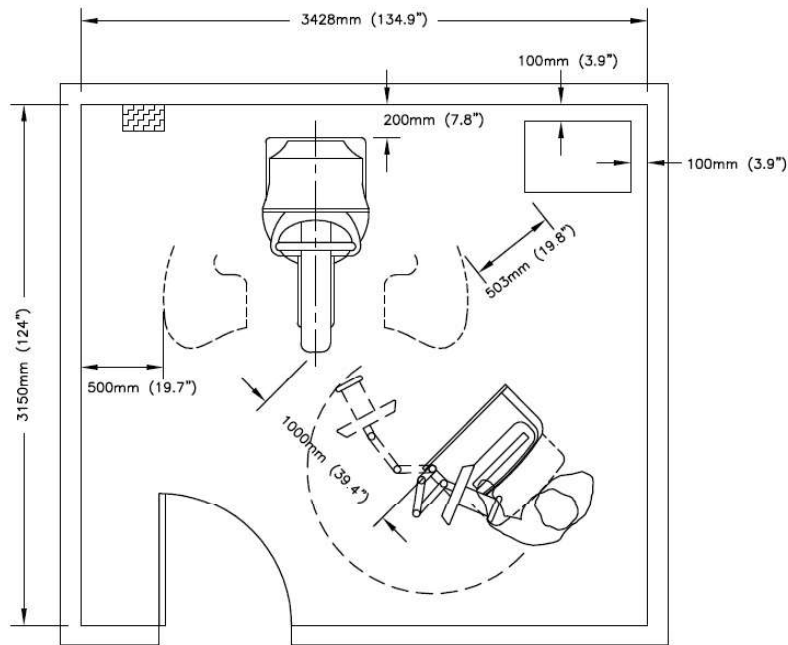


ILLUSTRATION 7 - NON RECUMBENT PATIENTS, LCD ON THE LEFT (USA)

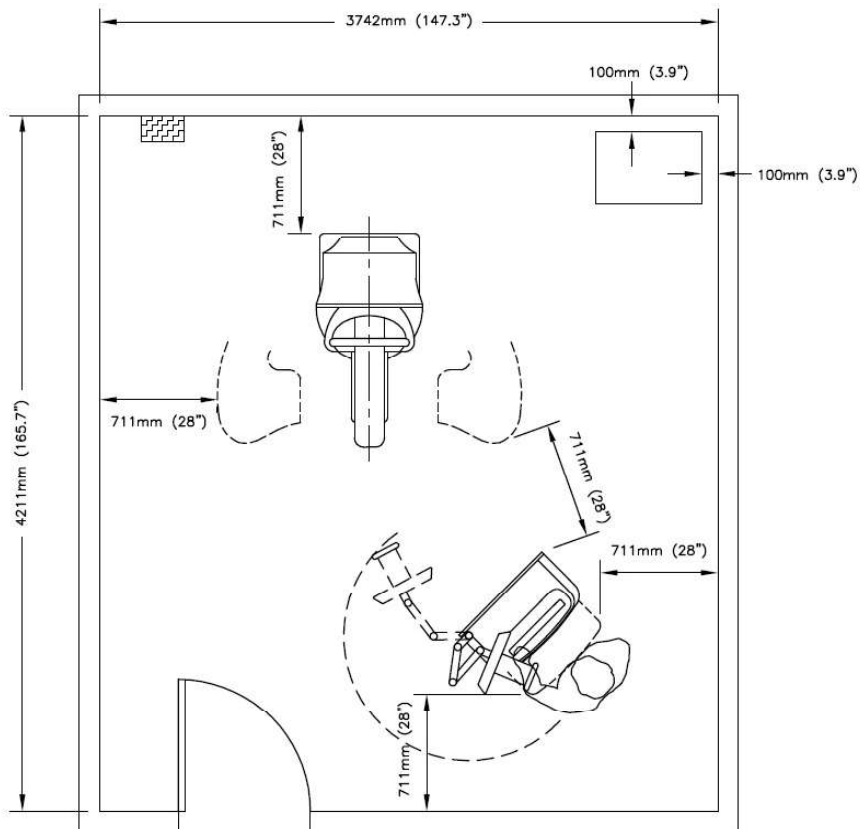


ILLUSTRATION 8 - NON RECUMBENT PATIENTS, LCD ON THE RIGHT (NON USA)

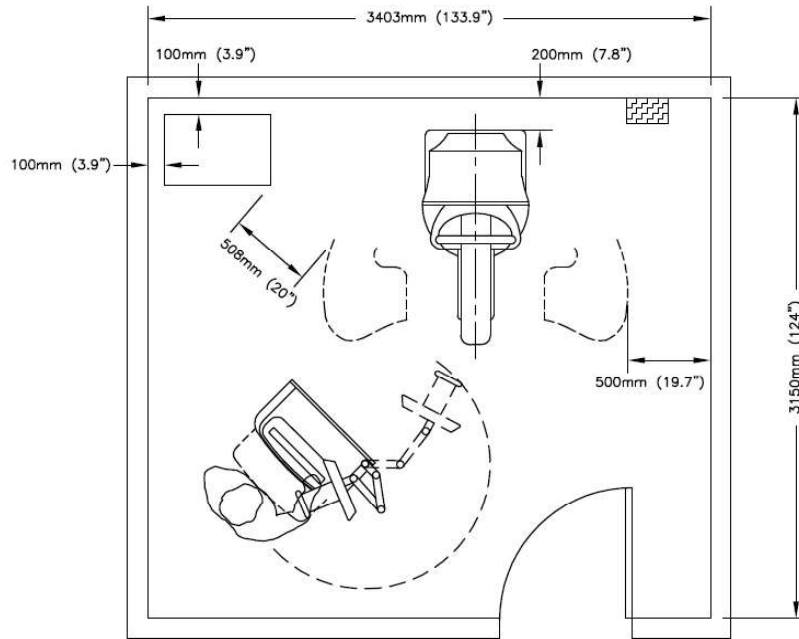


ILLUSTRATION 9 - NON RECUMBENT PATIENTS, LCD ON THE RIGHT (USA)

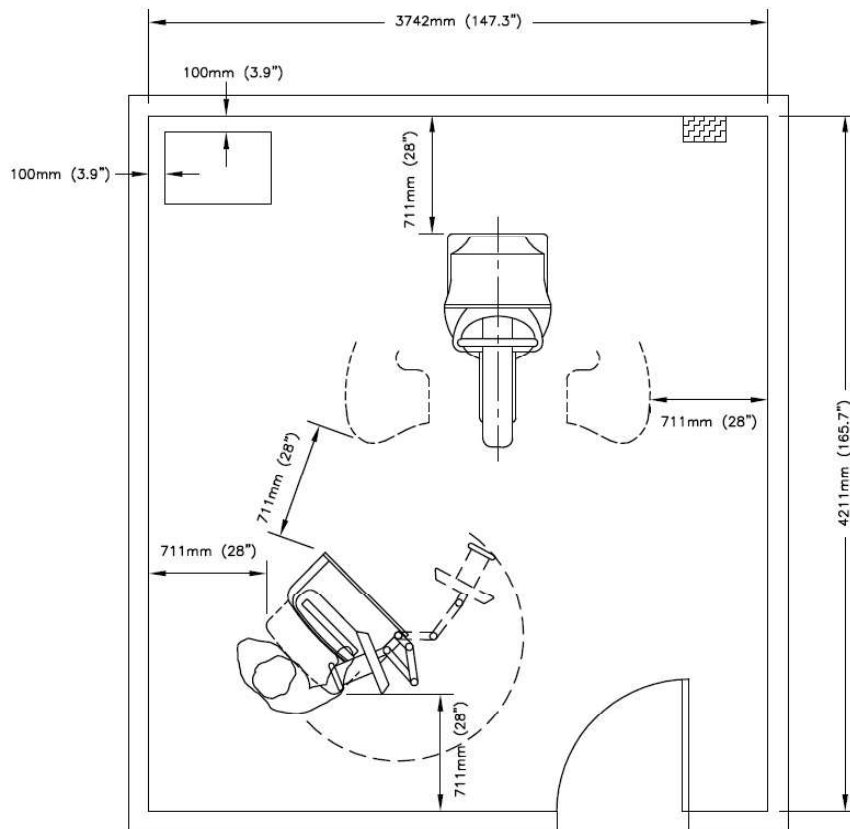


ILLUSTRATION 10 - RECUMBENT PATIENTS, CONTROL STATION IN FRONT OF TUBE HEAD (NON USA)

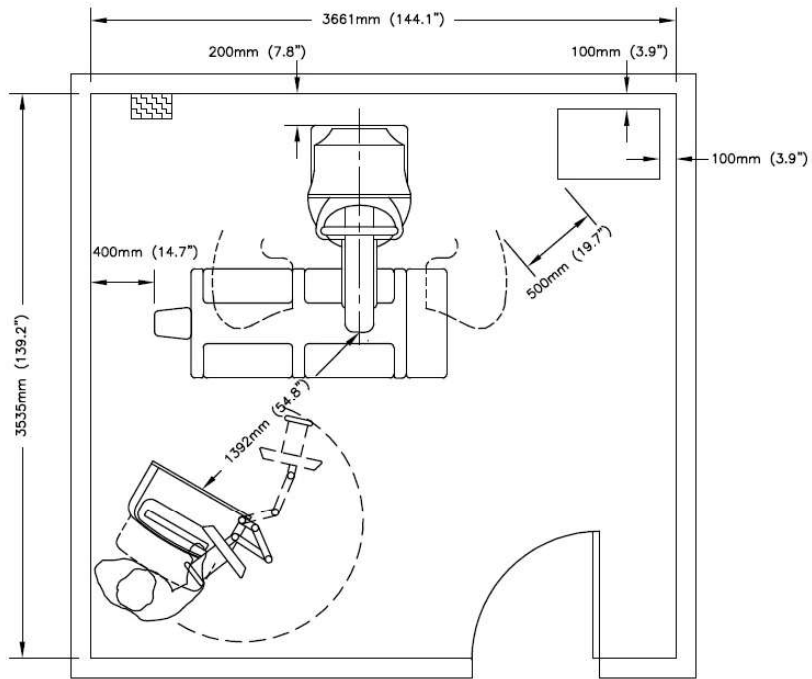


ILLUSTRATION 11 - RECUMBENT PATIENTS, CONTROL STATION IN FRONT OF TUBE HEAD (USA)

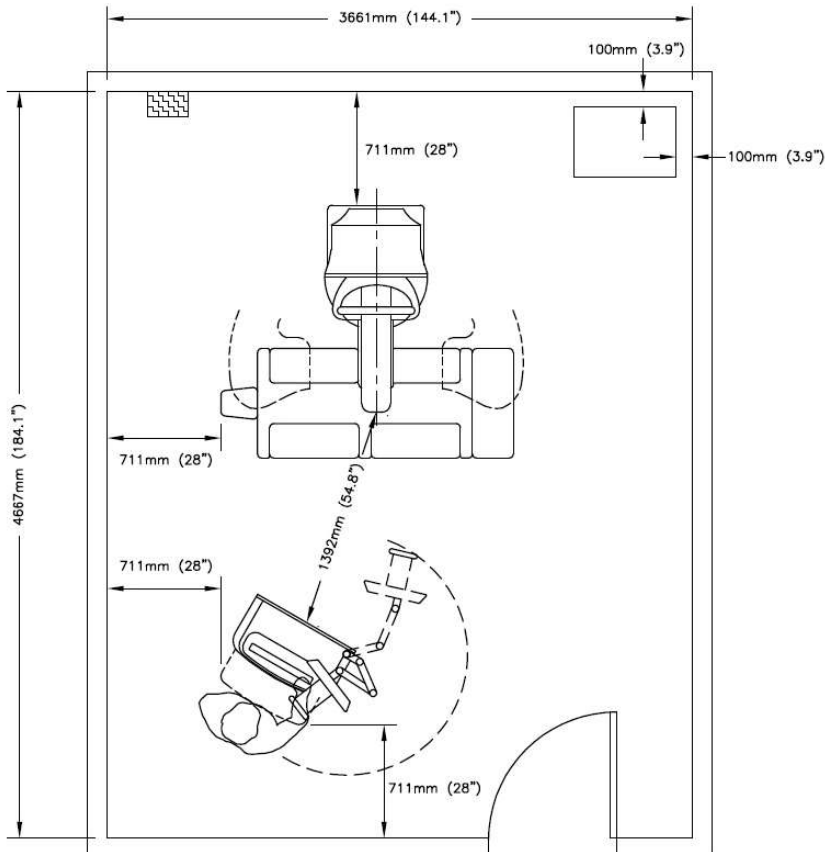


ILLUSTRATION 12 - RECUMBENT PATIENTS, CONTROL STATION BEHIND TUBE HEAD (NON USA)

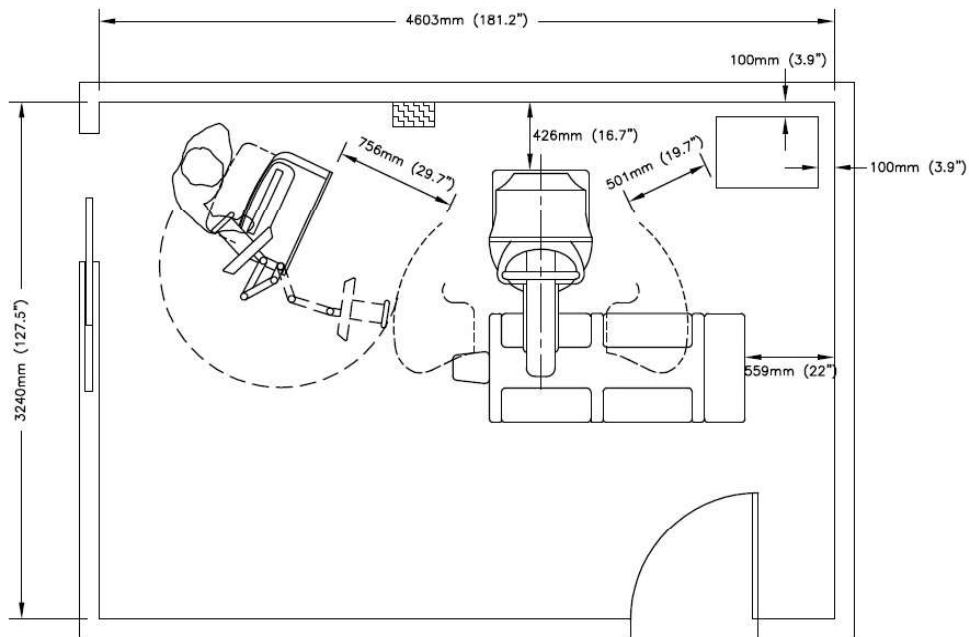


ILLUSTRATION 13 - RECUMBENT PATIENTS, CONTROL STATION BEHIND TUBE HEAD (USA)

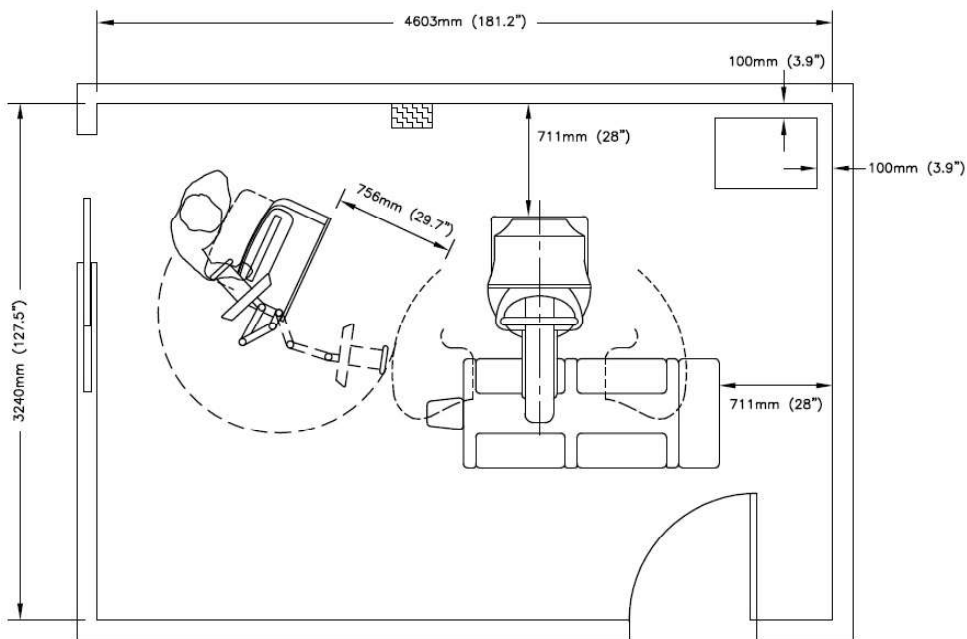
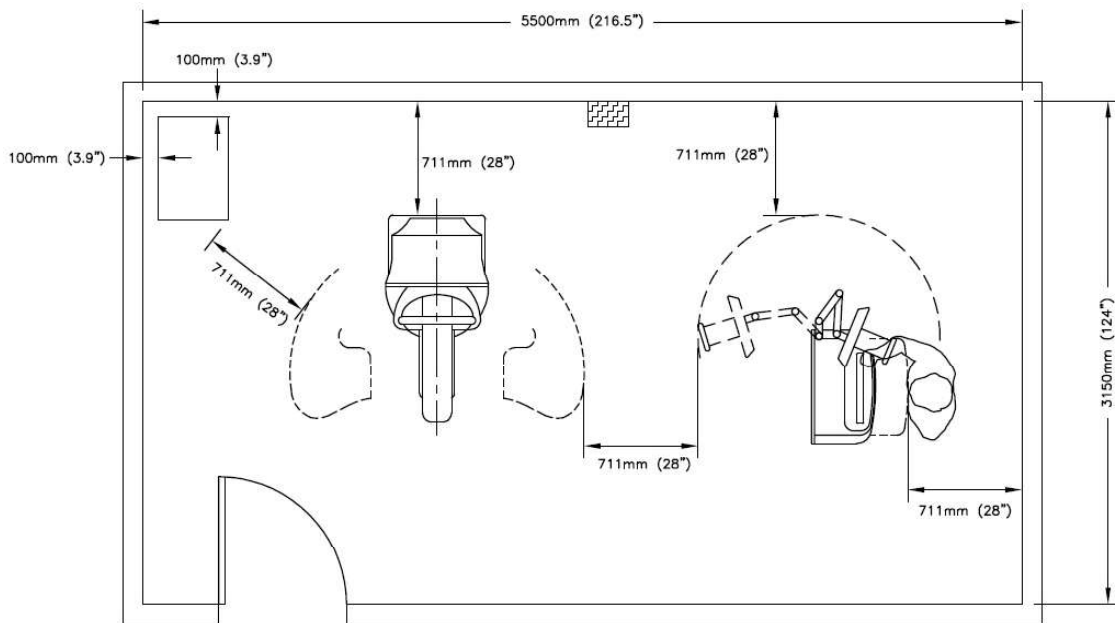


ILLUSTRATION 14 - IDEAL ROOM LAYOUT IF THERE ARE NO SPACE RESTRICTIONS (USA)

In the ideal room layout (for USA), the orientation of the Control Station, Generator, and Gantry are all positioned in a way, such that:

- the 28" egress clearance is everywhere
- all the cable groups are along one wall and kept out of the way, preventing damage to them or having them become a trip hazard
- full use of the Rotative Arm for LCD monitor is permitted

10-3. Anchoring to the Floor

10-3-1. The Positioning Templates

The installation kit supplied with the equipment includes two templates printed on white paper. These templates assist with the layout of the Gantry and Control Station, and positioning the anchors.

! **Notice:**

Remember to respect the minimum distances required between the Gantry and the Control Station or radiation screen to allow access to the stop motion buttons.

10-3-2. Anchoring Inserts

Please ensure that the load rating for the floor is enough to withstand the mass of the Gantry, the Control Station, and the Generator: refer to [Floor Requirements on page 46](#).

10-3-2-1. Anchoring Inserts Provided with the Senographe System (only for non-seismic areas)

The recommendations listed in the table below correspond to the anchoring inserts that are supplied with the Senographe system. You must choose to use different anchoring inserts if your floor thickness is less than 120 mm and/or if you are installing the Senographe system in a seismic area.

Anchoring holes in the floor	Gantry baseplate (see Illustration 15)	Control Station baseplate (see Illustration 16)
Number of holes in the plate	3	4
Diameter of the hole in the plate	11 mm	14 mm
Hole diameter in the floor	10 mm	16 mm
Hole depth in the floor	Min: 70 mm Max: 110 mm	Min: > 90 mm
Provided inserts	Fischer FUR 10x100SS External diameter of 10 mm for a screw with 7 mm diameter	Hilti HAM M10x80 External diameter of 16 mm for a screw with 10 mm diameter
Maximum bolt load pull tension (at each bolt)	150 daN	580 daN
Minimum floor thickness	120 mm	120 mm
Recommended tightening torque	10.1 Nm	45 Nm on concrete 20 Nm on masonry

If you use different anchoring inserts to those supplied, you must use the recommendations corresponding with those anchoring inserts and not those listed in this table. Your local structural engineer is responsible for evaluating the recommendations of third-party anchoring inserts.

10-3-2-2. Anchoring Inserts Not Provided with the Senographe System (for seismic areas)

The following tables provide the recommended anchoring inserts seismic areas. Due to the differing availability of Hilti bolts in different continents, the following tables provide different bolt recommendations. The minimum floor thickness required varies according to the bolts used.

USA - Hilti Kwik Bolt III

Anchoring holes in the floor	Gantry baseplate (see Illustration 15)	Gantry baseplate additional anchoring holes for seismic areas (see Illustration 15)	Control station baseplate (see Illustration 16)
Number of holes in the plate	3	2	4
Diameter of the hole in the plate	11 mm	11 mm	14 mm
Recommended inserts	Hilti Kwik Bolt III 3/8"	Hilti Kwik Bolt III 3/8"	Hilti Kwik Bolt III 3/8"
Hole diameter in the floor	9.5 mm (3/8")	9.5 mm (3/8")	9.5 mm (3/8")
Hole depth in the floor	64 mm (2 1/2")	64 mm (2 1/2")	64 mm (2 1/2")
Minimum floor thickness	95 mm (3 3/4")	95 mm (3 3/4")	95 mm (3 3/4")
Maximum bolt load pull tension (at each bolt)	490 daN	490 daN	490 daN
Recommended tightening torque	34 Nm	34 Nm	34 Nm

EUROPE - Hilti HSA Bolts

Anchoring holes in the floor	Gantry baseplate (see Illustration 15)	Gantry baseplate additional anchoring holes for seismic areas (see Illustration 15)	Control station baseplate (see Illustration 16)
Number of holes in the plate	3	2	4
Diameter of the hole in the plate	11 mm	11 mm	14 mm
Recommended inserts	HSA M10 x 90 - 20 / 25	HSA M10 x 90 - 20 / 25	HSA M10 x 90 - 20 / 25
Hole diameter in the floor	10 mm	10 mm	10 mm
Hole depth in the floor	70 mm	70 mm	70 mm
Maximum bolt load pull tension (at each bolt)	490 daN	490 daN	490 daN
Minimum floor thickness	105 mm	105 mm	105 mm
Recommended tightening torque	34 Nm	34 Nm	34 Nm

ILLUSTRATION 15 - GANTRY BASEPLATE TEMPLATE

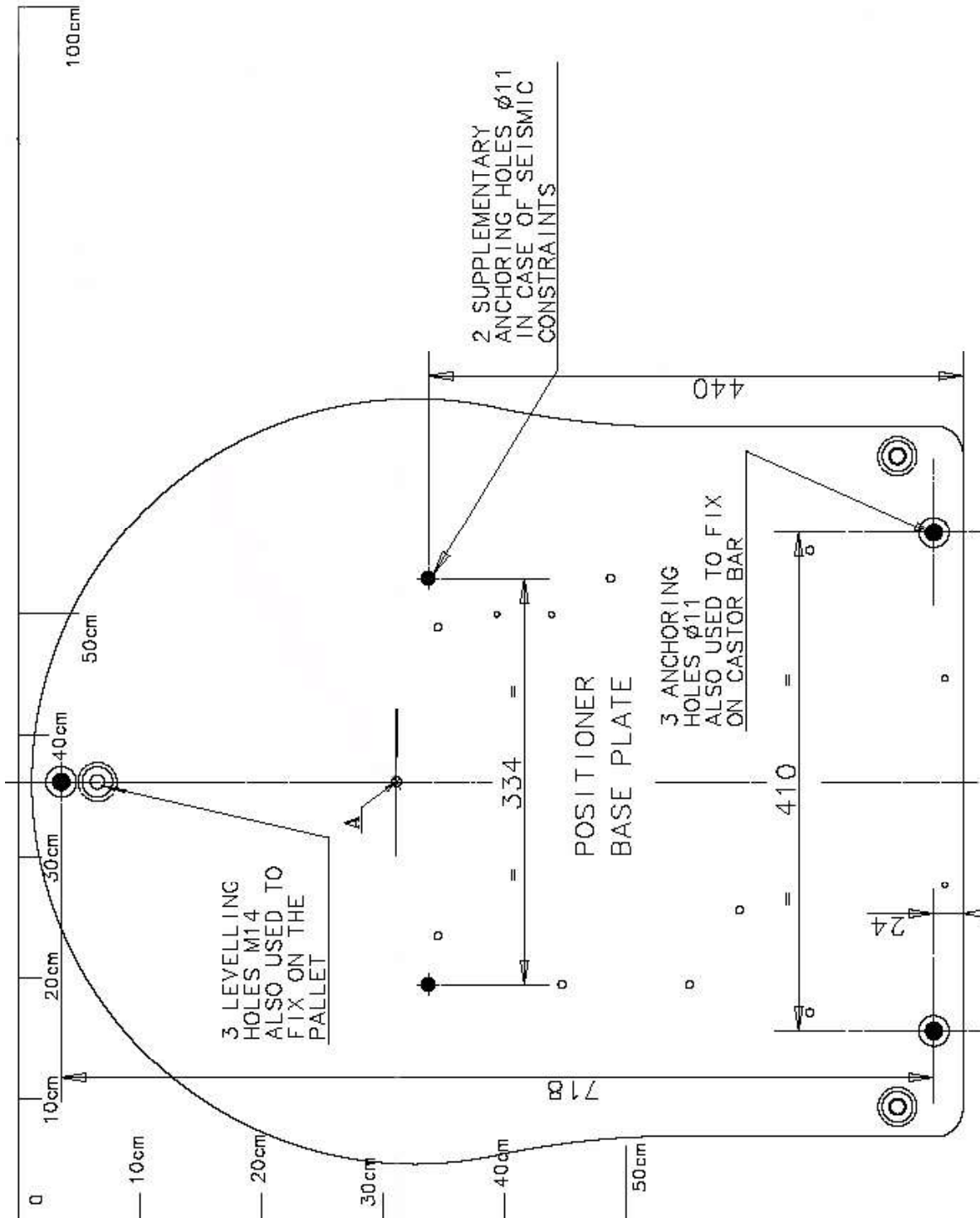
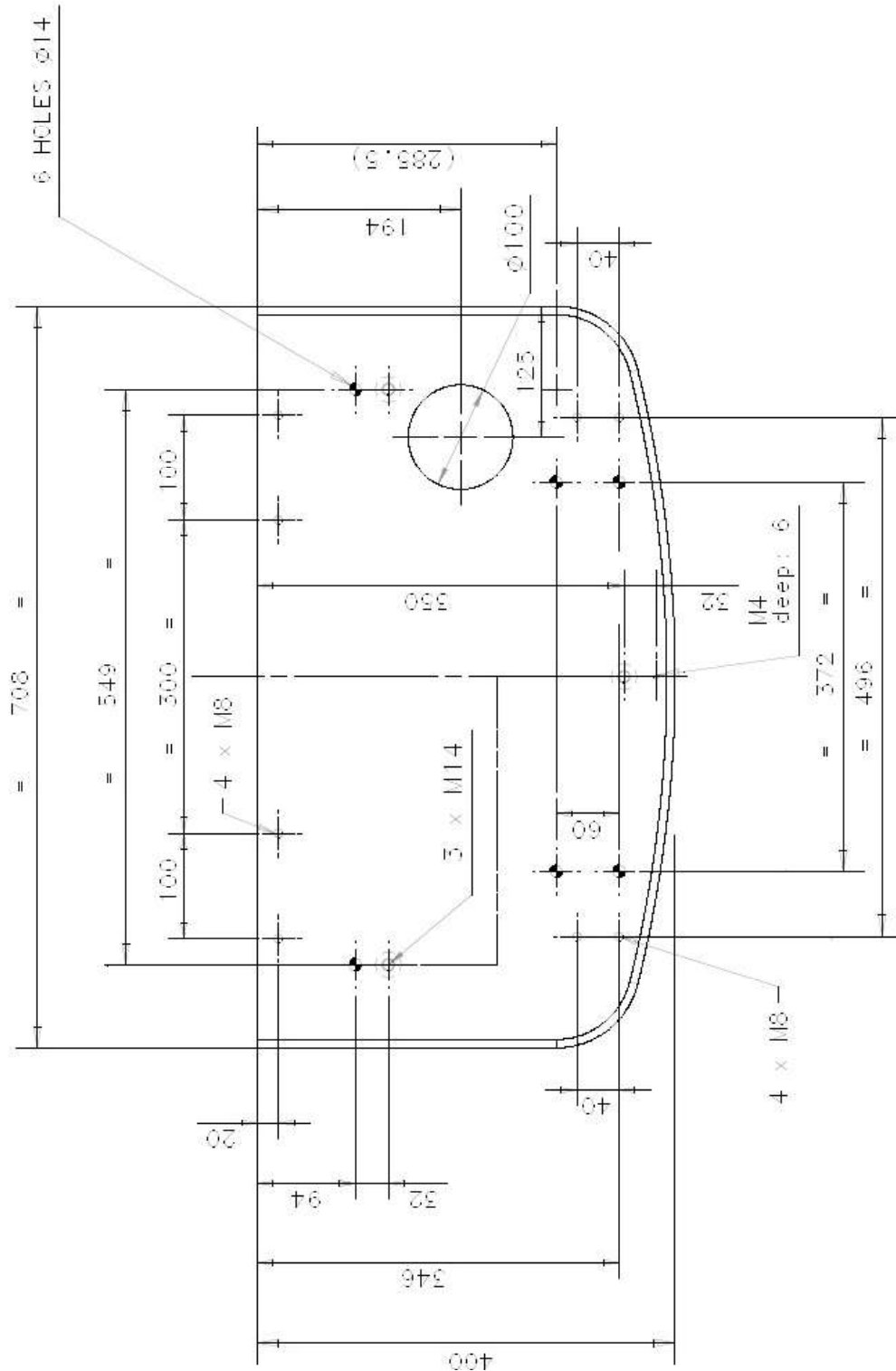


ILLUSTRATION 16 - CONTROL STATION BASEPLATE TEMPLATE



10-4. Interconnecting Cables Path and Length

The diagram below is provided to help planning cable runs between subsystems.

Codification color on the illustration:

Black = Harness, Shipped with the system

Red = Power AC supply (Line Supply Cable) (GEMS supplies a usable length = 6.5 m (21'-4") cable)

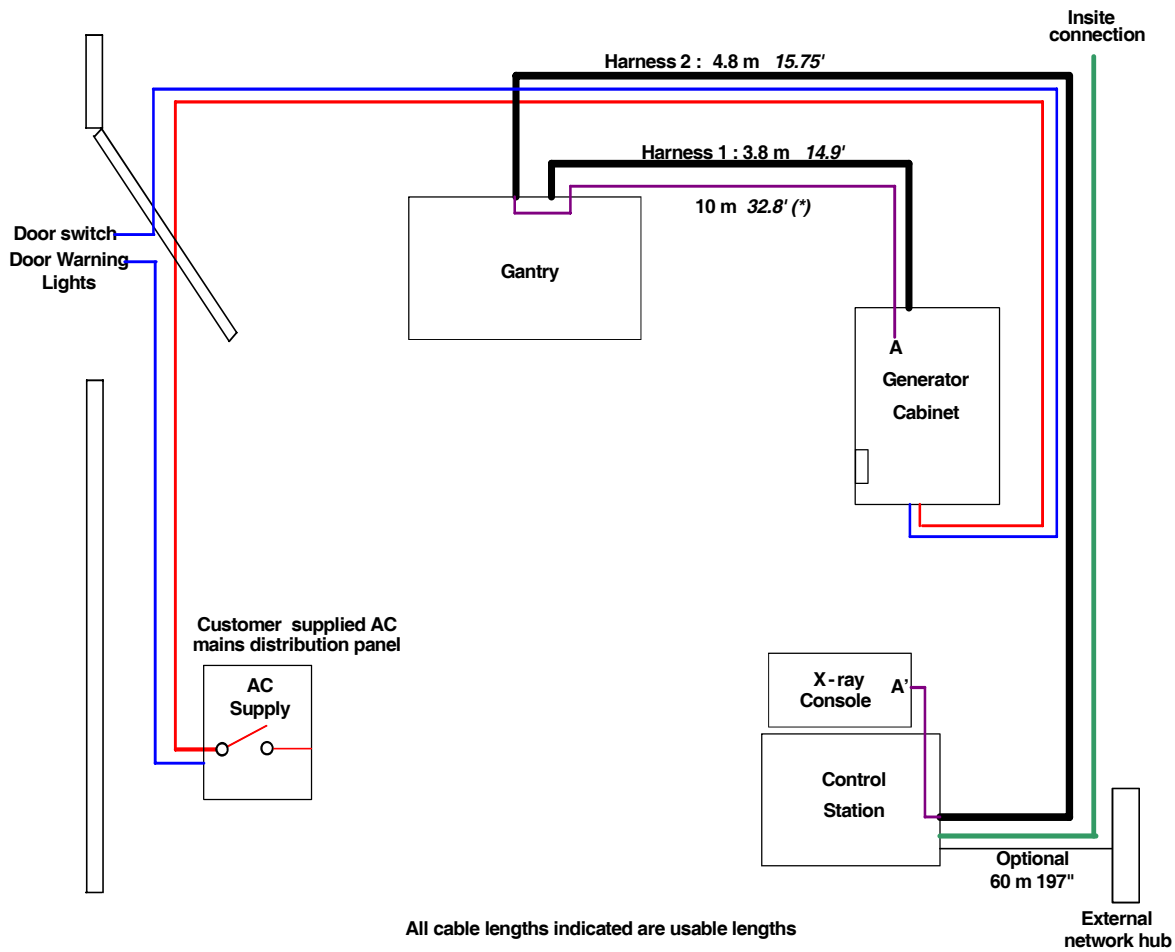
Blue = Door light and switch (local adaptation)

Green = Insite connection

Purple = X-ray Console Cable



Cables between Generator and Gantry and X-ray Console are fragile: Protect these cables in a cable housing or ensure that the cable path is safe.



* - The X-ray Console cable is integrated within harness 2, and cable tied alongside harness 1. It can be separated from the harnesses, where its total usable length is 10 m (32.8') (between A and A').

11. INSITE CONNECTION

A broadband Internet connection or a Dedicated Service Network must be provided for access to Insite services.

There are currently three main methods of providing this connection. Either Virtual Private Network (VPN) tunneling on a broadband Internet connection, or a Dedicated Service Network as follows:

- Site to Site VPN (GE Solution) : using an analog or digital broadband router supplied by GE.
- Site to Site VPN (Customer Solution) : using an analog or digital broadband router and infrastructure supplied by the customer.
- Dedicated Service Network provided by the country local health service (if available) (e.g. NHSnet/ N2/N3 in the UK, SJUnet in Sweden, and Sescam in Spain).

More information can be found in the Insite Pre-Installation Manual 2327624-100 and the Broad Band (BB) Solutions Catalogue. You can download this from the *OTR & Sales* section at http://supportcentral.ge.com/products/sup_products.asp?prod_id=24026 (GEMS SSO login credentials required).

Note:

The Insite Pre-Installation Manual and the BB Solutions Catalogue are only available via the GEMS Intranet. If a customer require these documents then GEMS personnel can provide the customer with these documents at request. In the Americas region, only the Site to Site VPN (Customer Solution) is possible.

12. NETWORKING CONNECTIONS

- The Control Station and any optional equipment provided are to be connected together as a hospital network.
- Before installation, the following information must be obtained for each network host so that it can be addressed by the AWS:
 - IP address; Gateway address; Subnet mask.The hospital network administrator usually supplies this information.
- Provision must be made for Ethernet cables to be easily run from the Control Station to the hospital network.

Typical equipment options which can be connected to the hospital network include: review workstation, Mass Archiver, Laser Printer, HIS/RIS network kit, CAD (Computer Aided Detection).

13. TELEPHONE CONNECTION

It is recommended that a telephone is provided close to the X-ray Console (normally mounted on the Control Station), to allow convenient dialog with teleservice technicians.

14. ASSOCIATED REVIEW WORKSTATIONS

Planning information for the Seno Advantage Review Workstation can be found in the *Volume Share/ AW/SA Pre-Installation Manual, 5180573-x-100*.

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CHAPTER 5 PRE-INSTALLATION PROCEDURES

The following pages list recommended procedures for planning and implementing the installation of a Senographe system.

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Scenario PRE A001 - Pre-installation Procedures

1 CONTEXT

This scenario provides a check list for use in planning and carrying out pre-installation work.

2 STEERING GUIDE

#	Requirement	Reference	Who?	Done?
Pre-purchase site visit				
1	Visit the proposed site to check for any potential problems associated with installation.	Scenario PRE A002 - Pre-purchase Site Visit	GEMS sales representative	
Purchase Senographe system				
2	Order Senographe system with all appropriate options from the Price Book. For customers in all countries except China, order the optional line supply cable. For customers in China, order an equivalent CCC-certified line supply cable from the Price Book. For more information see Line Supply Cable on page 51 .		GEMS sales representative	
3	If the floor thickness is less than 120 mm and/or the installation is in a seismic area, order different anchoring bolts to those that are supplied with the system.	Anchoring Inserts on page 68		
Installation planning visit				
4	Visit site to assess installation requirements and specify the preparatory work required before delivery and installation.	Scenario PRE A003 - Installation Planning Visit	GEMS site planner	
Preparatory work				
5	Hospital or third-party contractors carry out preparatory work.		Hospital	
Pre-delivery check				
6	Visit site to confirm that the preparatory work is satisfactory and the site is ready for delivery and installation.	Scenario PRE A004 - Pre-Delivery Check	GEMS site planner	
Delivery and storage				
7	System delivery to designated storage.	Chapter 4 Pre-Installation System Requirements , section 9 Planning for Storage	Delivery personnel and hospital	
Installation				
8	System installation.		GEMS installation engineers	

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Scenario PRE A002 - Pre-purchase Site Visit

1 CONTEXT

This scenario provides a check list for use in planning and carrying out a pre-purchase site visit.

2 STEERING GUIDE

#	Requirement	Reference	Who?	Done?
Altitude				
1	Check that product specifications are compatible with the altitude of the site	Chapter 4 <i>Pre-Installation System Requirements</i> , section 1 <i>Environmental Requirements</i>	Hospital engineer	
Operating conditions				
2	Check that operating the temperature and humidity requirements can be met	Chapter 4 <i>Pre-Installation System Requirements</i> , section 1 <i>Environmental Requirements</i>	Heating engineer	
Rom layout				
3	Check that an adequate room is available, with suitable floor and access	Chapter 4 <i>Pre-Installation System Requirements</i>	Site planner	
Electrical supply				
4	Check availability of suitable supply	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Hospital engineer	
Networking				
5	Check possibility of connection to hospital network	Chapter 4 <i>Pre-Installation System Requirements</i> , section 12 <i>Networking Connections</i>	Hospital engineer, GEMSE HMS representative	
Insite connection				
6	Check availability and type of broadband connection	Chapter 4 <i>Pre-Installation System Requirements</i> , section 11 <i>Insite Connection</i>	Hospital engineer	

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Scenario PRE A003 - Installation Planning Visit

1 CONTEXT

This scenario provides a check list for use in planning and carrying out an installation planning visit.

2 STEERING GUIDE

#	Action	Reference	Who?	Done?
Storage conditions				
1	Check the dimensions and environment of the pre-installation storage room.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 9 <i>Planning for Storage</i>	Hospital engineer	
Room layout				
2	Plan and specify layout with adequate spacing between the Gantry and control station components.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 10 <i>Room Layout Planning</i>	Site planner	
Operating conditions				
3	Check that operating the temperature and humidity requirements will be met	Chapter 4 <i>Pre-Installation System Requirements</i> , section 1 <i>Environmental Requirements</i>	Heating engineer	
Radiation protection (wall, ceiling, floor, doors)				
4	Consult the Radiation Physicist for advice on radiation protection.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 8 <i>Planning for Radiation Protection</i>	Radiation protection specialist	
Structural requirements				
5	Check access door width and height.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 4 <i>Structural Requirements</i>	Hospital engineer	
6	Check floor requirements (strength, flatness).	Chapter 4 <i>Pre-Installation System Requirements</i> , section 4 <i>Structural Requirements</i>	Flooring specialist	
Room Layout Planing				
7	Make the underfloor plan localizing the water and electrical ducts		Hospital engineer	
8	Plan the location of the main components.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 10-3 <i>Anchoring to the Floor</i>	Hospital engineer + GEMS Site planner	
9	Specify the installation of anchorage bolts. In seismic areas, anchors must be provided for the generator cabinet and ancillary equipment (additional radiation screen, etc.).	Chapter 4 <i>Pre-Installation System Requirements</i> , section 10-3 <i>Anchoring to the Floor</i>	Flooring specialist	
10	Plan cable runs; specify ducting, etc.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 10-4 <i>Interconnecting Cables Path and Length</i>	Site planner	

Scenario PRE A003 - Installation Planning Visit

#	Action	Reference	Who?	Done?
Electrical requirements				
11	Check that room power supply requirements will be met.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
12	Check the line voltage specification.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
13	Check the line frequency specification.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
14	Check the kVA load characteristics.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
15	Check the line impedance.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
16	Check the main circuit breaker characteristics.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
Door protection switches				
17	Specify the requirement for provision and connection of the door X-ray protection switches.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 5 <i>Electrical Requirements</i>	Electrician	
Insite connection				
18	Specify requirements for Insite broadband connection	Chapter 4 <i>Pre-Installation System Requirements</i> , section 11 <i>Insite Connection</i>	Hospital Network Administrator	
Networking				
19	Specify network connections and cable runs.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 12 <i>Networking Connections</i>	Site planner	
20	Allocate IP, Gateway, and Subnet mask addresses.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 12 <i>Networking Connections</i>	Hospital Network Administrator	
Lighting				
21	Specify requirements for dimmer switches, drapes, etc.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 7 <i>Room Lighting</i>	Lighting specialist	

Scenario PRE A004 - Pre-Delivery Check

1 CONTEXT

This scenario provides a check list for use in planning and carrying out a pre-delivery check visit.

2 STEERING GUIDE

#	Requirement	Reference	Who?	Done?
Storage conditions				
1	Check preparation of pre-installation storage room	Chapter 4 <i>Pre-Installation System Requirements</i> , section 9 <i>Planning for Storage</i>	Hospital engineer	
Room preparation				
2	Check the proposed layout and preparations for cable runs.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 10 <i>Room Layout Planning</i>	Site planner	
3	Check floor and anchorage preparation.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 10 <i>Room Layout Planning</i>	Flooring specialist	
4	Check access requirements.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 4 <i>Structural Requirements</i>	Hospital engineer	
Radiation protection (wall, ceiling, floor, doors)				
5	Check preparation for radiation protection (wall, ceiling, doors);	Chapter 4 <i>Pre-Installation System Requirements</i> , section 8 <i>Planning for Radiation Protection</i>	Radiation protection specialist	
Insite connection				
6	Check preparations for Insite broadband connection	Chapter 4 <i>Pre-Installation System Requirements</i> , section 11 <i>Insite Connection</i>	Hospital Network Administrator	
Lighting				
7	Check room lighting conditions	Chapter 4 <i>Pre-Installation System Requirements</i> , section 7 <i>Room Lighting</i>	Lighting specialist	

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Scenario PRE A005 - Receiving and storing a Senographe system

1 CONTEXT

This scenario provides a check list to receive and store a Senographe system, before the system is installed.

2 STEERING GUIDE

#	Requirement	Reference	Who?	Done?
1	Receive the equipment and check for external damage	Job Card PRE A001 - Checking for Damage on page 87	GEMS representative and hospital staff	
2	Store the Senographe system.	Chapter 4 <i>Pre-Installation System Requirements</i> , section 9 <i>Planning for Storage</i>	Hospital staff	

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Job Card PRE A001 - Checking for Damage

The Senographe DS system is inspected for proper operation and appearance before shipment. However, it is necessary to inspect the product after the shipment is received.

The Senographe DS system is supplied in three different pallets as follows.

Pallets	Contents
1	Gantry Generator Cabinet
2	Control Station
3	Image Receptor (Digital Detector)
4	Accessories Cabinet, containing: Monitor Bucky Accessories Box (containing X-ray Console) Installation Kit Mag Stand 1.5 Mag Stand 1.8 Coolant Kit

Pallets for overseas shipment are protected by a wood and cardboard cover with shock and tilt indicators. Pallets for road shipment do not have this cover.

1 POSSIBLE TYPES OF DAMAGE

Two types of possible damage can exist, as follows:

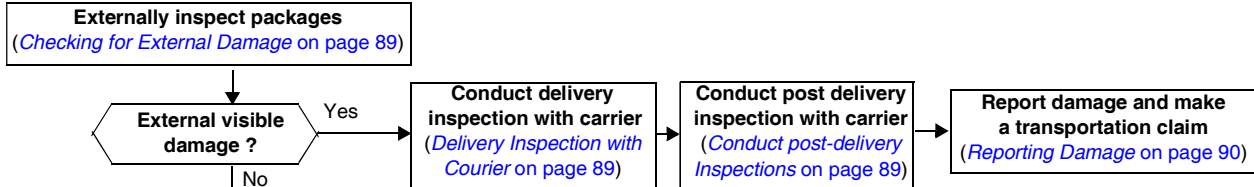
- External (noted) damage: damage is visible on the packages and there may or may not be actual damage to the contents of the packages. This type of damage is a consequence of bad transportation.
- Internal (concealed) damage: no damage is visible on the packages however there is actual damage to the contents of the packages. This type of damage is a consequence of bad manufacturing.

The illustration on the below summarizes the general process to determine:

- whether any of the Senographe components are damaged
- the cause (and liability) of possible damage
- whether you have to make a claim for damage with the carrier company
- whether you have to make a manufacturing claim for damage or components considered dead on arrival (DOA) with GE Healthcare

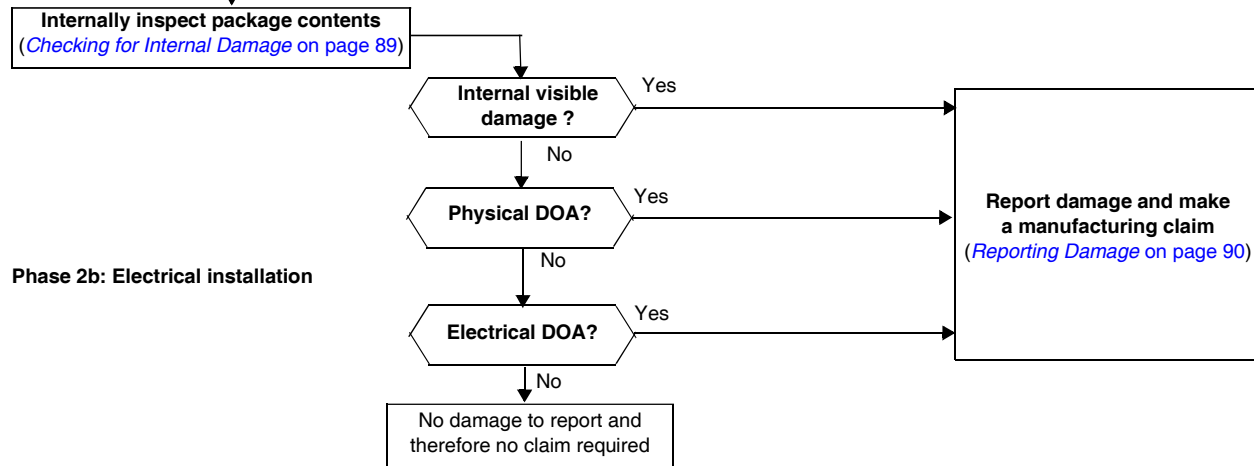
Phase 1:

Pre-installation/delivery time



Phase 2a:

Physical installation



The damage checking process is split into two main phases.

- The first phase must be undertaken during the *delivery complaint period* defined by your country consumer laws (usually 14 days). So that in the event that external damage has occurred, the liability of the damage can be attributed to the carrier company.

! Notice:

External (noted) damage must be reported to the carrier immediately upon discovery, or in any event within the delivery complaint period (defined by your local consumer laws) after receiving the delivery (e.g.14 days in the USA). A transportation company will not pay a claim for damage if a *post-delivery inspection* is not requested within the delivery complaint period defined by your country consumer laws (usually 14 days).

- The second phase can be undertaken later during physical and electrical installation of the Senographe system. Any damage found during this phase is considered as either physical DOA or electrical DOA, which is the responsibility of GE Healthcare manufacturing.

2 CHECKING FOR EXTERNAL DAMAGE

2-1 Delivery Inspection with Courier

When the shipment of the Senographe system arrives, a General Electric representative or a hospital receiving agent must proceed as follows for each of the three pallets.

1. Closely examine each pallet for visible damage, and check any shock and tilt indicators present.
If the pallets in the shipment show visible signs of damage, excessive shock, etc. you must perform a *delivery inspection* as follows:
 - a. Open the pallets immediately to check the contents, and ask the driver to inspect the contents with you.
 - b. Write a precise description of the damage on your copy and carriers copy of the delivery receipt, along with the notation "damage in shipment".
 - c. Sign for the shipment and arrange a post-delivery inspection within *delivery complaint period* defined by your country consumer laws.
 - d. Contact GE Healthcare to report the initial damage according to [section 4, Reporting Damage](#).
If the pallets in the shipment do not show visible signs of damage or excessive shock, no action is required other than to sign for the shipment.
2. Move the pallet into or close to the x-ray room, ready for unpacking.

2-2 Conduct post-delivery Inspections

Contact the Customer Service Department at phone number provided on the carriers bill to help you determine whether a post-delivery inspection and formal written report is required. Occasionally, the carrier may not have an inspector examine the damaged freight. Instead, they may request that you do the post-delivery inspection yourself and keep a written description. This written description can be used if a transportation claim is filed later. Note, that a post-delivery inspection report is **not** a transportation claim.

Once you have completed a post-delivery the details of the damage to GE Healthcare and the carrier according to [section 4, Reporting Damage](#).

3 CHECKING FOR INTERNAL DAMAGE

As soon as possible after delivery, unpack, and inspect your shipment. If you discover internal (concealed) damage, report it to GE Healthcare immediately according to [section 4, Reporting Damage](#).

4 REPORTING DAMAGE

1. Contact the GE Healthcare Distributor and/or GE Healthcare Account Manager from which the product was purchased to inform them of the damage. Be ready to supply the following information:
 - name of carrier
 - delivery date
 - consignee name
 - freight or express bill number
 - item damaged
 - extent of damage
2. The GE Healthcare Distributor and/or GE Healthcare Account Manager will contact the factory of origin to determine the most cost effective way to repair the damage.
 - If damage deemed to warrant a factory repair, a Return Merchandise Authorization (RMA) will be issued to return damaged product to factory. Factory will provide quote to repair damaged equipment after inspection of damage upon receipt of damaged equipment. Do not ship any damaged product back to factory without an RMA.
 - If damage is deemed minimal and can be repaired in the field with replacement parts, the factory will provide a quote to the consignee to purchase those parts.
 - If damage is deemed catastrophic and requires complete replacement of damaged equipment, GE Healthcare will provide a quote to the consignee with quote to replace damaged equipment.
3. Discuss how to proceed with your GE Healthcare Distributor and/or GE Healthcare Account Manager:
 - If you determined that the bad transportation was to blame for the damage then your GE Healthcare Distributor and/or GE Healthcare Account Manager will advise you how to file a transportation claim and how to proceed with the transportation claim process.
 - If you determined that the transportation was not to blame for the damage then your GE Healthcare Distributor and/or GE Healthcare Account Manager will advise you how to file a manufacturing claim and how to proceed with the manufacturing claim process.

End of the Publication

You have reached the end of this Publication.

To consult the Revision History, see [Revision History on page 25](#).

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Imagination at work