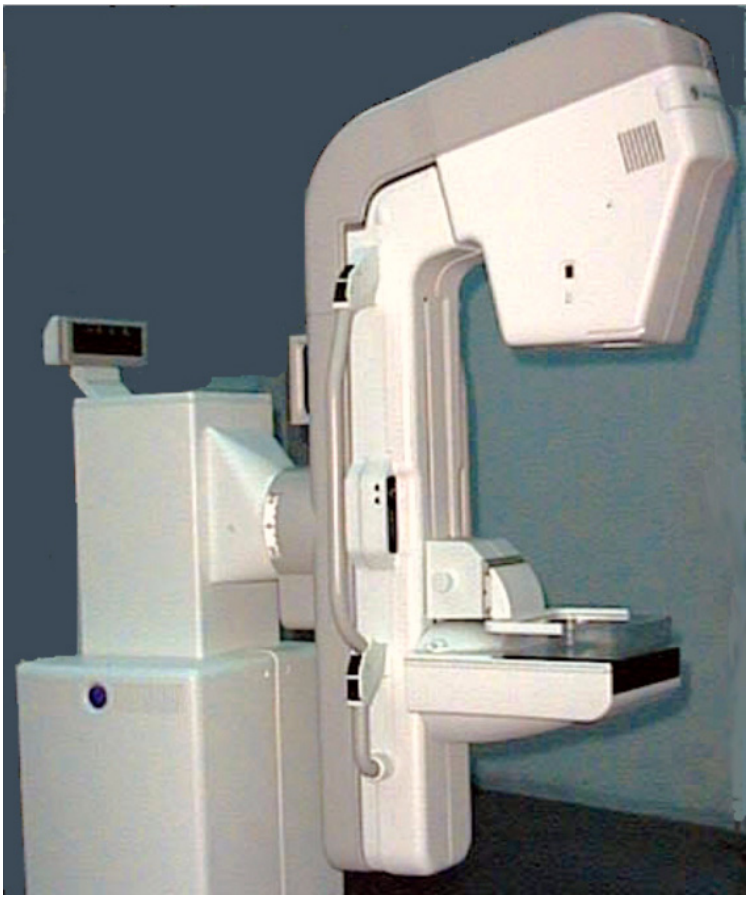
GE Healthcare

Senographe 2000 D Acquisition System

Pre-Installation Manual
PIM

CE 0459



5128704-1-100
Revision 1

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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 appliquees

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.

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.

ATENCION

Los aparatos de rayos X son peligrosos para el paciente y el manipulador cuando las normas de proteccion no estan 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: Recomendaciónes de la Comisión Internacional sobre la Protección Radiológica y normas nacionales.

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 Sichereitsnormen, 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, daßunbefugte 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.

Table of Contents

CHAPTER 1 PUBLICATION DESCRIPTION

1. APPLICABILITY

This publication provides information for planning and carrying out the installation of a Senographe 2000 D system. 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 2 *Responsability of Purchaser* describes the responsability of the purchaser during pre-installation.

  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.

Revision History

REFERENCE	DATE	REASON FOR CHANGE	PAGES
5128704-1-100	November 21, 2006	New release based on document 5128704-100. Technical release ONYX post M4 (8). • CCC Requirements SPR EURge39282: - Improvement of supply cable description in sections 1-4-5 and 1-4-7 of Chapter 4 - Pre-Installation System Requirements. - Added ordering conditions of the supply cable in the steering guide of the Scenario PRE A001 - Pre-installation procedures • PIM structure improvement: - Chapter definition - Added Chapter 5 - Pre-Installation Procedures	50

CHAPTER 2 RESPONSABILITY OF PURCHASER

1. PRE-INSTALLATION DEFINITION

”Pre–installation” refers to work necessary to plan and prepare a site for installation of Senographe 2000 D equipment, whether included in a complete new system or being added to an existing X–Ray room.

Delay, confusion and waste of manpower can be avoided by adequate pre–installation work, including:

- Procurement of required materials.
- Installation of material required before delivery of the Senographe 2000 D system.
- Anticipation of alterations and modifications not provided in the sales contract.

2. CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing shall be performed by qualified GE 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’s electrical work on these products will comply with the requirements of the applicable electrical codes.

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

3. DAMAGE IN TRANSPORTATION

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

Call Traffic and Transportation, Milwaukee, WI (414) 785-5052/8*323-5052 immediately after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section “S” of the Policy & Procedure Bulletins.

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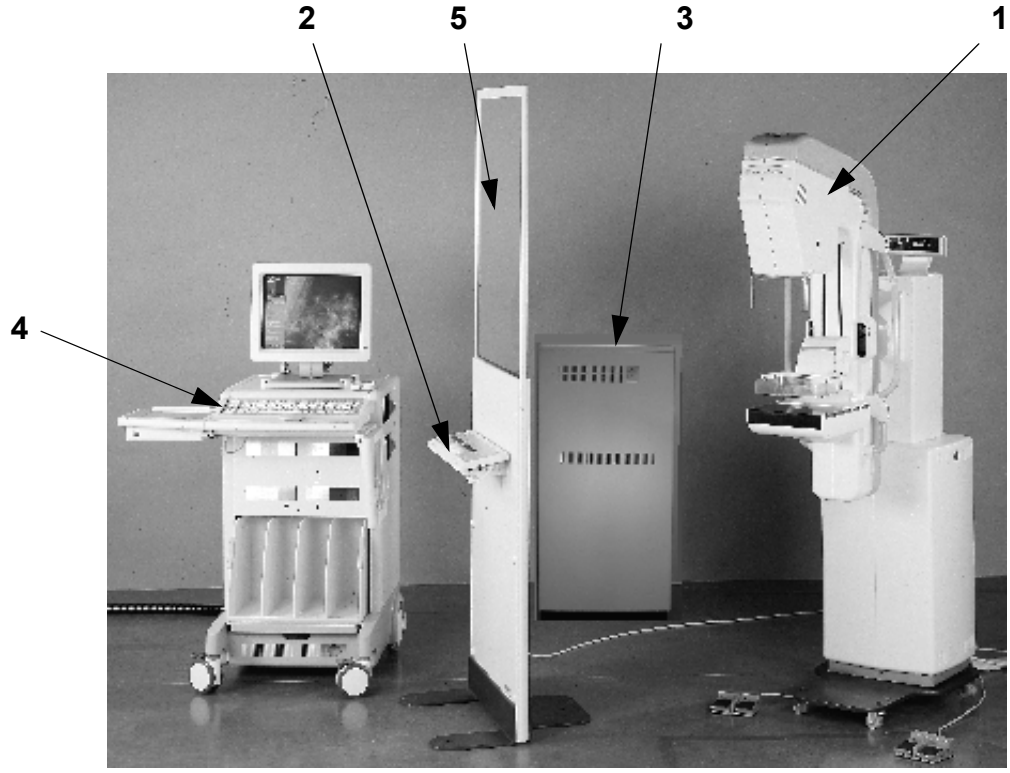
CHAPTER 3 SYSTEM DESCRIPTION

1. MAJOR COMPONENTS

The Senographe 2000 D system includes the following major components, shown in the illustration below:

- Gantry with Digital Detector (1)
- Control Console (2)
- Generator Cabinet (3)
- Cart (4)
- Radiation Shield (5)

Also included, but not shown in the illustration, are the Network Connectivity kit and a number of accessories (additional screen, compression paddles, etc.).



2. OPTIONAL EQUIPMENT

Optional equipment available for use with the system includes:

1. Senographe 2000 D Review Workstation.
2. Archive Senographe 2000 D mass archiving system.
   For the two systems mentioned above, a specific Pre-Installation Manual is available.
3. Laser Printer.
4. CD-R (CD Recordable) writing system.
5. Computer Aided Detection (CAD) system.
6. Additional accessories.

CHAPTER 4 PRE-INSTALLATION SYSTEM REQUIREMENTS

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

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1. ROOM REQUIREMENTS

1-1. Environmental Requirements/Limitations

TABLE 1 - CLIMATIC CONDITIONS

Relative Humidity (non-condensing)				Temperature				Heat Output	
In Use		Storage		In Use		Storage		Standby	Active
Min.	Max.	Min.	Max.**	Min.	Max.*	Min.**	Max.**	Min.	Max.
40%	80%	30%	50%	15ºC	35ºC	10ºC	25ºC	1.95 kW	2.9 kW
				59ºF	*95ºF*	*50ºF*	*77ºF*	*6655 BTU*	*9755 BTU*

* **Operating temperatures - 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 35ºC (*95ºF*).

** **Storage - temperature changes, humidity, and frost damage**:

- 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.
- Before installation, the detector assembly must normally be stored between 10ºC (*50ºF*) and 25ºC (*77ºF*), but the temperature can be allowed to fall to a minimum of -10ºC (*14ºF*) or rise to a maximum of 50ºC (*122ºF*), in both cases for a maximum period of one day.
- For long term storage (more than two weeks), the detector assembly must be kept in a low humidity environment (r.h. less than 50%). For shorter periods than two weeks, the humidity can be allowed to rise to 95% (non-condensing).
- After the cooling circuit has been filled at installation, serious damage will be caused if the temperature is allowed to fall below freezing point.

TABLE 2 - ALTITUDE AND ATMOSPHERIC PRESSURE

Altitude (from sea level)				Atmospheric Pressure			
In Use		Storage		In Use		Storage	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
-400 m	3000 m	-400 m	3000 m	700 hPa	1060 hPa	500 hPa	1060 hPa
-1310 ft	*9840 ft*	*-1310 ft*	*9840 ft*				

1-2. IEC60601-1-2 Electromagnetic Standards Compliance

1-2-1. 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.

1-2-2. Electromagnetic Emission

The Senographe is suitable for use in the specified electromagnetic environment. The purchaser or user of the Senographe should assure 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.

1-2-3. Electromagnetic Immunity

The Senographe is suitable for use in the specified electromagnetic environment. The purchaser or user of the Senographe should 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 sec	0% U_n for 5 sec	Mains power quality is that of a typical commercial and/or hospital environment. If the user of the Senographe requires continued operation during mains power interruptions, it is recommended that the Senographe be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m 1A/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 may present some slight flicker. If this occurs, the monitor may 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 may 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 may present some slight flicker. If this occurs, the monitor may 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 may present some slight flicker. If this occurs, the monitor may 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 may present some slight flicker. If this occurs, the monitor may 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.
• 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. **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 should be performed. If the measured field strength exceeds the RF compliance level above, monitor the Senographe to verify normal operation in each use location. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Senographe.			
• Interference may occur in the vicinity of equipment marked with the following symbol:  .			
• No portable or mobile RF communications equipment may 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 may vary.

1-2-4. 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	$d = [\frac{3,5}{V_2}]\sqrt{P}$	$d = [\frac{3,5}{V_2}]\sqrt{P}$	$d = [\frac{3,5}{E_2}]\sqrt{P}$	$d = [\frac{7}{E_4}]\sqrt{P}$
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
• 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 (800MHz to 2.5GHz carrier frequency) should 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 & 2.5GHz, some slight disturbance might 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 may vary.

1-2-5. Use Limitation

- External components:

  The use of accessories, transducers, and cables other than those specified may result in degraded Electromagnetic compatibility of the Senographe.

1-2-6. Installation Requirements and Environmental Control

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

1-2-6-1. Cable shielding & grounding

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

1-2-6-2. 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 doctor's office, for example), it is recommended that it should be connected to a separate AC power dis-

tribution panel and line, and it must be installed in an X-ray shielded room.

1-2-6-3. 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:

- We 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, which is itself supplied by a single power line.

1-2-6-4. Stacked components & equipment

- The Senographe should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the Senographe should be monitored to verify normal operation in the configuration in which it will be used.

1-2-6-5. Low frequency magnetic field

- In the case of a digital Senographe, the Gantry (with its digital detector) must be separated by at least 1 meter from the generator cabinet, and 1 meter from the analog (CRT) monitors. These specified distances minimize the risk of low frequency magnetic field interference.

1-2-6-6. 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.

1-2-6-7. Electrostatic discharge environment & recommendations

- In order to reduce electrostatic discharge interference, a charge dissipative floor should 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.

1-3. Structural Requirements

1-3-1. Access requirements

Access through a door opening at least 0.70 m (27.6 in) wide and of at least normal height of 2 m (78.75 in) is required.

1-3-2. Ceiling requirements

None.

1-3-3. Wall requirements

None.

1-3-4. Floor requirements

The stand column is placed directly on the floor. The floor must be stable and flat, and sufficiently strong to accept the weight and the weight/area defined below without distortion beyond the tolerance given:

- The weight of the complete column is 280 kg *(616 lbs)*.
- The bearing surface of the base plate is 0.34 m^2 *(3.6 sq. ft.)*.
- The stand column is provided with three anchoring points (refer to the Gantry Dimensions Illustration in the Physical Characteristics section of this document). GEMS provides three bolts M10 x 100 mm, together with three inserts suitable for use on concrete slab floors. The maximum permisable pull strength on each bolt is 310 daN *(690 lbs)*.
- The floor surface must remain horizontal and flat within $\pm$2.5 mm per meter (*±1/10 inch in 39 inches*) after installation of the column.

1-3-5. Seismic requirements

1-3-5-1. Gantry / Generator Cabinet / Radiation Shield

In sesmic areas, anchoring to the floor is mandatory.

1-3-5-2. Cart

The cart is intended only to be moved from one position to another in the same room (during normal use). In seismic areas, provision should be made for securing it in place when in the stored position.

- The following information is provided in the *Physical Characteristics* chapter to allow compliance with local codes or regulations:
  - Weight of the unit.
  - Center of Gravity.
- Recommended method for securing in place: encircle the unit with a nylon belt secured to wall anchors.

1-4. Electrical Requirements

! Notice:

The connection from the hospital a.c. mains supply must be switched by a circuit breaker external to the Senographe 2000 D system, accessible in case of emergency.

1-4-1. Line voltage specifications

- Nominal a.c. voltages (phase/neutral or phase/phase): 200/208/220/240/380/415 V (±10%).

1-4-2. Line frequency specifications

- 50 or 60 Hz (±5%).

1-4-3. 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 to 2 at 415 V.

1-4-4. 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.

For a nominal supply voltage of 380 V, the line resistance $R_{L(380)}$ must be less than 1 Ω:

$$R_{L(380)} \leq 1\ \Omega$$

For other supply voltages, calculate the equivalent permissable resistance value in ohms as follows:

$$R_{L(U)} = R_{L(380)} \times (U/380)^2$$

Where: U = local input voltage

$R_{L(U)}$ = total apparent resistance (two-wire) of the supply at the local voltage (U).

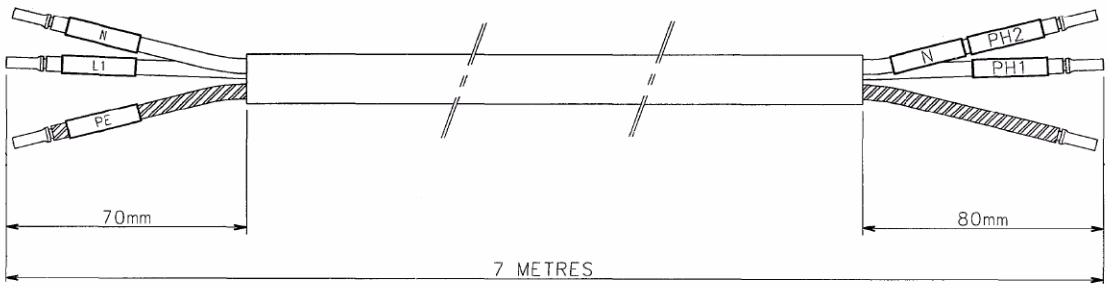
$R_{L(380)}$ = total apparent resistance (two-wire) of the supply at 380 V.

Thus, as $R_{L(380)}$ must be less than 1 Ω, the value of $R_{L(U)}$ must be less than $(U/380)^2$.

1-4-5. Line supply cable

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").*



1-4-5-1. Obtaining a line supply cable

- For customers in all countries except China, the optional line supply cable (S30331BC) must be ordered from the Price Book so that it is supplied with the Senographe System.

- For customers in China: the optional line supply cable from GEMS must **not** be ordered. Instead Chinese customers must locally order an equivalent CCC-certified supply cable from their local electrical supplier.

1-4-6. Main circuit breaker

Circuit breaker sizes for Europe:

- From 380 V up to 415 V: circuit breaker: In = 15 A - magnetic I = 7 In ±*20%;*
  with differential trigger: 30 mA (waveform pulsed).
- From 200 V up to 240 V: circuit breaker: In = 25 A - magnetic I = 7 In ±*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:

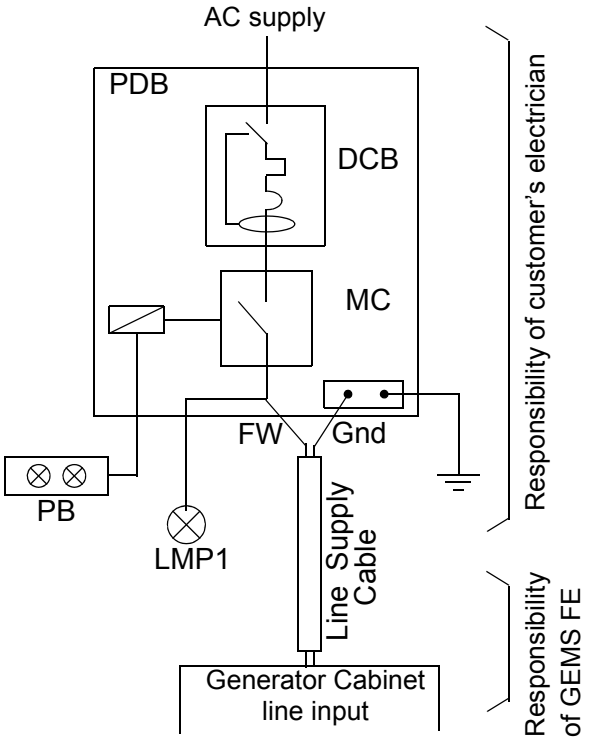
  The current capacity of supply branch circuit conductors and the current rating of overcurrent protective devices shall not be less than 50 percent of the momentary rating or 100 percent of the long–time rating, whichever is greater.
- **NEC 1993 Section 517-73 (a) Item 2:**
  The current capacity of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

1-4-7. Room distribution

The Senographe 2000 D provides facilities for room control from the generator cabinet. The diagram given here outlines a suitable supply system and indicates items to be provided and installed by the customer's electrician:

Legend:

- PDB: Power distribution box supplying AC power the Senographe 2000 D equipment.
- DCB: Differential circuit breaker (thermo-magnetic).
- MC: Main contactor.
- PB: Contactor remote-control ON/OFF impulse push-buttons, lockable on OFF, with indicator lamps (Red = ON, Green = OFF), located near access door, 1.5 m (59 inches) above the floor.
- LMP1: Red presence indicator lamp (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.
- Generator Cabinet.



1-4-8. Room lighting

Recommendation: In order to obtain the nominal room brightness value of 50 lux (maximum 80 lux) for correct viewing of monitor images, the room lights should be equipped with a dimmer switch; window shades and/or drapes should be fitted.

2. INSITE CONNECTION AND NETWORKING

2-1. Insite Connection

A telephone outlet connected to a dedicated phone line, to be used only for a modem connection, must be installed no more than one meter from the position chosen for the Cart. The line should be a direct standard telephone line or may pass through a PABX switchboard with automatic call distribution (ACD).

It is also recommended that a telephone be provided close to the operator console, to allow convenient dialog with teleservice technicians.

2-2. Networking Connections

- The AWS Cart and any optional equipment provided are to be connected together as a local network, using the Networking Connectivity kit provided. The kit includes an Ethernet switch and six cables.
- For security and regulatory reasons, connections to the hospital network must be made through this local network, not directly. When planning such connections, consideration must be given to requirements for the separation of radiological and administrative functions in the hospital network.
  - For connection to a hospital network, a special study is required. Contact your GEMS HNS representative for details.
- Before installation, the following information should be obtained for each network host to be addressed by the AWS:
  - IP address; Gateway address; Subnet mask.

  This information is normally supplied by the hospital network administrator. Then contact your Online Support Center, which will give you a unique set of addresses for your installation.
- Provision should be made for the Ethernet switch supplied to be placed in a suitable room, from which cables can be easily passed to the Senographe room and to any other equipment to be connected to the local network.
  - The switch is a free-standing unit, it should be placed on a suitable stable flat surface:
    Dimensions: (h x w x d): 45 x 445 x 268 mm *(1.75 x 17.5 x 10.6 inches)*. Weight: 4.5 kg *(10 lb)*.
  - Six RJ45 cables are provided:
    Lengths: two cables 60 m *(197 ft)*; three cables 15 m *(49 ft)*; one cable 3 m *(10 ft).*
    Cable diameter: 6 mm *(0.25 inches)*.
    RJ45 connector dimensions: 14 x 16 x 30 mm *(0.55 x 0.63 x 1.18 inches)*.

Typical equipment options which may be connected to the local network include: RWS (Review WorkStation), Mass Archiver, Laser Printer, HIS/RIS network kit, CAD (Computer Aided Diagnosis).

The following diagrams illustrate some possible network configurations. The distances quoted are the lengths of cables typically used, but are not intended to indicate restrictions.

ILLUSTRATION 1 - TYPICAL SINGLE HUB NETWORK (AWS CLOSE TO RWS)

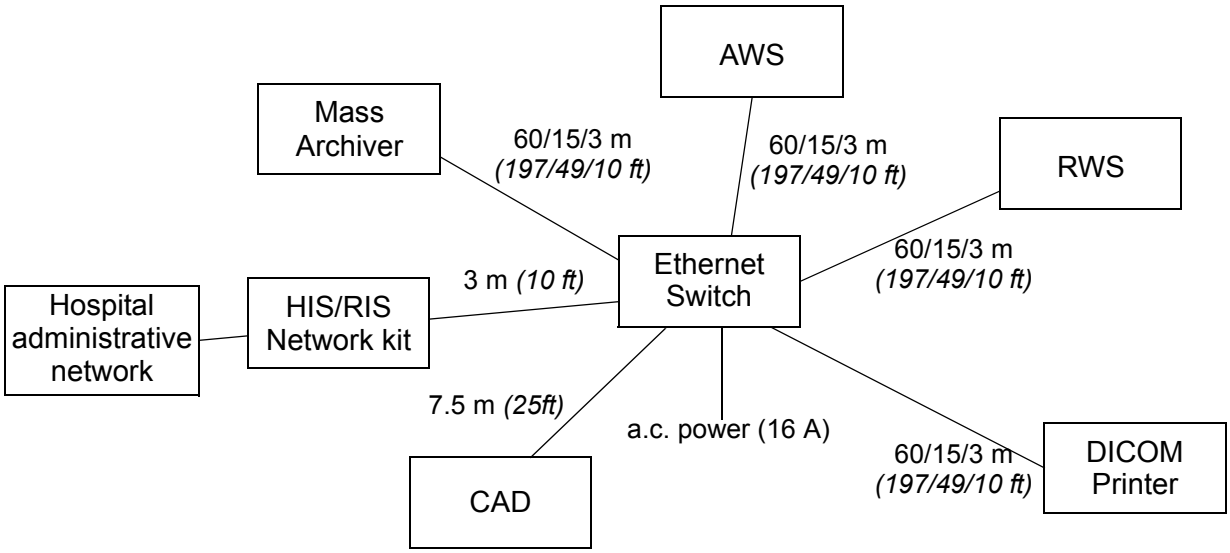


ILLUSTRATION 2 - TYPICAL TWO-HUB NETWORK (AWS DISTANT FROM RWS)

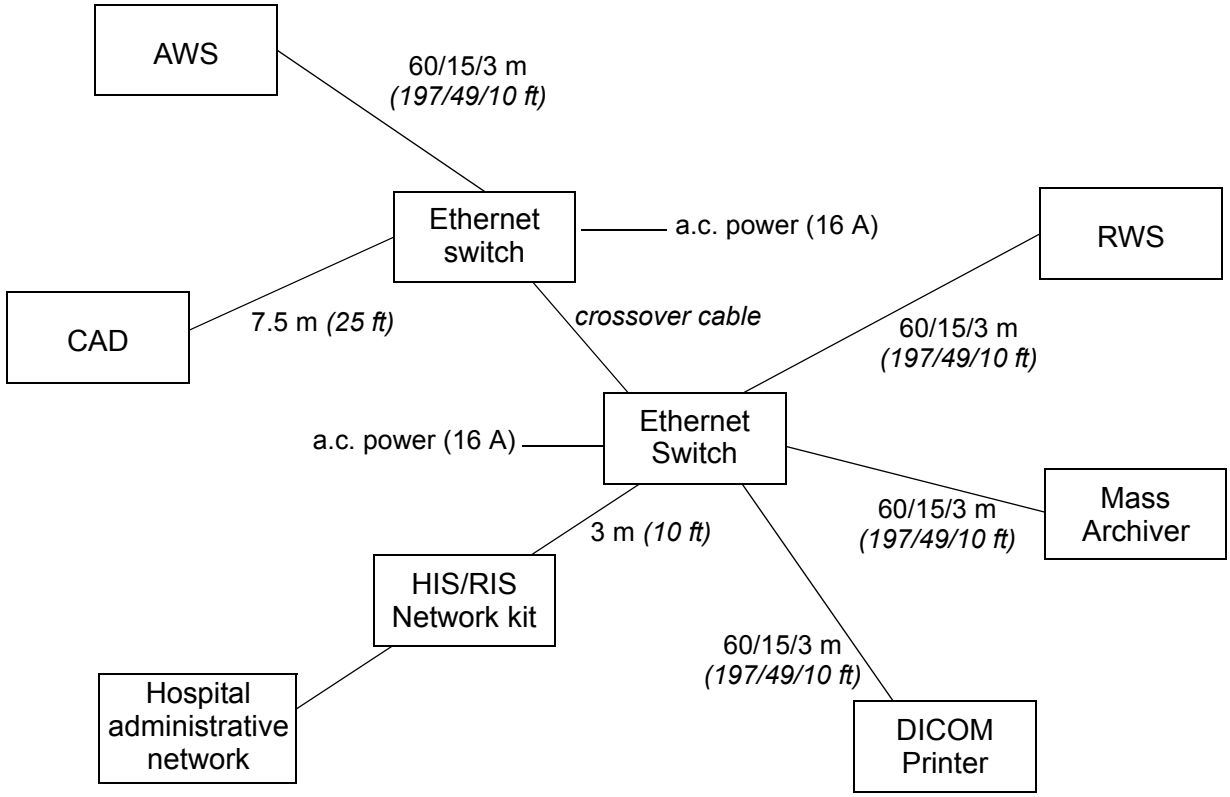
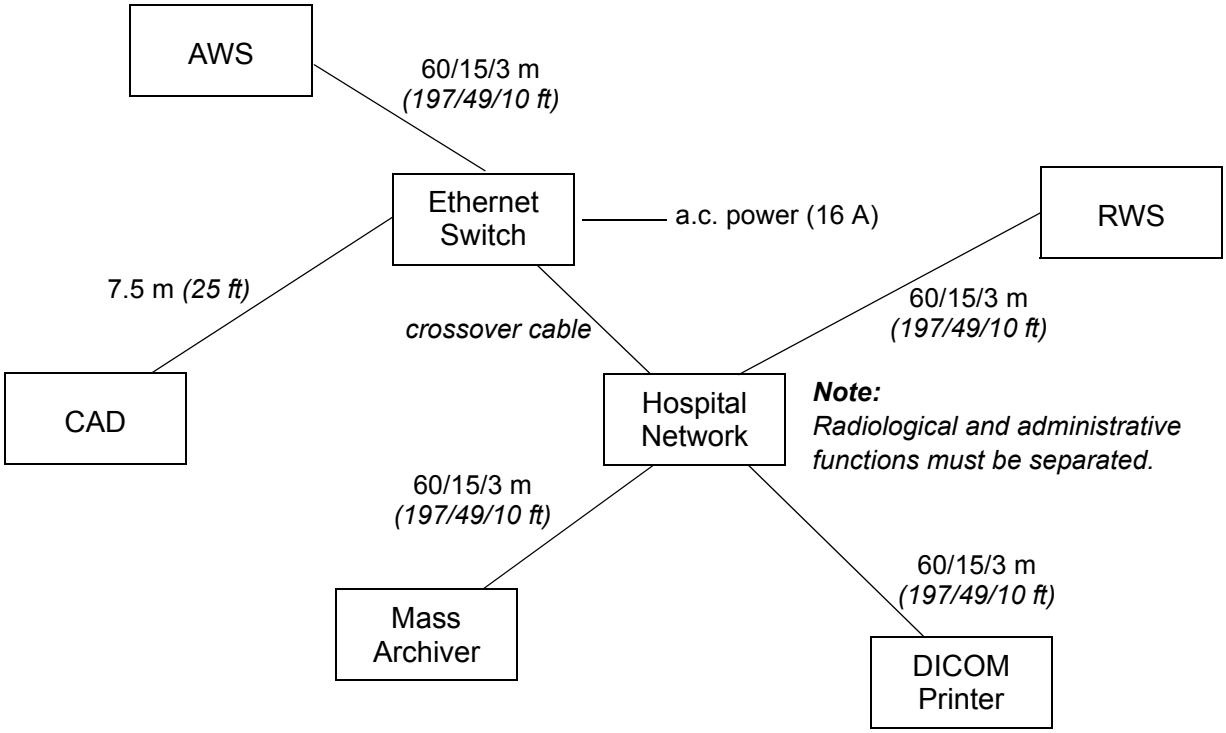


ILLUSTRATION 3 - TYPICAL CONNECTION THROUGH HOSPITAL NETWORK (AWS DISTANT FROM RWS)



3. PHYSICAL CHARACTERISTICS

3-1. Physical Characteristics

This document provides product information for the various main components. The table below lists the main dimensions and weights, and the illustrations on the following pages give relevant information such as location of center of gravity (CG), mounting holes, and access areas for servicing and cabling.

TABLE 1 - PHYSICAL CHARACTERISTICS).

Component	**Depth** mm *(inches)*	**Width** mm *(inches)*	**Height** mm *(inches)*	**Weight** kg *(lbs)*
Gantry	1200 (*47.5)*	540 (*21.5)*	1710/2410 (*67.5/95')*	280 (*617.3)*
Control Console	550 (*22)*	180 (*7)*	85 (*3.5)*	3 (*6.6)*
Generator Cabinet	640 (*25)*	435 (*17.5)*	1330 (*52.5)*	160 (*353)*
Cart	1220 (*48)*	1088 (*43)*	1540 (*61)*	230 (*506)*
Radiation Shield	700 (*27.5)*	490 (*19.5)*	2200 (*87)*	90 (*155)*

3-2. Noise

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

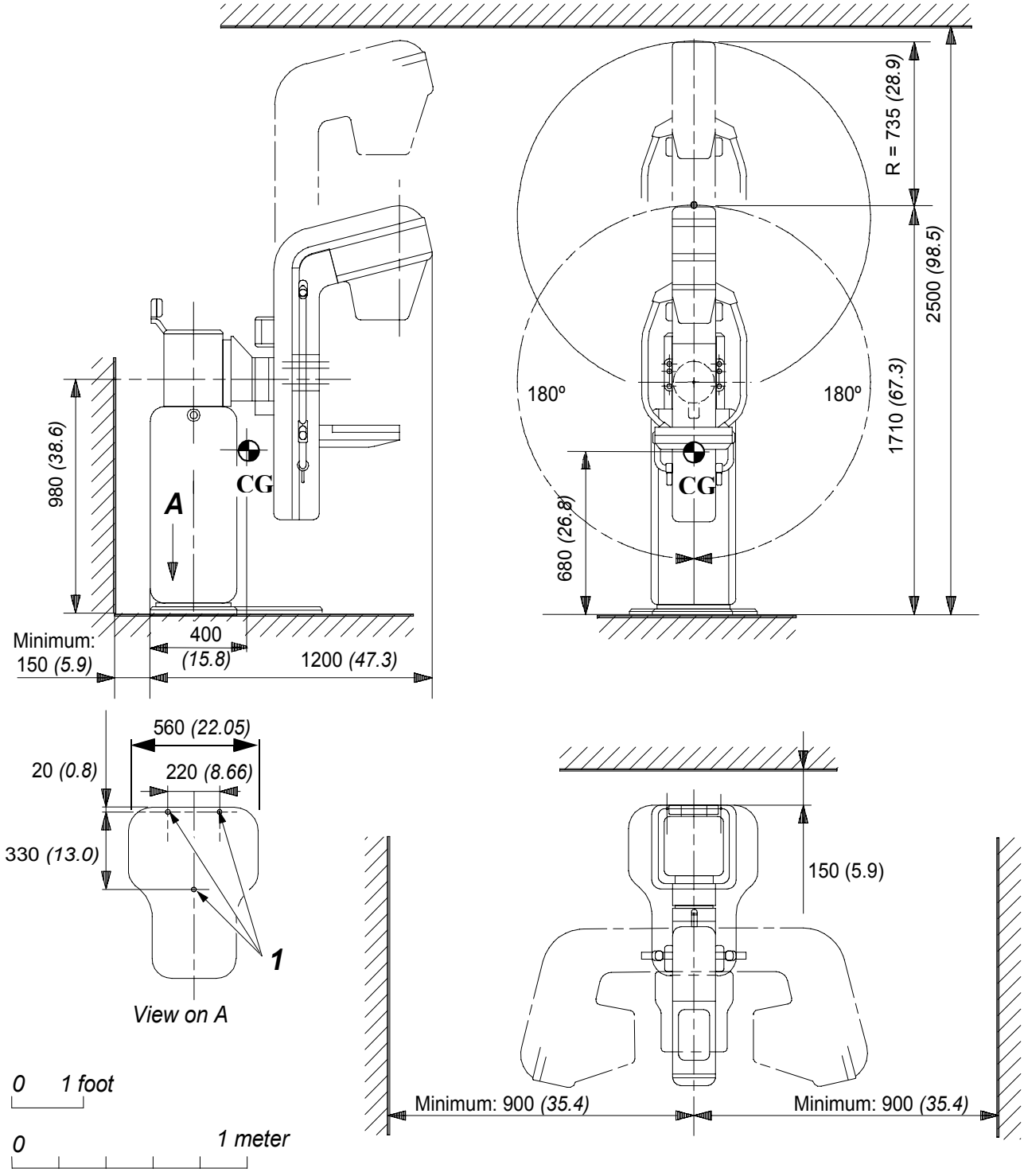
3-3. Radiation Shielding

The RAD shield screen has a 1 mm (0.04") lead thickness equivalence.

To meet European Regulations, the limit value for the whole-body equivalent dose must not exceed 50 mSev (5 Rem) per year.

Minimum permissible distances for the observance of this limit are given in Illustration 6, *Isodose curve 50 mSev*.

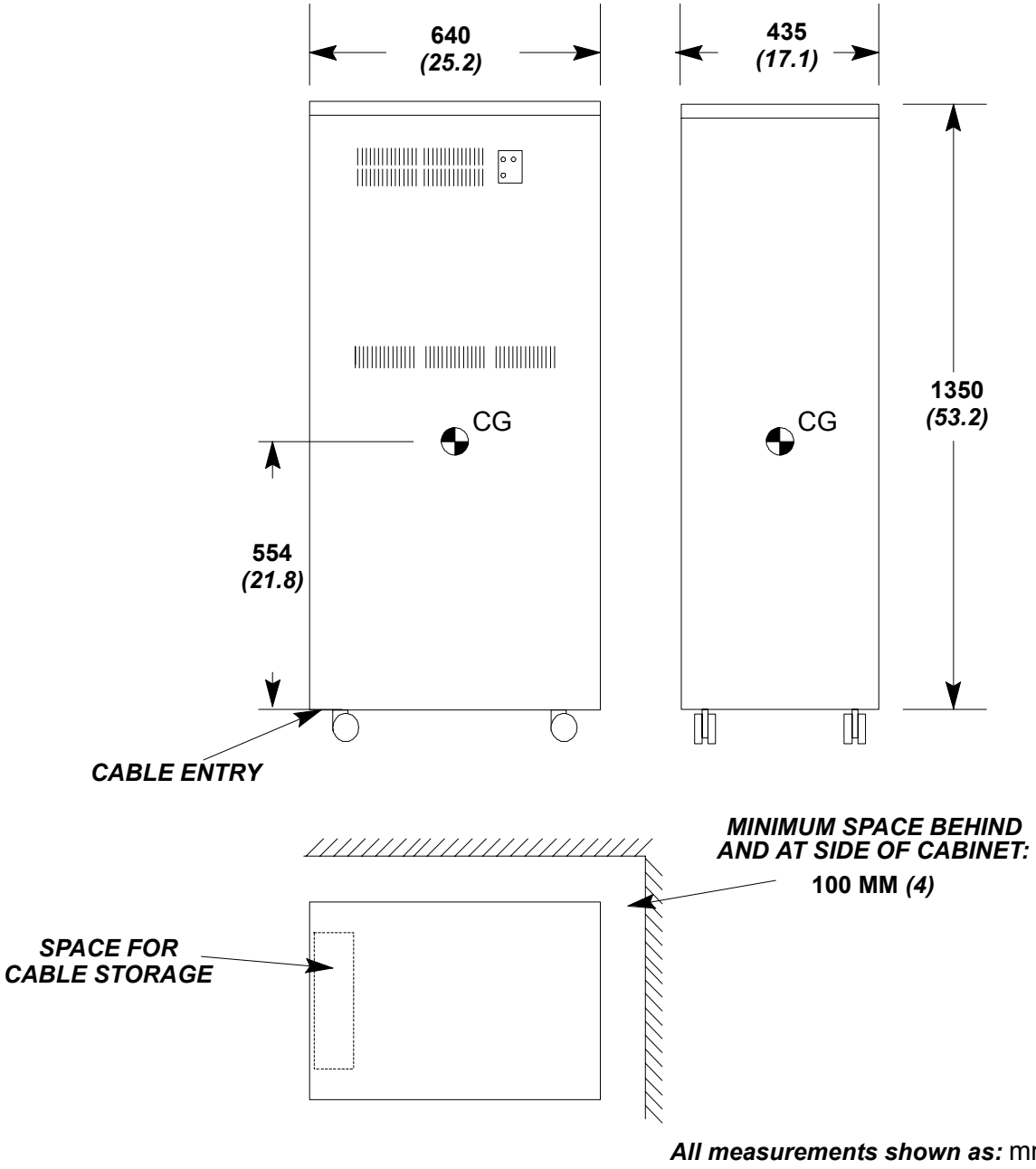
ILLUSTRATION 1 - GANTRY DIMENSIONS



All measurements shown as: mm *(inches)*

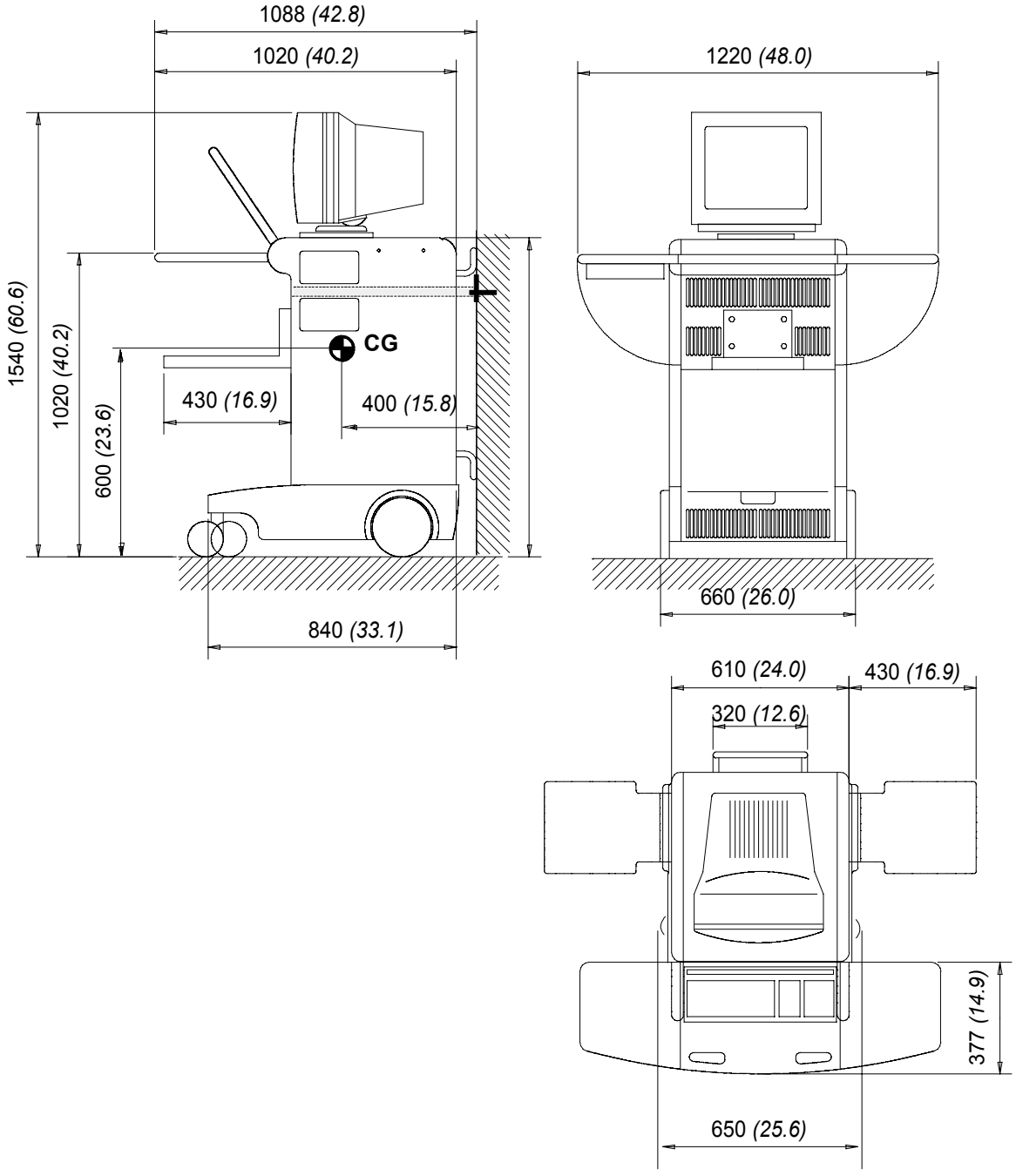
- *Anchor Points (reference 1 in diagram)*:
  GEMS provides three 10 mm bolts and three Hilti HDE M10 inserts, for use in concrete slab floors only. The HDE M10 inserts each require a hole 62 mm deep, 18 mm in diameter.

ILLUSTRATION 2 - GENERATOR CABINET DIMENSIONS



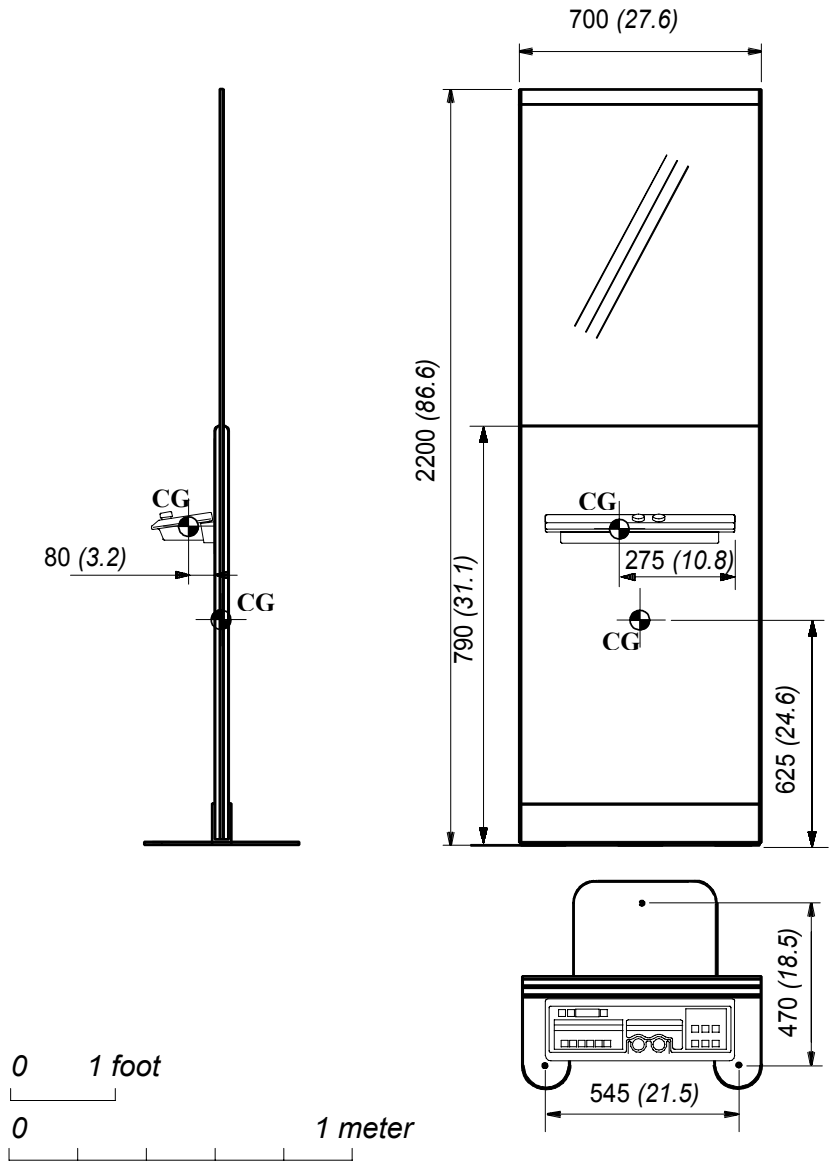
All measurements shown as: mm *(inches)*

ILLUSTRATION 3 - CART DIMENSIONS



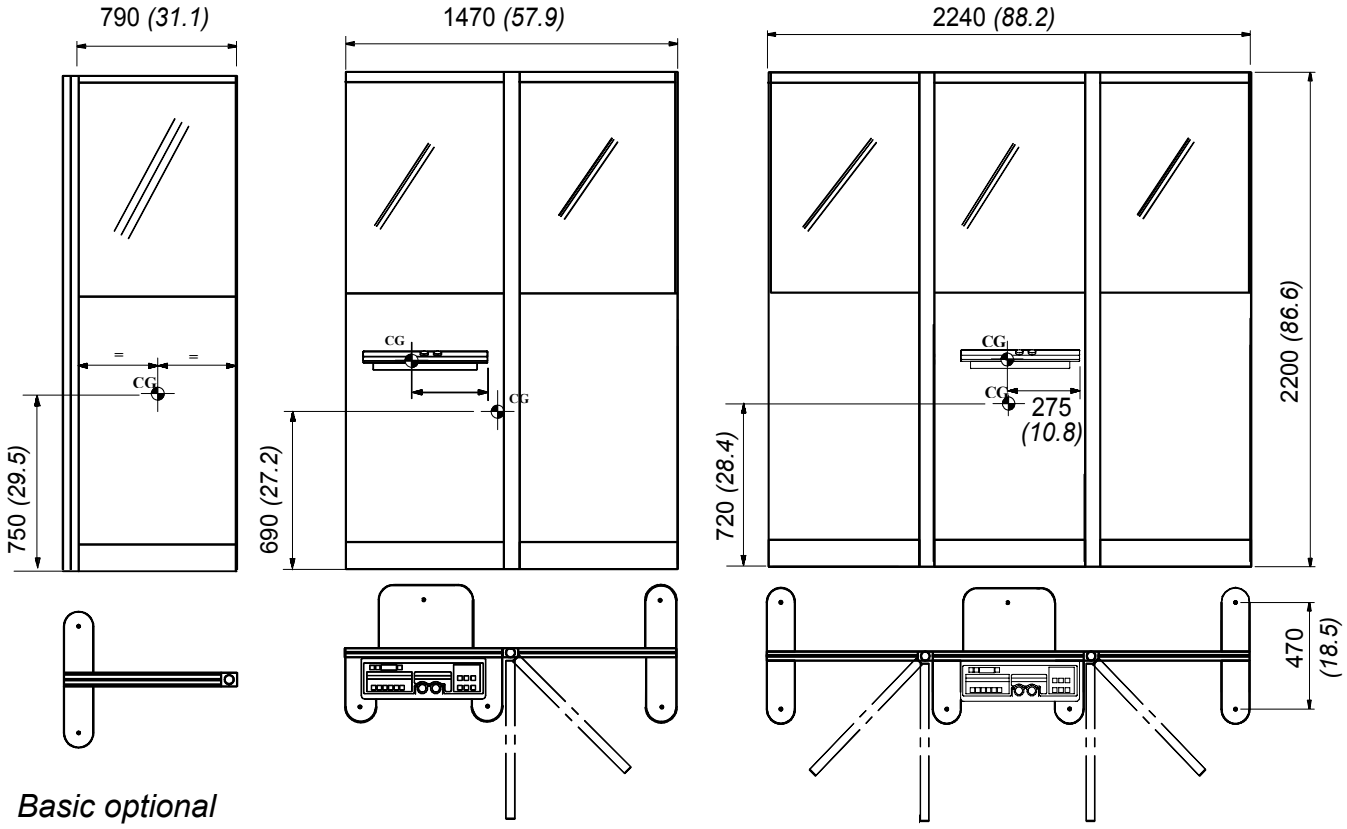
All measurements shown as: mm *(inches)*

ILLUSTRATION 4 - DIMENSIONS OF RAD SHIELD SCREEN WITH CONTROL CONSOLE



All measurements shown as: mm *(inches)*

ILLUSTRATION 5 - DIMENSIONS OF OPTIONAL SCREENS



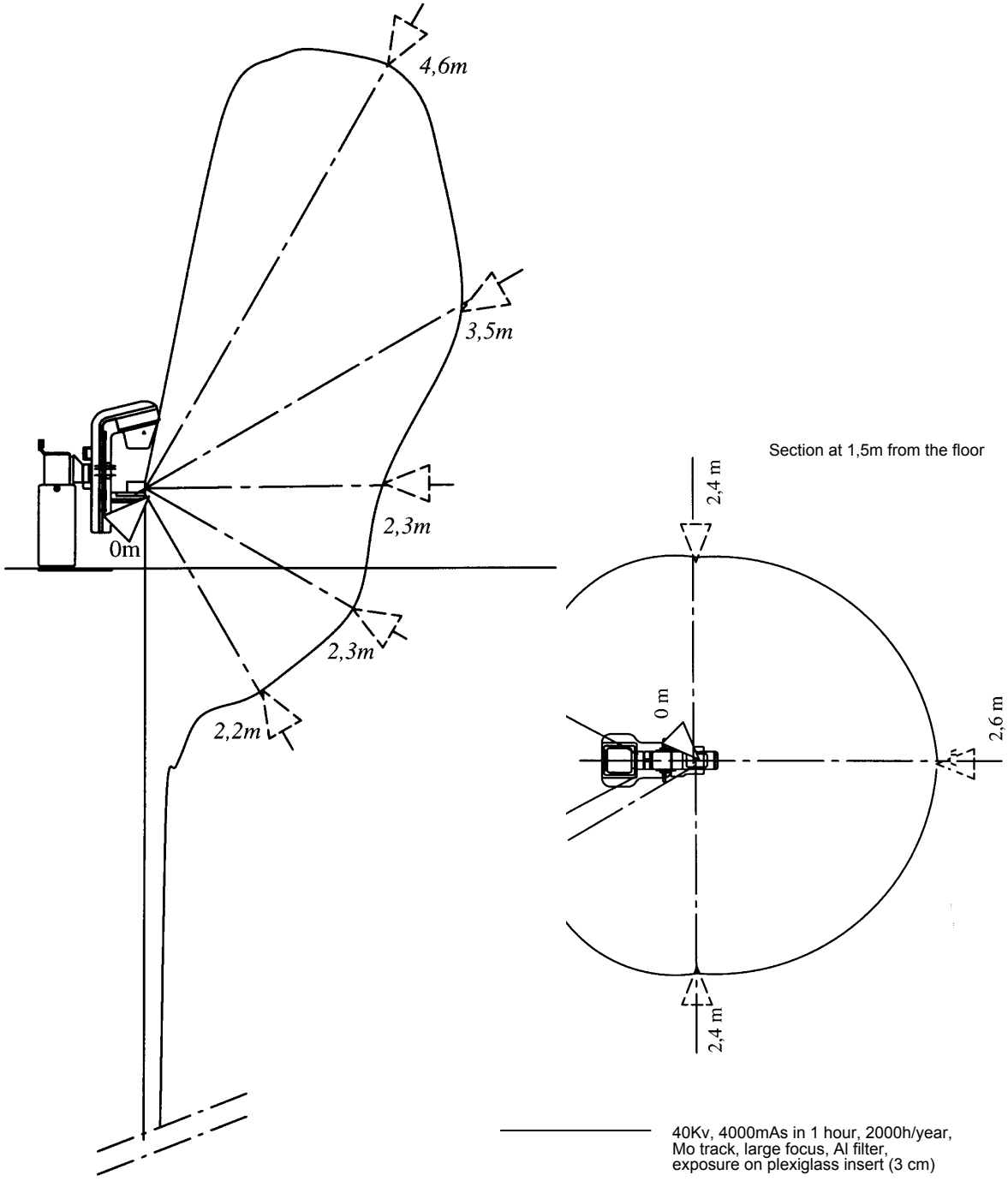
Basic optional screen

Rad Shield screen with optional left or right screen

Rad Shield screen with optional left and right screens

All measurements shown as: mm *(inches)*

ILLUSTRATION 6 - ISODOSE CURVE 50MSEV



4. ROOM LAYOUT

4-1. Radiation Protection

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

4-2. Service Access

Allow appropriate space for service access to equipment. Consult component pre–installation documents for clearance information.

4-3. Clinical Access

Make sure that the room is planned to meet the following clinical access requirements:

- Easy access to the patient table. Stretchers and other mobile hospital equipment must be able to reach the table quickly.
- Clinicians at the patient table must be able to communicate easily with operators and others in the control area.
- Operators in the control area must have easy access to the control console. However, the controls (including handswitches) must be positioned so that the operator cannot take exposures while looking around or standing outside the control booth's lead glass window.

4-4. Monitor To Detector Spacing

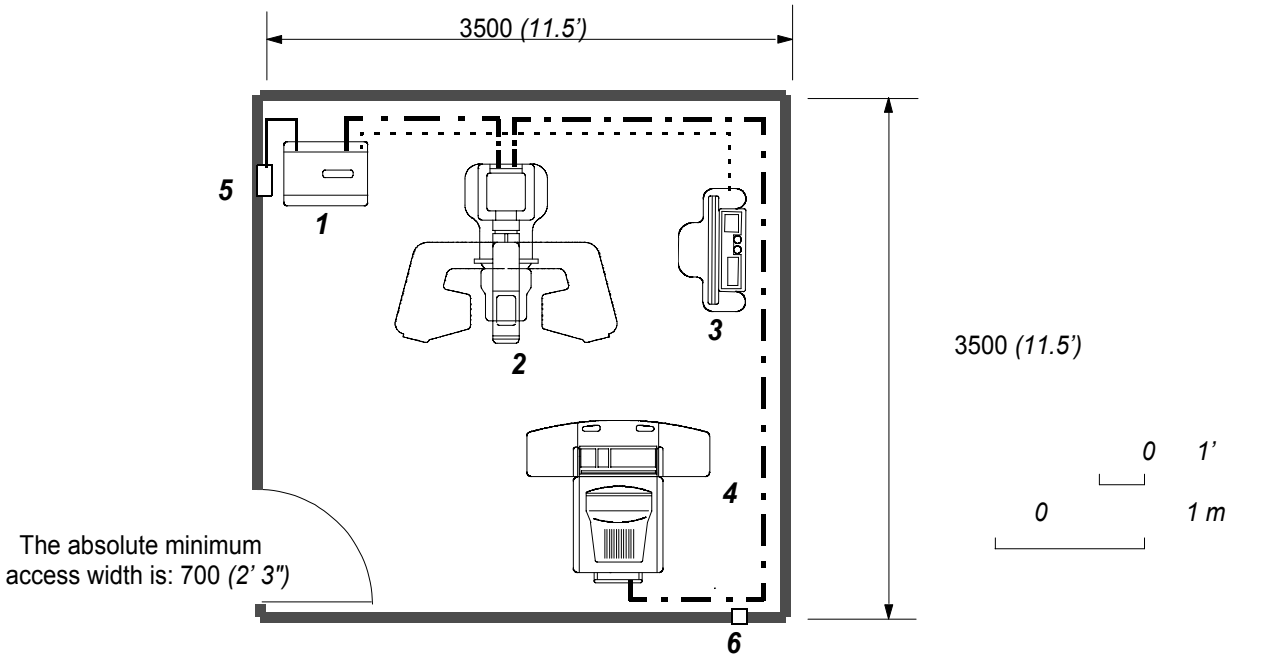
- The equipment must be arranged so that the distance between the Senographe Digital Detector (on the Gantry) and the Monitor (on the AWS Cart) is always greater than one meter (*40 inches*), to prevent electro-magnetic interference.

4-5. Peripheral Equipment

Consult hospital personnel regarding additional space requirements for hospital equipment such as:

- Storage cabinets.
- Sinks.
- Crash Cart.

4-6. Layout Suggestion



All measurements shown as: mm *(feet)*

1. Generator Cabinet.
2. Gantry (column).
3. Control Console with Rad Shield Screen.
4. AWS Cart.
5. Power Distribution box (supplied by customer).
6. Telephone outlet

.

Cable 14 mm diameter
Cable 8 mm diameter
Flexible conduit 40 mm diameter

4-7. Cables and Conduits

The diagram shows the main cable runs. After the room layout has been decided, suitable provision (plinths, under-floor conduits, etc.) should be made for passing cables and conduits. See the section "Interconnections" for approximate cable lengths.

4-8. Services

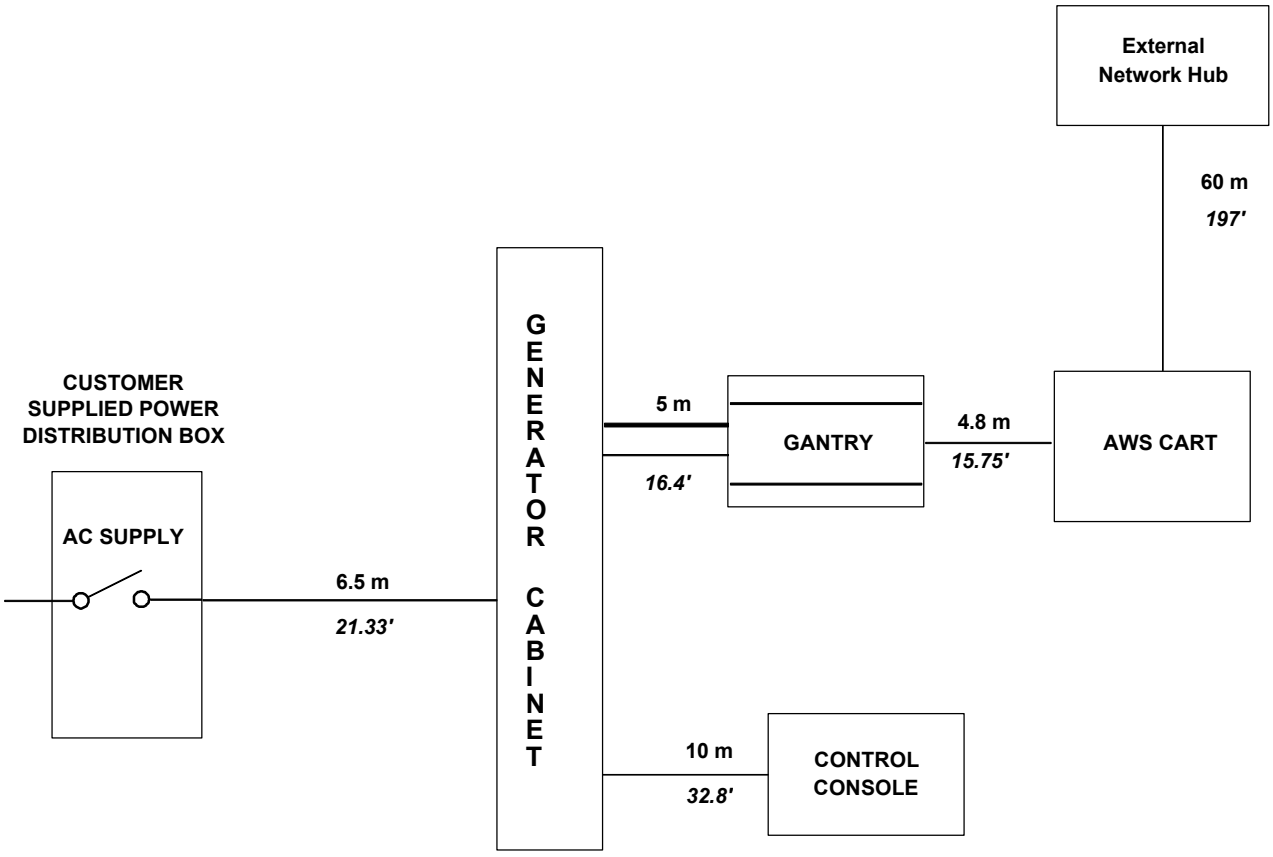
Provision must be made for services including:
A.C. power.
Direct telephone line.
Network connection.
X-ray ON cable
Room Door cable
ASM cables.

5. INTERCONNECTIONS

5-1. Interconnections

The diagram below is provided to help planning for the location of each subsystem. All cable lengths shown are duct or usable lengths.

ILLUSTRATION 1 - INTERCONNECTION SCHEMATIC



ALL CABLE LENGTHS INDICATED ARE USABLE LENGTHS

6. PRODUCT SHIPPING INFORMATION

TABLE 1 - AIR AND ROAD SHIPMENT.

Item	Dimensions in mm *(feet)*			Weight in kg *(lbs)*
	Height	**Width**	**Length**	
Pallet 1	2015 *(6.61)*	870 *(2.85)*	1944 *(6.38)*	690 *(1521)*
Pallet 1 includes the Gantry, the Generator Cabinet, and the Radiation Shield				
Pallet 2	1550 *(5.09)*	852 *(2.80)*	1915 *(6.28)*	400 *(882)*
Pallet 2 includes the AWS Cart, AWS Monitor (boxed), and Accessories (boxed)				

Pallets for international shipment are protected by cardboard covers. Pallets for road shipment do not have covers.

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 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 Supply Cable. For customers in China locally order an equivalent CCC-certified Supply Cable. For more information see *Line supply cable* on page 20.		GEMS sales representative	
Installation planning visit				
3	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				
4	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				
6	System delivery to designated storage.	Chapter 4 *Pre-Installation System Requirements*, section 3-1 *Physical Characteristics*	Delivery personnel and hospital	
Installation				
7	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 *Pre-Installation System Requirements*, section 1-1 *Environmental Requirements/Limitations*	Hospital engineer	
Operating conditions				
2	Check that operating temperature and humidity requirements can be met	Chapter 4 *Pre-Installation System Requirements*, section 1-1 *Environmental Requirements/Limitations*	Heating engineer	
Rom layout				
3	Check that an adequate room is available, with suitable floor and access	Chapter 4 *Pre-Installation System Requirements*	Site planner	
Electrical supply				
4	Check availability of suitable supply	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Hospital engineer	
Networking				
5	Check possibility of connection to hospital network	Chapter 4 *Pre-Installation System Requirements*, section 2-2 *Networking Connections*	Hospital engineer, GEMSE HMS representative	
Insite connection				
6	Check availability and type of broadband connection	Chapter 4 *Pre-Installation System Requirements*, section 2-1 *Insite Connection*	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 *Pre-Installation System Requirements*, section 3-1 *Physical Characteristics*	Hospital engineer	
Room layout				
2	Plan and specify layout with adequate spacing between the gantry and control station components.	Chapter 4 *Pre-Installation System Requirements*, section 4-6 *Layout Suggestion*	Site planner	
Operating conditions				
3	Check that operating temperature and humidity requirements will be met	Chapter 4 *Pre-Installation System Requirements*, section 1-1 *Environmental Requirements/ Limitations*	Heating engineer	
Radiation protection (wall, ceiling, floor, doors)				
4	Consult the Radiation Physicist for advice on radiation protection.	Chapter 4 *Pre-Installation System Requirements*, section 4-1 *Radiation Protection*	Radiation protection specialist	
Structural requirements				
5	Check access door width and height.	Chapter 4 *Pre-Installation System Requirements*, section 3-1 *Physical Characteristics*	Hospital engineer	
6	Check floor requirements (strength, flatness).	Chapter 4 *Pre-Installation System Requirements*, section 1-3 *Structural Requirements*	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 *Pre-Installation System Requirements*, section 4-6 *Layout Suggestion*	Hospital engineer + GEMS Site planner	
9	Specify installation of anchorage bolts. In seismic areas, anchors must be provided for the generator cabinet and ancillary equipment (additional radiation screen, etc).	Chapter 4 *Pre-Installation System Requirements*, section 1-3 *Structural Requirements*	Flooring specialist	
10	Plan cable runs; specify ducting, etc.	Chapter 4 *Pre-Installation System Requirements*, section 5-1 *Interconnections*	Site planner	

#	Action	Reference	Who?	Done?
Electrical requirements				
11	Check that room power supply requirements will be met.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
12	Check the line voltage specification.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
13	Check the line frequency specification.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
14	Check the kVA load characteristics.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
15	Check the line impedance.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
16	Check the main circuit breaker characteristics.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
Door protection switches				
17	Specify requirement for provision and connection of door X-ray protection switches.	Chapter 4 *Pre-Installation System Requirements*, section 1-4 *Electrical Requirements*	Electrician	
Insite connection				
18	Specify requirements for Insite broadband connection	Chapter 4 *Pre-Installation System Requirements*, section 2-1 *Insite Connection*	Hospital Network Administrator	
Networking				
19	Specify network connections and cable runs.	Chapter 4 *Pre-Installation System Requirements*, section 2-2 *Networking Connections*	Site planner	
20	Allocate IP, Gateway, and Subnet mask addresses.	Chapter 4 *Pre-Installation System Requirements*, section 2-2 *Networking Connections*	Hospital Network Administrator	
Lighting				
21	Specify requirements for dimmer switches, drapes, etc.	Chapter 4 *Pre-Installation System Requirements*, section 1-4-8 *Room lighting*	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 *Pre-Installation System Requirements*, section 3-1 *Physical Characteristics*	Hospital engineer	
Room preparation				
2	Check proposed layout and preparations for cable runs.	Chapter 4 *Pre-Installation System Requirements*, section 4-6 *Layout Suggestion*	Site planner	
3	Check floor and anchorage preparation.	Chapter 4 *Pre-Installation System Requirements*, section 1-3 *Structural Requirements*	Flooring specialist	
4	Check access requirements.	Chapter 4 *Pre-Installation System Requirements*, section 3-1 *Physical Characteristics*	Hospital engineer	
Radiation protection (wall, ceiling, floor, doors)				
5	Check preparation for radiation protection (wall, ceiling, doors);	Chapter 4 *Pre-Installation System Requirements*, section 4-1 *Radiation Protection*	Radiation protection specialist	
Insite connection				
6	Check preparations for Insite broadband connection	Chapter 4 *Pre-Installation System Requirements*, section 2-1 *Insite Connection*	Hospital Network Administrator	
Lighting				
7	Check room lighting conditions	Chapter 4 *Pre-Installation System Requirements*, section 1-4-8 *Room lighting*	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	Chapter 2 *Responsability of Purchaser*, section 3 *Damage In Transportation*	GEMS representative and hospital staff	
2	Store the Senographe system.	Chapter 4 *Pre-Installation System Requirements*, section 3-1 *Physical Characteristics*	Hospital staff	

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End of the Publication

Congratulations !! You have reached the end of this Publication.
To consult the Revision History, see *Revision History* on page 6.

End of the Publication

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