GE Healthcare

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Technical Publication

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GE Healthcare
Precision 500D® R&F System, Pre-Installation

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IMPORTANT PRECAUTIONS

LANGUAGE

WARNING

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**
- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

AVERTISSEMENT

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

WARNUNG

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

AVISO

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

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS 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 POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A‘ CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL’APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL’ADDETTO ALLA MANUTENZIONE, ALL’UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

警告

このサービスマニュアルには英語版しかありません。
ＧＥＭＳ以外で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下さい。
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注意:

本维修手册仅存有英文本。
非 GEMS 公司的维修员要求非英文本的维修手册时，
客户需自行负责翻译。
未详细阅读和完全了解本手册之前，不得进行维修。
忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent write “Damage In Shipment” on ALL copies of the freight or express bill BEFORE delivery is accepted or “signed for” by a GE representative or 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 or 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 And Procedures Bulletins.

14 July 1993

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.

IMPORTANT...X-RAY PROTECTION

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

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

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

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

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

OMISSIONS & ERRORS

Customers, please contact your GE Sales or Service representatives.

GE personnel, please use the GEMS CQA Process to report all omissions, errors, and defects in this publication.

Revision History

Revision	Date	Reason for change
0	May 13, 2002	Initial M3 Release
1	Sept. 3, 2002	Added: System cable information (PCN219829) Changed: System cabinet clearances
2	Nov. 1, 2002	M4 Release. Resolved: CQA10210637. Added: New System Cabinet (2336900)
3	Nov. 18, 2002	Resolved: FPR10210593, Added note to “Typical Room Layout” drawing. Additions: IUI Keyboard Garage Dimensions, Hospital network requirements, MIS numbers to Room P.S. drawing. SG60 dimensions and center of gravity values, Wall support bracket (2127289PSP_s1_rA). Changed: Sample room layout drawing.
4	Dec. 17, 2002	Changed: System cabinet door requirements updated.
5	May 19, 2003	Resolved: CQA1030030, Changed dimension line on table base plate. CQA1030170, Corrected dimensions on wall plates and added note. XRYge44259, System Cable Information Updated. Changed: Location of base plate measurements (682mm). Additions: 18" LCD Monitor.
6	July 1, 2003	Changed: Cable table updated and corrected to match M5 release.
7	Nov. 24, 2003	Changed: Corrected text associated with Monitor and VCR graphics. Deletions: MIS Cables 11673A and 11678A (PCNs 238216 & 238217) Additions: MIS Cable 11743A (PCNs 238216 & 238217), Specifications for IUI wall mount bracket.
8	May 12, 2004	Resolved: PSR13015226 - The word “NICHT” removed from the German translation of “Do not attempt...” in language statements Changes: Convention used to communicate hazards modified to comply with ISO 3864 and ANSI Z535 standards. New video switch added to system. Additions: C1601RT (VCR/Video Switch Cables), LCD Monitor Suspension, LCD Cart, Positioner and Table cables.
9	Nov. 11, 2004	Resolved: XRYge53865 - Customer and System supplied hardware clarified in Wiring Electrical Power and Disconnects section. References to obsolete service manual removed (2308535-100) and replaced with 2307489-100. Changes: Cable charts updated to reflect new cables added for Table, 2403791 & Positioner Cabinet, 2401181. Typical electrical connections drawing updated to better reflect customer and system supplied items. Additions: SG80 and SG120 Wallstand
10	Dec. 4, 2004	Resolved: PQR13023517- Updated cable lengths in System Cable Information chapter.
11	Feb. 18, 2005	Additions: Seismic Calculations Updated wire size tables in Chapter 4, Section 1.2 (PQR 13031075).
12	April 29, 2005	Changes: Updated wire size tables in Chapter 4, Section 1.2 (PQR 13031075).
13	July 28, 2005	Resolved: PQR 13043256 - System Power Statement added to specify that only WYE Power connections be used in Generator Power Specifications (Section 2.2.1.1 on Page 90) PQR13041895 - Run 10 “Net Usable” and “Used In” lengths corrected (Chapter 8 on page 107)

Revision	Date	Reason for change	
14	Aug. 30, 2005	Changes:	ECR/ECO2012594 - New drawings showing system with and without media converter shown, because it's no longer used in systems.
15	Mar. 20, 2006	Changes:	Revised cable tables to show only shortest usable length for each run. Updated information on SG-60, SG-80, SG-100, SG-120 wallstands (PQR 13058546).
16	Apr. 11, 2006	Resolved:	PQR13077759 - Precision 500D R&F Table Floor Preparation revised to include: supplied materials and need for primer. 10/05/2006, changed 'shunt' trip references to 'under voltage' trip references.
		Changes:	Changed 'shunt' trip references to 'under voltage' trip references.

List of Effected Pages

PAGES	REVISION	PAGES	REVISION
1 through 148	16		

Preface
Publication Conventions

Standardized conventions for representing information is a uniform way of communicating information to a reader in a consistent manner. Conventions are used so that the reader can easily recognize the actions or decisions that must be made. There are a number of character and paragraph styles used in this publication to accomplish this task. Please become familiar with them before proceeding forward.

It's important that you read and understand hazard statements, and not just ignore them.

Section 1.0
Safety & Hazard Information

Proper product safety labeling allows a person to safely use or service a product. The format and style for safety communications reflected in this publication represents the harmonization of IEC/ ISO 3864 and ANSI Z535 standards.

Within this publication, different paragraph and character styles are used to indicated potential hazards. Paragraph prefixes, such as hazard, caution, danger and warning, are used to identify important safety information. Text (Hazard) styles are applied to the paragraph contents that are applicable to each specific safety statement.

1.1 Hazard Messages

Any action that will, could or potentially cause personal injury will be preceded by the safety alert symbol and an appropriate signal word. The safety alert symbol is the triangle with an exclamation mark within it. It's always used next to the signal word to indicate the severity of the hazard. Together, they are used to indicate a hazard exists.

Signal words describe the severity of possible human injures that may be encountered. The alert symbol and signal word are placed immediately before any paragraph they affect. Safety information includes:

1.) Signal Word - The seriousness level of the hazard.

2.) Symbol or Pictorial - The consequence of interaction with the hazard.

3.) Word Message:

   a.) The nature of the hazard (i.e. the type of hazard)

   b.) How to avoid the hazard.

The safety alert symbol is not used when an action can only cause equipment damage.

1.2 Text Format of Signal Words

DANGER - INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY. THIS SIGNAL WORD IS LIMITED TO THE MOST EXTREME SITUATIONS.

WARNING - INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

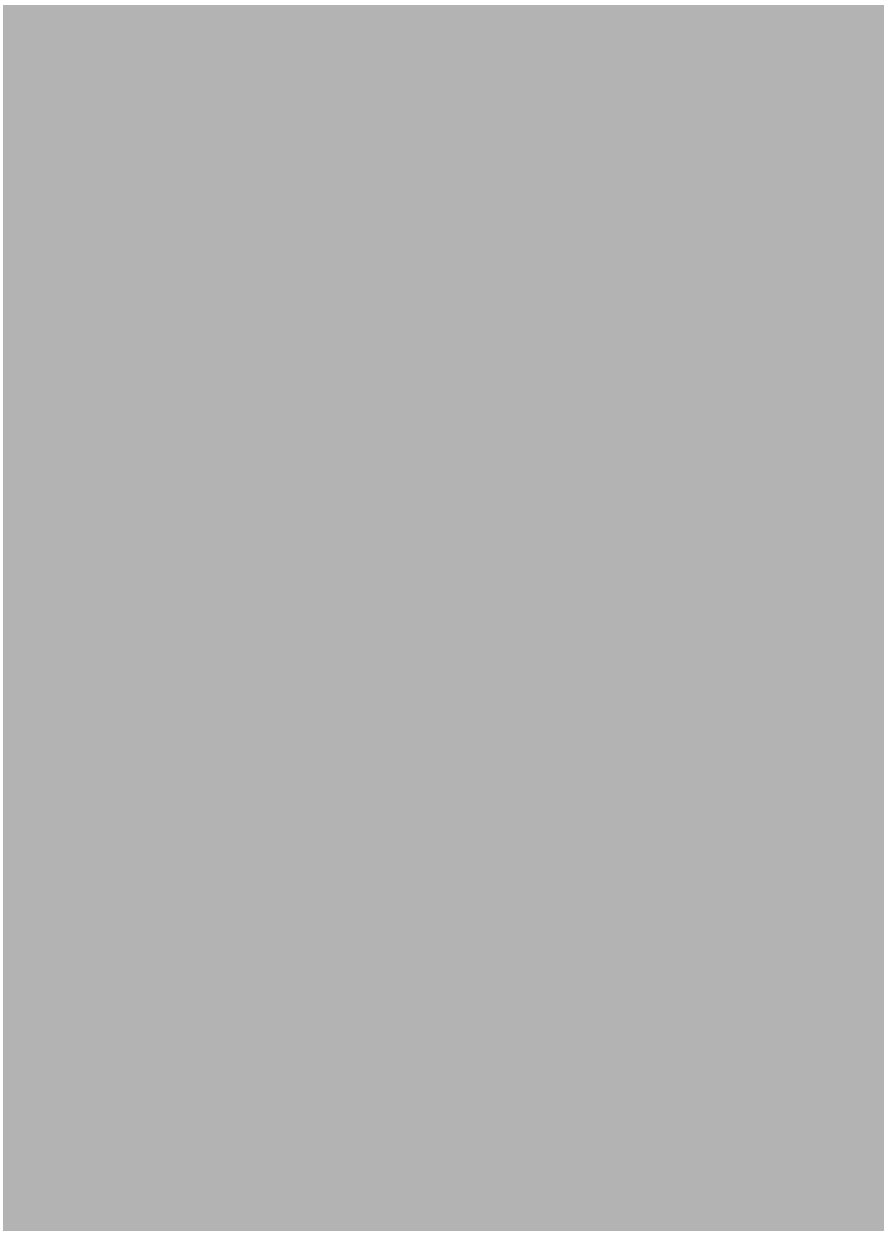
Caution - Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE - Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property. This signal word is associated directly with a hazard or hazardous situation and is used in place of 'DANGER,' 'WARNING,' or 'CAUTION.' It can include:

- **Destruction of a disk drive**
- **Potential for internal mechanical damage, such as to a X-ray tube**

1.3 Symbols and Pictorials Used

The following Symbols and Pictorials are be used in this publication. These graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm.



Section 2.0
Publication Conventions

2.1 General Paragraph and Character Styles

Prefixes are used to highlight important non-safety related information. Paragraph prefixes (such as Purpose, Example, Comment or Note) are used to identify important but non-safety related information. Text styles are also applied to text within each paragraph modified by the specific prefix.

EXAMPLES OF PREFIXES USED FOR GENERAL INFORMATION:

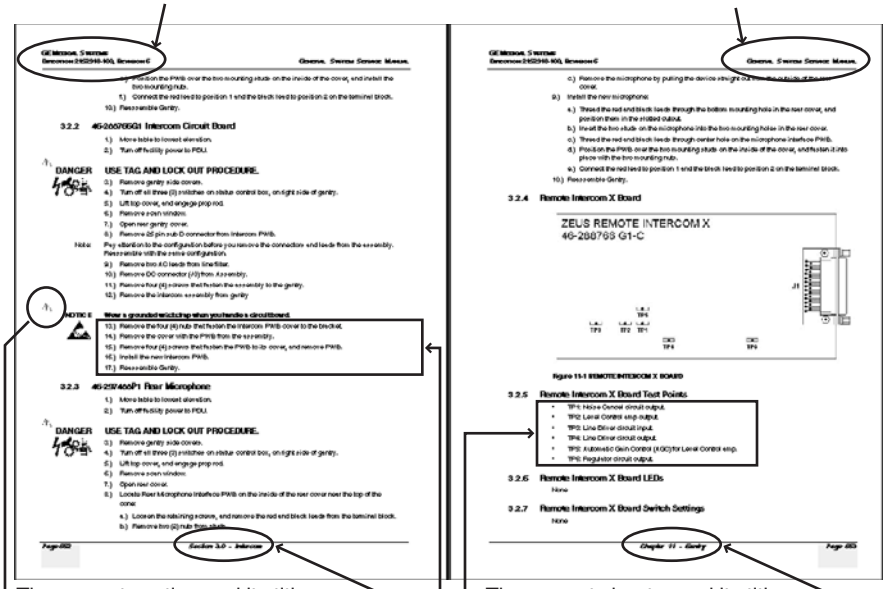
Purpose: Introduces and provides meaning as to the information contained within the chapter, section or subsection (such as used at the beginning this chapter, for example).

Note: Conveys information that should be considered important to the reader.

Example: Used to make the reader aware that the paragraph(s) that follow are examples of information possibly stated previously.

Comment: Represents "additional" information that may or may not be relevant to your situation.

2.2 Page Layout



Headers and footers in this publication are designed to allow you to quickly identify your location. The document part number and revision number appears in every header on every page. Odd numbered page footers indicate the current chapter, its title and current page number. Even page footers show the current section and its title, as well as the current page number.

2.3 Computer Screen Output/Input Text Character Styles

Within this publication, mono-spaced character styles (fonts) are used to indicate computer text that's either screen input and output. Mono-spaced fonts, such courier, are used to indicated text direction. When you type at your keyboard, you are generating computer input. Occasionally you will see the math operator "greater-than" and "less-than" symbols used to indicate the start and finish of variable output. When reading text generated by the computer, you are reading it as computer generated output. In addition to direction, characters are italicized (e.g. *italics*) to indicate information specific to your system or site.

Example: Fixed Output

`This paragraph's font represents computer generated screen "fixed" output. Its output is fixed from the sense that it does not vary from application to application. It's the most commonly used style used to indicate filenames, paths and text that do not change from system to system. The character style used is a fixed width such as courier.`

Example: Variable Output

This paragraph's font represents computer screen output that is "variable". It's used to represent output that varies from application to application or system to system. Variable output is sometimes found placed between greater-than and less-than operators for clarification. For example: <variable_ouput> or <3.45.120.3>. In both cases, the < and > operators are not part of the actual input.

Example: Fixed Input

This paragraph's font represents fixed input. It's computer input that is typed-in via the keyboard. Typed input that does not vary from application to application or system to system. Fixed text the user is required to supply as input. For example: cd /usr/3p

Example: Variable Input

This paragraph's font represents computer input that can vary from application to application or system to system. With variable text, the user is required to supply system dependent input or information. Variable input sometimes is placed between greater-than and less-than operators. For example: <variable_input>. In these cases, the (<>) operators would be dropped prior to input. For example: **ypcat hosts | grep *<3.45.120.3>* would be typed into the computer as:**

ypcat hosts | grep *3.45.120.3*

without the greater-than and less-than operators.

2.4 Buttons, Switches and Keyboard Inputs (Hard & Soft Keys)

Different character styles are used to indicate actions requiring the reader to press either a hard or soft button, switch or key. Physical hardware, such as buttons and switches, are called hard keys because they are hard wired or mechanical in nature. A keyboard or on/off switch would be a hard key. Software or computer generated buttons are called soft keys because they are software generated. Software driven menu buttons are an example of such keys. Soft and hard keys are represented differently in this publication.

Example: Hard Keys

A power switch **ON/OFF** or a keyboard key like **ENTER** is indicated by applying a character style that uses both over and under-lined bold text that is bold. This is a hard key.

Example: Soft Keys

Whereas the computer MENU button that you would click with your mouse or touch with your hand uses over and under-lined regular text. This is a soft key.

Table of Contents

Chapter 1
Introduction

Section 1.0
Objective and Scope of Pre-Installation Document

This document is intended as a guide and informational resource for planning and properly preparing a location for the installation of a Precision 500D R&F system. This document is intended to assist the customer and installer in properly preparing a site for product installation.

Section 2.0
Avoiding Unnecessary Expenses and Delays

To avoid unnecessary expenses and delays, use the “Pre-Installation” checklist located in “Chapter 7 to determine if you are ready for the installation to begin. Once you believe that your room/location is ready for installation to begin, complete the “Pre-Installation” checklist. The checklist is an important tool that helps verify that nothing has been missed. The checklists summarizes the preparations and allows you to record a permanent record of the activities that have taken place.

Section 3.0
An Overview of the Pre-Installation Process

Pre-installation is a co-operative effort between the customer/purchaser and GE Medical System (GEMS). Figure 1-1 outlines the information in this document and its place in the pre-installation process.

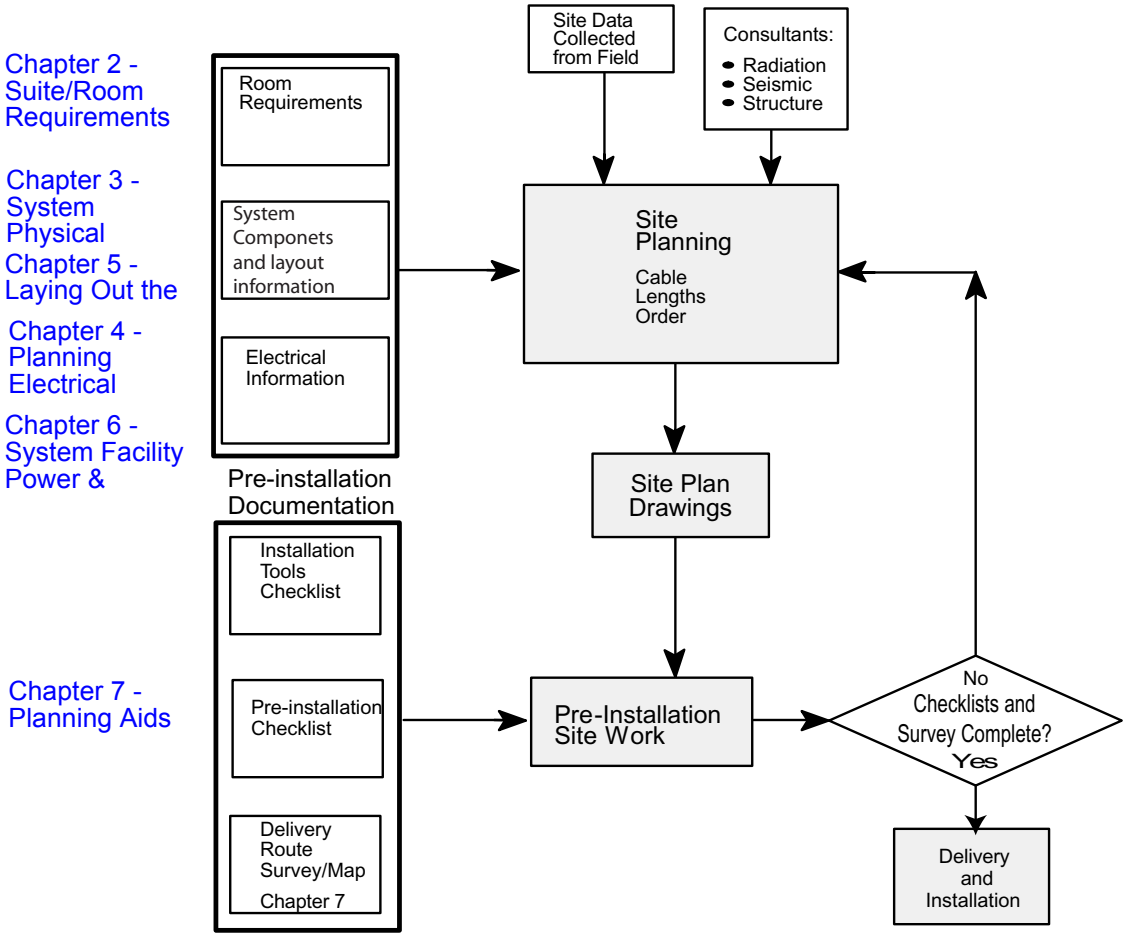


Figure 1-1 Pre-Installation Process

Section 4.0
Responsibilities of the Purchaser

The purchaser is responsible for completion of “Pre-Installation”. This includes the procurement and installation of all required materials and services to get the room ready for installation of the product. This responsibility includes providing:

- A clean and safe work environment for installation of the product (finished floor, ceiling, walls, and proper room lighting).
- A location suitable for the installation of the product. See Chapter 2 - Suite/Room Requirements.
  - Suitable support structures in the floor, walls, or ceiling necessary for the mounting of the product and/or its components. Installation of conduit, ducts and/or raceways necessary to route cables safely. See Chapter 3 - System Physical Characteristics and Chapter 4 - Planning Electrical Connections
  - Electrical power and grounds of specified quality and reliability. See Chapter 6 - System Facility Power & Grounds.
    * Electrical power of the required voltage, including an emergency-off safety switch in the room. Power and ground cables to the PDU.
    * Properly installed and sized junction boxes, including covers and fittings at locations required and called out in architectural drawings.

- A location suitable for operation of the product. See Chapter 5 - Laying Out the Room.

Section 5.0
What You Will Receive (System Components)

The Precision 500D R&F System is divided into sub-systems: (See Table 1-1, Figure 1-2 and Figure 1-3).

- Digital Imaging and JEDI X-ray Control sub-system (1 System Cabinet, and 1 Control Console).
- The IUI is the operator interface to the computer controls of the X-ray system. It is designed to be user-friendly. Its compact size and choice of different mount offerings also add to its ease of use by the customer. Because it *is* the computer interface for the system and the customer always uses it during X-ray procedures, it is one of the most critical pieces of equipment in the X-ray system.
- Precision 500D R&F Table and Intelligent Digital Device and R&F Positioner Cabinet.
- Imaging Review Station.

The Precision 500D R&F System can be configured with the following purchased as options:

- Single or Dual TV Monitors and suspension.
- Overhead Tube Support (OTS) Radiographic Suspension.
- SG60 or SG100 Vertical Wall Stand (Original)
- SG80 or SG120 Vertical Wall Stand (New style)

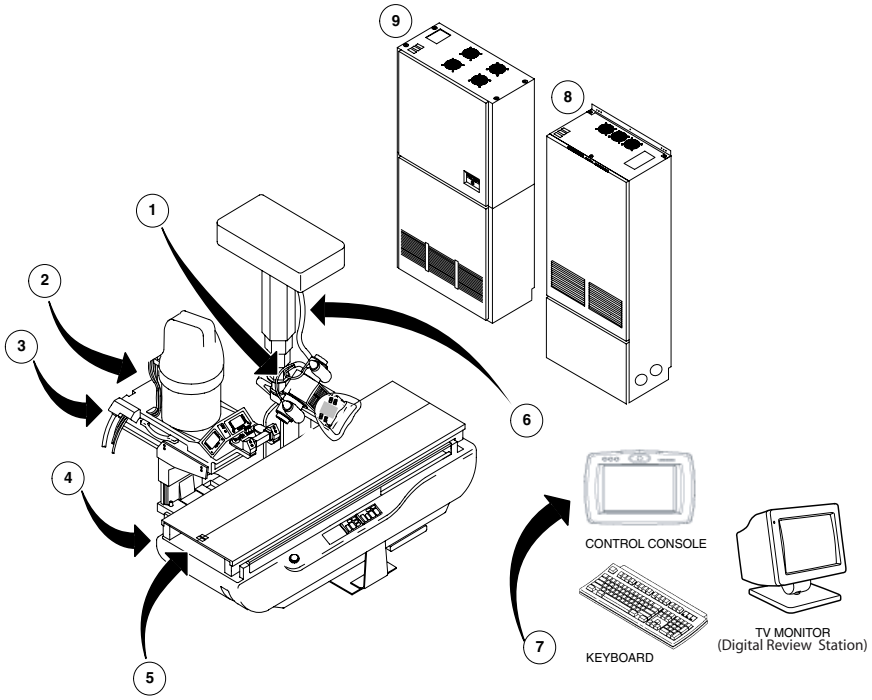


Figure 1-2 Precision 500D R&F System Identification

Item	Component	Model Number
1	MX 100-09 X-ray Tube Casing	46-155400G46
	Maxiray 100 X-ray Tube Insert; Focal Spots 0.6 - 1.25; 12.5°	46-155318G33
2	Image Intensifier (32 cm/40 cm)	2289148/2289147
3	Intelligent Digital Device	2305473
4	Precision 500D R&F Table	2305472
4a	R&F Table Collimator (Undertable)	2292592
4b	R&F Table Fluoro MX-100 X-ray Tube Casing	46-155500G18
	Maxiray 100FL; Focal Spots 0.6 - 1.0; 12.5° (FLUORO)	46-155500G228
4c	R&F Table Reciprocating Bucky	2189553
	Ion Chamber	2307342
	R&F Table Cassette Size Sensing Tray	2305545
5	R&F Table Top	46-180600G4
6	OTS - Overhead Tube Suspension (Manual)	2327101
7	Operator Console IUI	2304971
8	R&F Positioner Cabinet	2288798
9	System Cabinet	2336900
9a	JEDI Generator, 65, 80 kW	2290800
9b	Digital Imaging System	2290479
	SG-100 Vertical Bucky Stand - (Medys Version)	S19101RM or LM
	SG-80/SG-120 Wallstand - (Suinsa)	S0009144/S0009143

Table 1-1 Precision 500D R&F System Identification

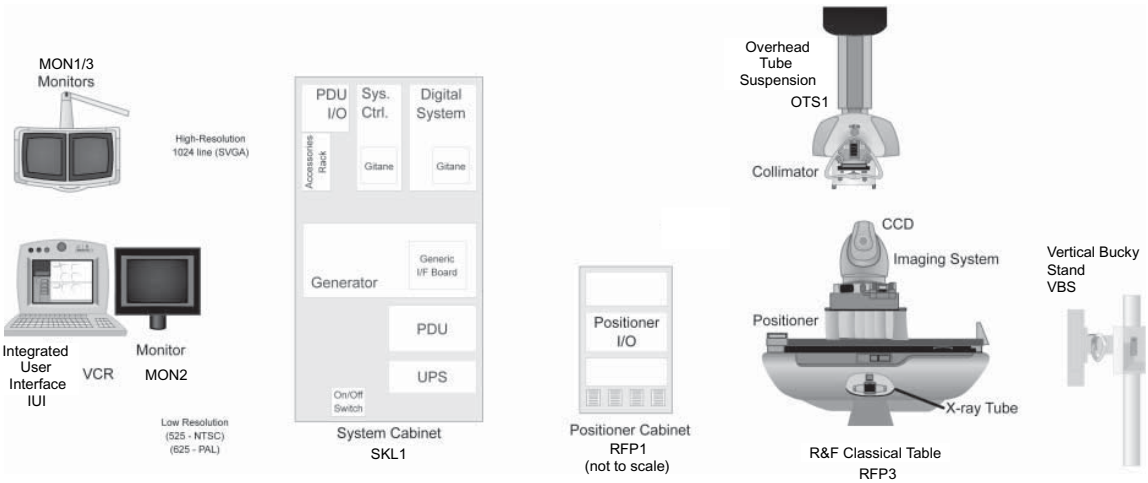


Figure 1-3 Precision 500D R&F System Components and Designators

Chapter 2
Suite/Room Requirements

Section 1.0
Environmental

1.1 Relative Humidity and Temperature

Product or Component	RELATIVE HUMIDITY (Non-Condensing)				TEMPERATURE			
	IN-USE		STORAGE		IN-USE		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Precision 500D Table RFP3	20%	80%	20%	80%	50° F (+10° C)	100° F (+38° C)	-40° F (-40° C)	140° F (+60° C)
Intelligent Digital Device - RFP2	20%	80%	20%	95%	50° F (+10° C)	104° F (+40° C)	-40° F (-40° C)	160° F (+70° C)
Positioner Cabinet RFP1	20%	80%	-	-	50° F (+10° C)	100° F (+38° C)	-40° F (-40° C)	158° F (+70° C)
System Cabinet SKL1	20%	80%	5%	95%	50° F (+10° C)	104° F (+40° C)	-40° F (-40° C)	158° F (+70° C)
Maxiray 100FL X-ray Tube (FLUORO)	-	-	-	-	0	104° F (+40° C)	-20° F (-29° C)	104° F (+40° C)
Maxiray 100-09 X-ray Tube (RAD)	-	-	-	-	0	104° F (+40° C)	-20° F (-29° C)	104° F (+40° C)
Image Intensifier	20%	80%	20%	95%	50° F (+10° C)	100° F (+38° C)	-40° F (-40° C)	160° F (+70° C)
Operator IUI	20%	80%	5%	95%	41° F (+5° C)	104° F (+40° C)	-40° F (-40° C)	160° F (+70° C)
OTS	20%	80%	5%	95%	59° F (+15° C)	95° F (+35° C)	-40° F (-40° C)	160° F (+70° C)
SG-100 Wall Stand	0%	80%	0%	80%	41° F (+5° C)	104° (+40° C)	41° F (+5° C)	104° (+40° C)
SG80/120 Wallstand	20%	85%	10%	95%	50° F (+10° C)	104° F (+40° C)	-40° F (-20° C)	158° F (+70° C)

Table 2-1 Environmental Requirements (Relative Humidity & Temperature)

1.2 Altitude and Atmospheric Pressure

Product or Component	ALTITUDE				ATMOSPHERIC PRESSURE			
	IN-USE		STORAGE		IN-USE		STORAGE	
	MIN.	MAX	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Precision 500D Table RFP3	-100 ft. (-31 m)	8000 ft. (2438 m)	-	-	-	-	-	-
Intelligent Digital Device - RFP2	-100 ft. (-31 m)	8000 ft. (2438 m)	-100 ft. (-31 m)	40,000 ft. (12,192 m)	-	-	3.5 psi (24 kPa)	15.4 psi (106 kPa)
Positioner Cabinet RFP1	-100 ft. (-31 m)	8000 ft. (2438 m)	328 ft. (-100m)	49,210 ft. (15,000 m)	10.15 psi (70 kPa)	15.4 psi (106 kPa)	1.74 psi (12 kPa)	15.4 psi (106 kPa)
System Cabinet SKL1	0 ft. (0 m)	8,005 ft. (2440 m)	0 ft. (0 m)	10,000 ft. (3048 m)	10 psi (69 kPa)	15.4 psi (106 kPa)	7 psi (48 kPa)	15.4 psi (106 kPa)
Maxiray 100FL X-ray Tube (FLUORO)	-	20,000 ft. (6096 m)	-	20,000 ft. (6096 m)	-	-	-	-
Maxiray 100-18 X-ray Tube (RAD)	-	20,000 ft. (6096 m)	-	20,000 ft. (6096 m)	-	-	-	-
Image Intensifier	-100 ft. (-31 m)	6000 ft. (1829 m)	-100 ft. (-31 m)	8000 ft. (2438 m)	10 psi (69 kPa)	15.4 psi (106 kPa)	7 psi (48 kPa)	15.4 psi (106 kPa)
Operator IUI	0 ft. (0 m)	15,092 ft. (4600 m)	0 ft. (0 m)	49,869 ft. (15,200 m)	-	-	-	-
OTS	-	-	-	-	-	-	-	-
SG-100 Wall Stand	-	-	-	-	-	-	-	-
SG80/120 Wallstand	-	9842 ft. (3000 m)	-	-	10.2 psi (70 kPa)	18.9 psi (130 kPa)	-	-

Table 2-2 Environmental Requirements - (Altitude & Atmospheric Pressure)

1.3 System Heat Output (Dissipation)

The continuous and peak power consumption of this system is as follows:

- 4.3 kW Continuous Power
- 9kW Peak Power (Duration is 22 seconds maximum)

PRODUCT OR COMPONENT	HEAT OUTPUT (Watts & BTU/hr.)	
	STANDBY	IN-USE
Precision 500D Table RFP3	< 50 W < 171 BTU/h	300 W 1024 BTU/h
Intelligent Digital Device - RFP2	75 W 256 BTU/h	300 W 1024 BTU/h
Positioner Cabinet RFP1	1,000 W 3,412 BTU/h	2,500 W 8,530 BTU/h
System Cabinet - SKL1	720 W 2457 BTU/h	960 W 3276 BTU/h
Image Intensifier	negligible	negligible
Operator IUI	53 W 181 BTU/h	56 W 191 BTU/h

Table 2-3 Heat Outputs by Component

1.4 Magnetic/Electrical Field Sensitivity and Electromagnetic Emissions

All the products or components of the Precision 500D R&F system meet EMI and EMC requirements 46-319024 and IEC 601-1-2 (International).

Because X-ray equipment produces radiation, special precautions may need to be taken or special site modifications may be required. GE Medical Systems does not make recommendations regarding radiation protection. It is the purchasers responsibility to consult a radiation physicist for advice on radiation protection in X-ray rooms.

Section 2.0 Structural

2.1 Room Size

LENGTH		WIDTH		CEILING HEIGHT	
Recommended	Minimum	Recommended	Minimum	Recommended	Minimum
18 ft. 6 in. (5.64 m)	16 ft. 6 in. (5.03 m)	15 ft. 0 in. (4.57 m)	12 ft. 6 in. (3.81 m)	9 ft. 6 in. (2.90 m)	9 ft. 0 in. (2.74 m)

Table 2-4 Recommended and Minimum Room Size Dimensions

Reference - See Chapter 5 Laying Out the Room, for additional details.

2.2 Door Size Requirements *(needed to deliver equipment)*

Note: Door widths are based on a “straight-in” approach requiring an 8 ft. (2.44 m) wide corridor. Calculations need to be made for accommodation of equipment through narrower corridors.

Minimum door sizes also apply to hallways and elevators. See Chapter 7 Planning Aids, for additional details.

Product or Component	MINIMUM DOOR SIZE REQUIREMENTS (using provided shipping dollies, pallets, or air freight containers)			
	HEIGHT		WIDTH	
	Inches	Centimeters	Inches	Centimeters
Precision 500D Table (On dolly)	55	140	44 (opening = 42.5)	111.8 (opening = 107.9)
Positioner Cabinet (On dolly)	81	206	29	74
Systems Cabinet (On dolly)	78	198	34	86
SG80/120 Wallstand	78.75	200	39	100

Table 2-5 Minimum Door Size Requirements (Largest Components)

2.2.1 Small Doors

If required, the table can be modified for smaller door sizes. The width of the table on the shipping dolly can be reduced as follows:

- Normal table body on dolly width:42.2 inches (107 cm)
- With SID pot removed:40.9 inches (104 cm)
- With four way table top back:40.7 inches (103 cm)
- With tower forward: 39.5 inches (100 cm)

2.2.2 Doors less than 39.5 inches (100 cm / 1m) Wide

Any opening less than 39.5 inches (100 cm) will require other means of table entry to the room (removing door frame, knocking out a partition wall, etc.).

NOTICE

Never Rotate Table

Under no circumstances should the table body be rotated. For example, to present a narrower dimension when moving it into place. Rotation can result in broken welds and/or distortion to the table frame.

2.3 Floor, Ceiling, and Walls

2.3.1 Seismic Requirements

See Chapter 9 - Seismic Calculations (123) for seismic calculations and seismic anchoring (slab on-grade and upper floor) methods.

2.3.2 Floor Requirements when using provided Table Floor Anchors

The maximum pullout force per provided anchor was calculated assuming:

- A regular weight concrete having a minimum, 28 day, compression strength (f'c) of 2500 psi (17.24 MPa) at the time of installation,
- Anchors installed to the required hole depth of 4 in. (102 mm), and
- Center of anchor hole to concrete edge distance 4.5 in. (114 mm).

Make sure to obtain data on compression strength of the concrete before using floor anchors.

2.3.3 Ceiling

Aluminum rails support the OTS Radiographic Suspension and In-Room TV Monitor bridge used in Precision 500D R&F system X-ray rooms.

Reference - For details on ceiling requirements for stationary rails, refer to Chapter 3 System Physical Characteristics.

2.3.4 Walls

2.3.4.1 System Cabinet

The System cabinet must be securely fastened to the wall to prevent tipping. Each cabinet is supplied with wall mounting brackets that may be used as drilling templates at the time of installation.

2.3.4.2 Intelligent User Interface (IUI) Keyboard Garage

The IUI keyboard garage can be mounted to a wall using the supplied wall mount bracket and fasteners. The garage contains the keyboard and attaches to the wall mount bracket. When the wall mount bracket is installed, the wall must be capable of supporting in excess of 80 lb. (32.9 kilograms). The dimensions of the IUI wall mount bracket are shown in Figure 2-1.

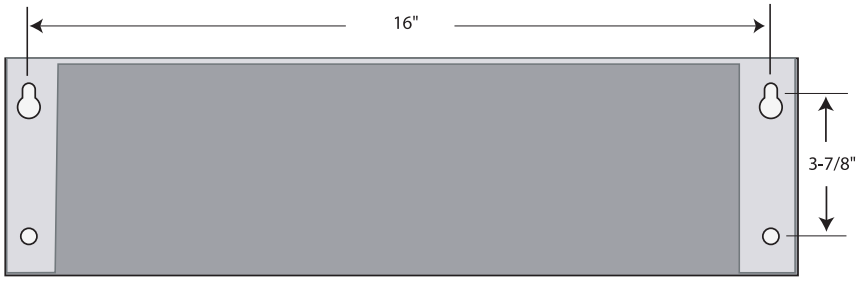


Figure 2-1 IUI Wall Mount Bracket

If the customer requests wall mounting of the IUI, the wall must be prepared and reinforced, if necessary, where the wall mount bracket is to be permanently installed. The keyboard, located in the garage, is typically located 38" (approximately 1 meter) from the floor or at a height convenient to the user. Therefore, the wall must be prepared for installation of the wall mount bracket where the keyboard can be easily operated.

2.3.4.3 Wall Stand

California Installations

For installations located in California U.S.A., the anchor bolts must support 55 lb. (245 N) Tension and 86 lb. (383 N) Shear.

SG60 / SG-100 Wall Mounting Kit

The SG-100 Vertical Bucky Stand is designed to be wall mounted. Under normal conditions, the wall at the installation site must be capable of supporting, minimally, a 50 lb. (222 N) pull from the wall at each anchor bolt.

A Wall Mounting Kit is supplied with both the SG-60 and SG-100 options. It is intended for hospital sites that are constructed with non-load bearing drywall construction.

Refer to Table 2-6 for a listing of parts contained in the Wall Mounting Kit. See Figure 2-2 for a view of the items in the Wall Mounting Kit after installation.

CATALOG	KIT NUMBER	PART NUMBER	QTY	DESCRIPTION
B3500J or S19011AV	2161320	2161319	3	102 cm (40 in.) length of P1000 Unistrut
		46-316373P3	6	1/4-20 Unistrut spring loaded mounting nut
		46-208561P25	6	1/4-20 x 1 1/4 in. long Hex Head Bolt - Grade 5
		46-220181P7	15	1/4 in. Lock washer (OD: 0.75 in.)
		12-1407	15	ID 0.328 OD 0.750 THK 0.125
		2162142-100	1	Installation Guide
		2162390	9	1/4-20 x 1 1/2 in. long Lag Screw - Grade 2 *(used for wood stud supported walls)*
		2162393	9	1/4-20 x 1 1/2 in. long, slotted head, Toggle Bolt (*used for metal stud supported walls)*
		2161313	3	Trim cover for P1000 Unistrut piece

Table 2-6 SG-60 / SG-100 Vertical Bucky Stand Wall Mount Kit

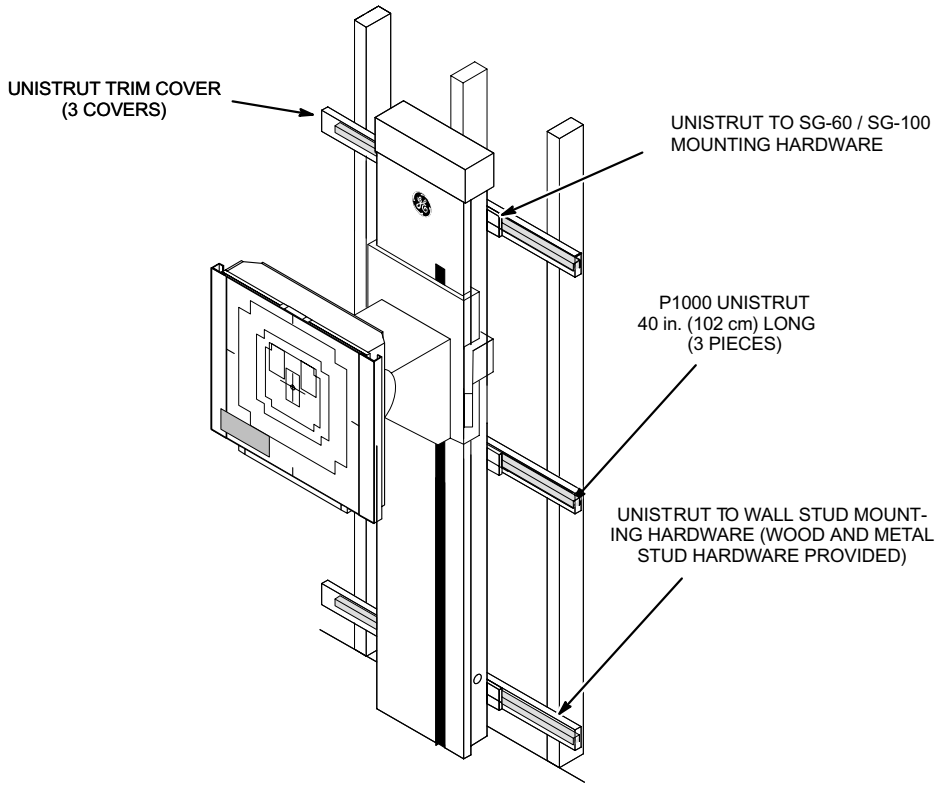


Figure 2-2 SG-60 / SG-100 Vertical Bucky Stand Wall Mount Kit

SG 80 & 120

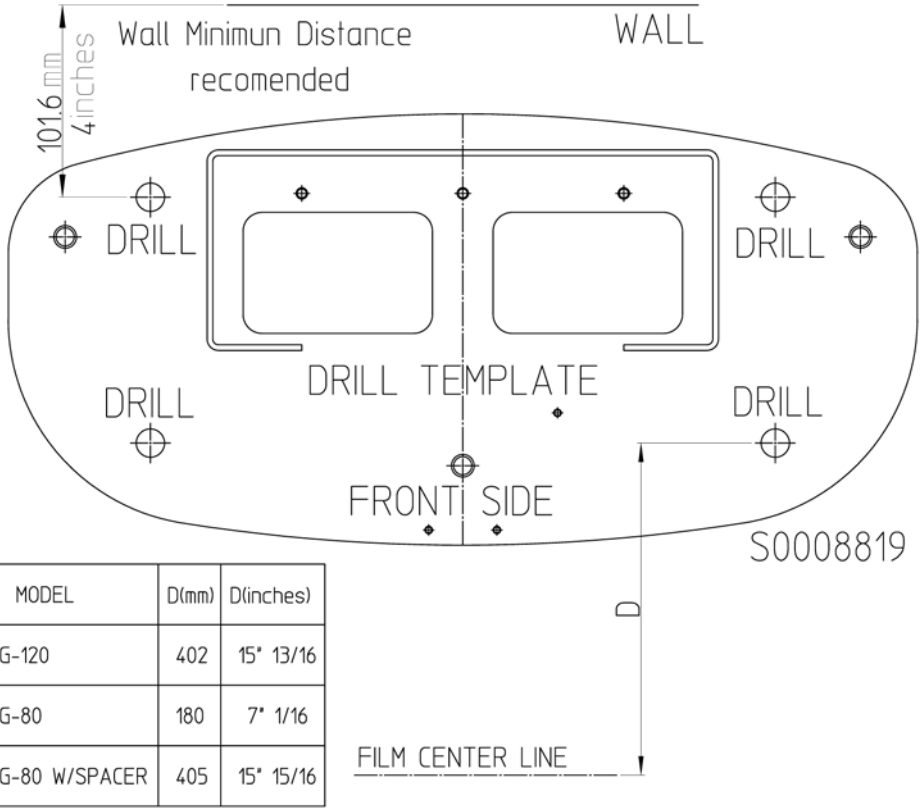
The SG-80/SG-120 vertical bucky stand is placed on the floor, which must accept the weight and the area defined by the equipment (see Figure 2-3, Figure 3-22, Figure 3-23, Figure 3-24).

The maximum weight of the complete bucky stand is 220 kg.

The ground surface under the bucky stand must be flat and horizontal (+ 0.5 cm/m).

The floor area where the vertical stand is to be installed should have been prepared before the installation. Floor preparation requires drilling anchor holes and possible routing of the cables.

An installation kit and a drill template are supplied with both SG-80 and SG-120. See a reduced copy of the drill template attached at the end of this publication.



MODEL	D(mm)	D(inches)
SG-120	402	15" 13/16
SG-80	180	7" 1/16
SG-80 W/SPACER	405	15" 15/16

Figure 2-3 SG-80/SG-120 Wallstand Base Plate Template

Chapter 3
System Physical Characteristics

Section 1.0
Component Dimensions

Refer to this section for dimensional drawings for the components of the Precision 500D R&F system. These components include:

- Operator Console (IUI) - Figure 3-2, Figure 3-3 and Figure 3-5
- R&F Positioner Cabinet (RFP1) - Figure 3-14
- System Cabinet (SKL1) - Figure 3-15
- Precision 500D Table (RFP3) - Figure 3-16, Figure 3-17, Figure 3-25 and Figure 3-26
- Overhead Suspension (OTS1) - Illustrations Figure 3-18, Figure 3-41, Figure 3-29, Figure 3-30, Figure 3-42,Figure 3-44, Figure 3-27 and Figure 3-28
- SG-60 and SG-100 Vertical Bucky Stands (VBS) - Figure 3-19, Figure 3-20 and Figure 3-21
- SG-80 and SG-120 Vertical Bucky Stands (VBS) - Figure 3-22, Figure 3-23 and Figure 3-24

Note: Drawings are not to scale. Dimensions are called out on each drawing.

Section 2.0
Base System Dimensions and Weights

Base refers to a Precision 500 without options.

2.1 Overview

2.1.1 Dimensions

PRODUCT OR COMPONENT	DIMENSIONS			Comments
	Width	Depth	Height	
Operator Console (IUI) and Keyboard Garage	559 mm (22.0 in)	330 mm (13.0 in)	589 mm (23.2 in)	See Figure 3-2
IUI Accessory Assembly	554 mm (21.8 in)	244 mm (9.6 in)	49 mm (1.9 in)	See Figure 3-4
Monitors: 17"	394 mm (15.5 in)	450 mm (17.7 in)	424 mm (16.7 in)	See Figure 3-5
21"	480 mm (18.9 in)	520 mm (20.5 in)	508 mm (20.0 in)	See Figure 3-6
18" LCD	410 mm (16.1 in)	91 mm (3.6 in)	338 mm (13.3 in)	
CRT Monitor Suspension	1270 mm (50 in)	1893 mm (74.5 in)	1270 mm (50 in)	Approximate range of motion

Table 3-1 Product Physical Characteristics (width / depth / height)

PRODUCT OR COMPONENT	DIMENSIONS			Comments
	Width	Depth	Height	
LCD Monitor Suspension	See Section 7.6 on page 69.			
Table Assembly, including IDD	2273 mm (89.5 in)	1893 mm (74.5 in)	2030 mm (79.9 in)	See Figure 3-16 and Figure 3-17
Stationary Rail *(5.79 m each)*	5.79 m (19 ft.)	62.3 mm (2.45 in)	84.3 mm (3.32 in)	See Figure 3-42, Figure 3-27 and Figure 3-28
3 Meter Bridge	3061 mm (120.5 in)	655.3 mm (25.8 in)	158.7 mm (6.25 in)	
OTS *(includes carriage, collimator, tube, and UIF)*	940 mm (37 in)	508 mm (20 in)	927 mm (36.5 in)	See Figure 3-41 and Figure 3-42
System Cabinet (2336900)	907 mm (35.7in)	754 mm (29.7 in)	1900 mm (74.8 in)	See Figure 3-15
Positioner Cabinet	838 mm (33 in)	470mm (18.5 in)	1981 mm (78 in)	See Figure 3-14
SG-60 *(without Knee Spacer)*	684 mm (26.9 in)	340 mm (+/- 3 mm) 13.4 in (+/- 0.12 in)	2156 mm (84.9 in)	See Figure 3-19
SG-60 *(with Knee Spacer)*	684 mm (26.9 in)	575 mm (+/- 3 mm) 22.64 in (+/- 0.12 in)	2156 mm (84.9 in)	See Figure 3-19
SG-100 Vertical Bucky Stand	684 mm (26.9 in)	656 mm (25.8 in)	2156 mm (84.9 in)	See Figure 3-20 and Figure 3-21

Table 3-1 Product Physical Characteristics (width / depth / height)

Product	Width		Depth		Height	Weight
	Max	Min.	Max	Min.		
SG80	652 mm (25.67 in)	652 mm (25.67 in)	373 mm (14.69 in)	373 mm (14.69 in)	2235 mm (87.99 in)	180 Kg (396.9 lbs)
SG80 with Spacer	652 mm (25.67 in)	652 mm (25.67 in)	637 mm (25.08 in)	637 mm (25.08 in)	2235 mm (87.99 in)	194 kg (427.8 lbs)
SG120	915 mm (36.02 in)	652 mm (25.67 in)	927 mm (36.5 in)	687 mm (27.05 in)	2235 mm (87.99 in)	220 kg (485.1 lbs)

Table 3-2 SG80 & SG2120 Physical Characteristics (width / depth / height / weight)

2.1.2 Floor / Ceiling Loading

PRODUCT OR COMPONENT	WEIGHT	WEIGHT/OCCUPIED AREA: kg/m2 (lb./ft2)	MOUNTING INFORMATION
Operator Console	17.24 kg (38 lbs)	NA	Shelf/Table/Wall mount
IUI Accessory Assembly	6.35 kg (14 lbs)	NA	Shelf/Table/Wall mount
CRT 17 inch Monitor *(Control Room)*	23.5 kg (52 lbs)	NA	Shelf/Table mount *(not anchored)*
18 inch LCD Desktop-Mounted Flat Panel Monitor	8 kg (17.6 lbs)	NA	Monitor stand has mounting holes provided so that stand can be attached to desktop (in seismic areas)
LCD 18 inch Wall Mounted Flat Panel Monitor	10.9 kg (24 lbs)	NA	Wall mounted
CRT 21inch Monitor *(In-Room)*	30.8 kg (68 lbs)	15.5 (34) *point contact*	Floor mount (on casters - not anchored)
Dual (2) CRT Monitor Suspension *(Wall/ceiling mount)*	78 kg (172 lbs)	NA	Does not include weight of monitor
Single (1) CRT Monitor Suspension *(Wall/ceiling mount)*	64 kg (141 lbs)	NA	Does not include weight of monitor
LCD Monitor Suspension (See Section 7.0 on page 64)			
CRT Monitor Cart	40 kg (88.2 lbs)	NA	Does not include weight of monitor
LCD Monitor Cart	17 kg (37 lbs)	NA	Does not include weight of monitor
Table Assembly	1562 kg (3444 lbs)	2169 (443)	Mount on floor
Stationary Rail (5.79 m)	49.9 kg (110 lbs)	NA	
3 Meter Bridge	63.5 kg (140 lbs)	NA	
3 Meter Cable Assembly	49 kg (108 lbs)	NA	
Overhead Tube Support *(Includes, carriage, collimator, tube, and UIF)*	171 kg (377 lbs)	NA	
Systems Cabinet	429 kg (946 lbs)	NA	• 3/8 in. or 10 mm (4) anchors to floor • 5/16 in. or 8 mm (2) anchors to wall *(Mounting hardware not provided.*
Positioner Cabinet	310.7 kg (685 lbs)	NA	• 3/8 in. or 10 mm (4) anchors to floor • 5/16 in. or 8 mm (2) anchors to wall *(Mounting hardware not provided.)*
SG-60 Vertical Bucky Stand	120 kg (264 lbs)		See Wall Stand Pre-Install Manual
SG-100 Vertical Bucky Stand	186 kg (409 lbs)		See Wall Stand Pre-Install Manual
SG-80 Vertical Bucky Stand	180 kg (397 lbs)		See Wall Stand Pre-Install Manual
SG-80 Vertical Bucky Stand with Spacer	194 kg (428 lbs)		See Wall Stand Pre-Install Manual
SG-120 Vertical Bucky Stand	220 kg (485 lbs)		See Wall Stand Pre-Install Manual

Table 3-3 Product Physical Characteristics (weight)

2.2 Dimensioned Drawings

2.2.1 Monitors and the Interactive User Interface (IUI)

Figure 3-1 Monitor and Console Configurations

The monitors, console and mouse can be configured as shown:

- Desk mount
- Add-On Shelf mount with monitor wall mount (*The wall mount bracket can be used with any configuration.)*
- Stand-alone mount

2.2.1.1 Interactive User Interface (IUI)

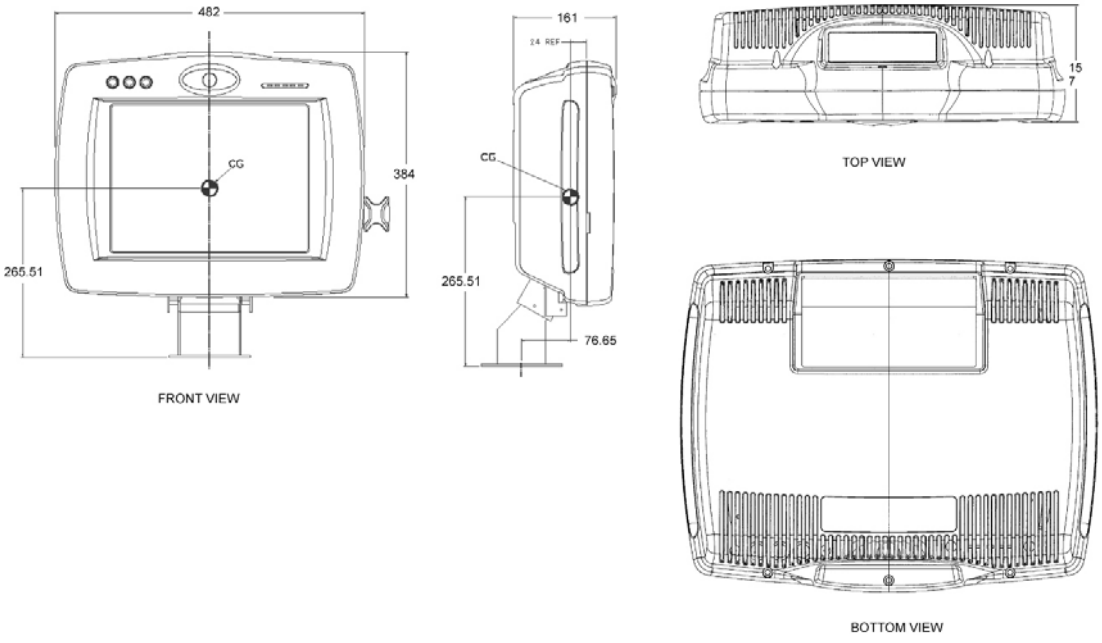


Figure 3-2 Interactive User Interface (IUI) Dimensions

2.2.1.2 IUI Keyboard Garage

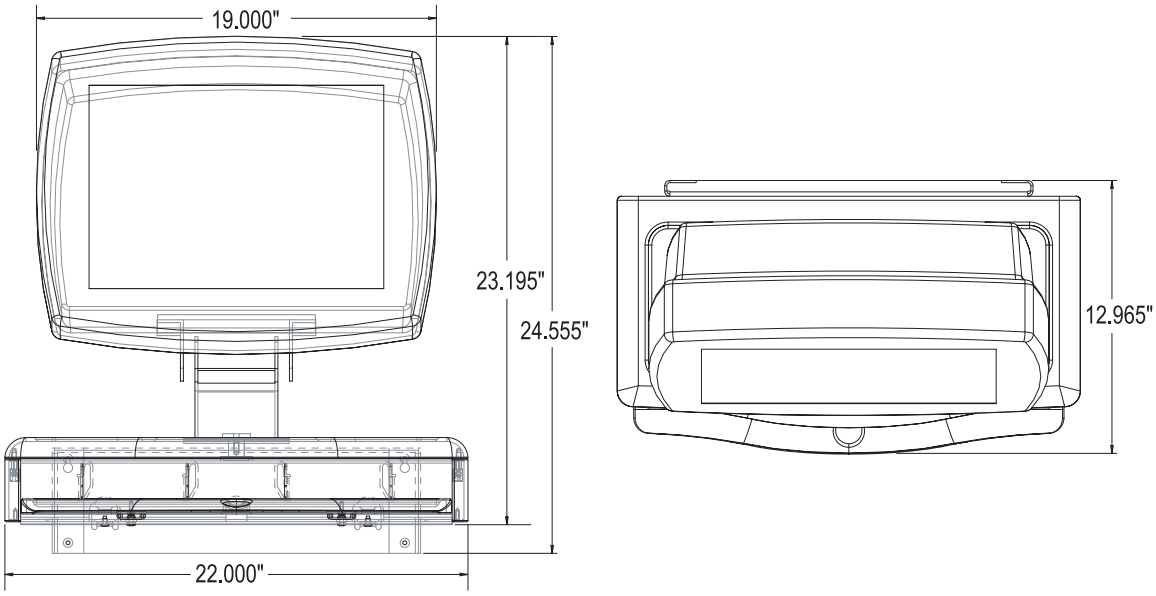


Figure 3-3 IUI Keyboard Garage Dimensions

2.2.1.3 IUI Accessory Assembly

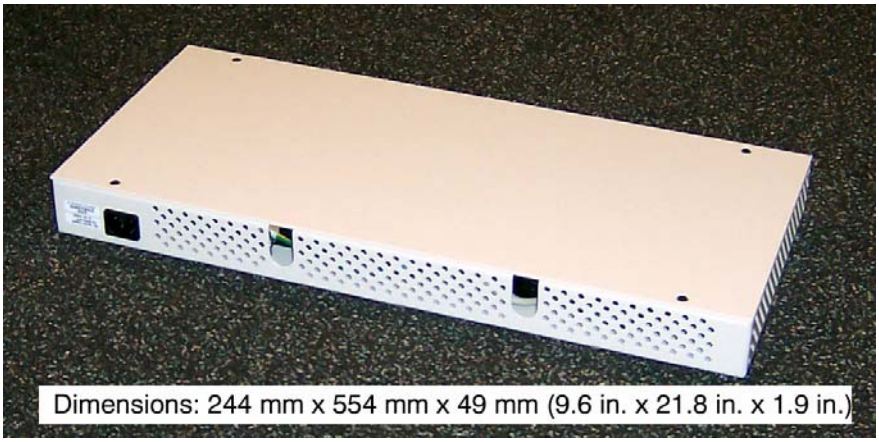


Figure 3-4 IUI Accessory Assembly

2.2.1.4 CRT - 17" Monitor

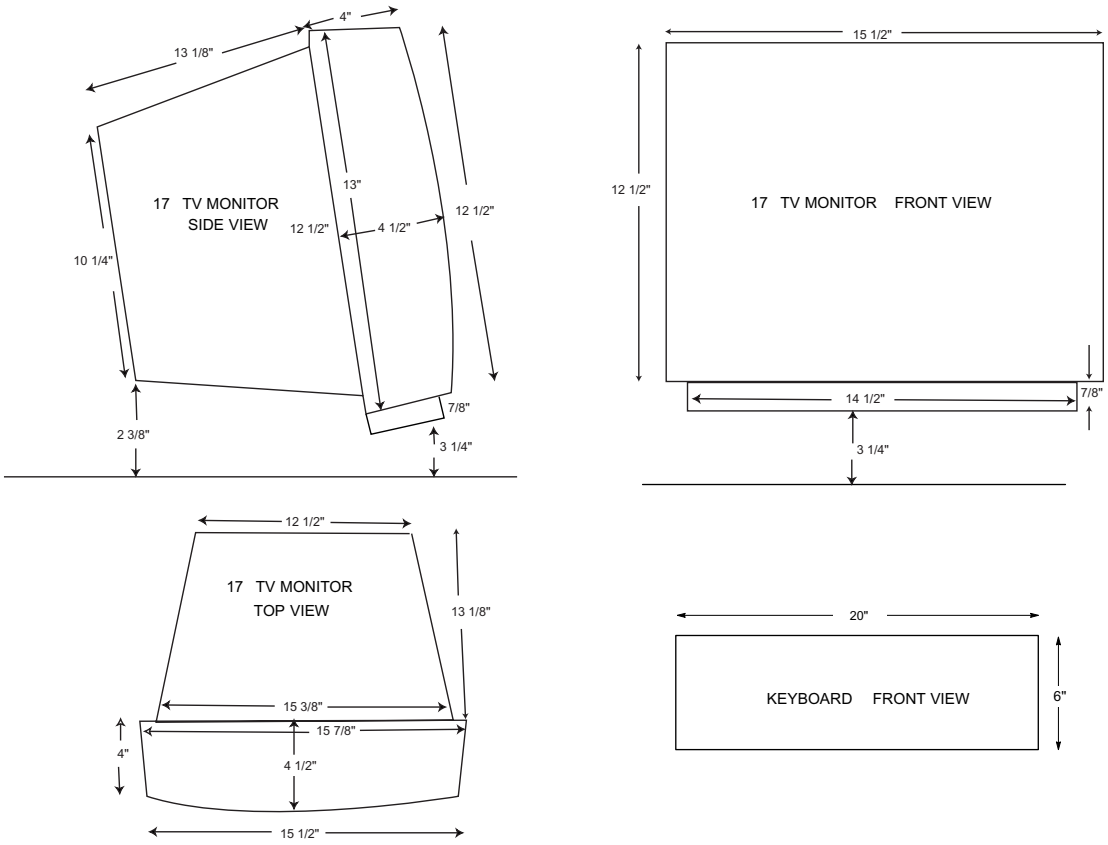


Figure 3-5 17" Monitor (Control Booth) Dimensions

2.2.1.5 CRT - 21" Monitor

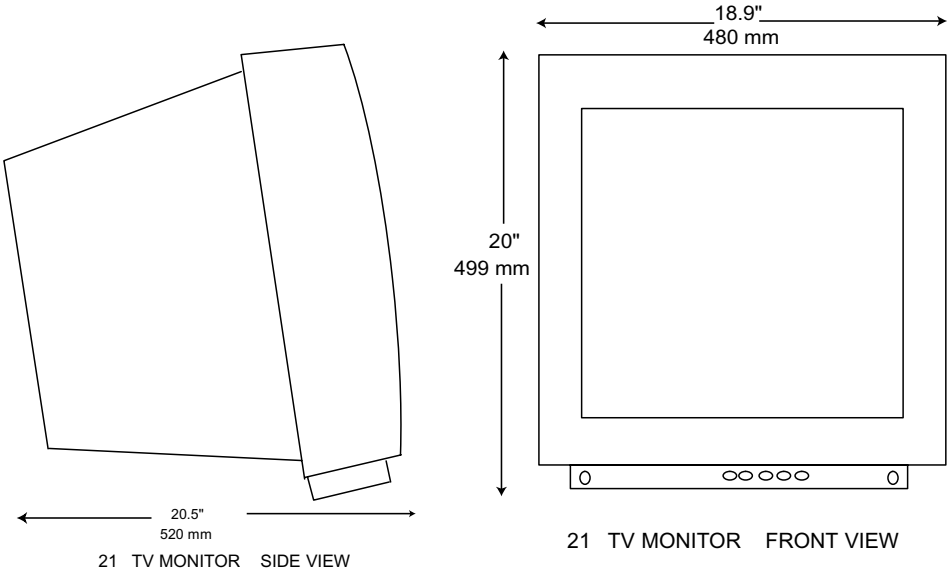


Figure 3-6 21" Monitor (In-Room) Dimensions

2.2.1.6 CRT Monitor Wall Mount/Suspension

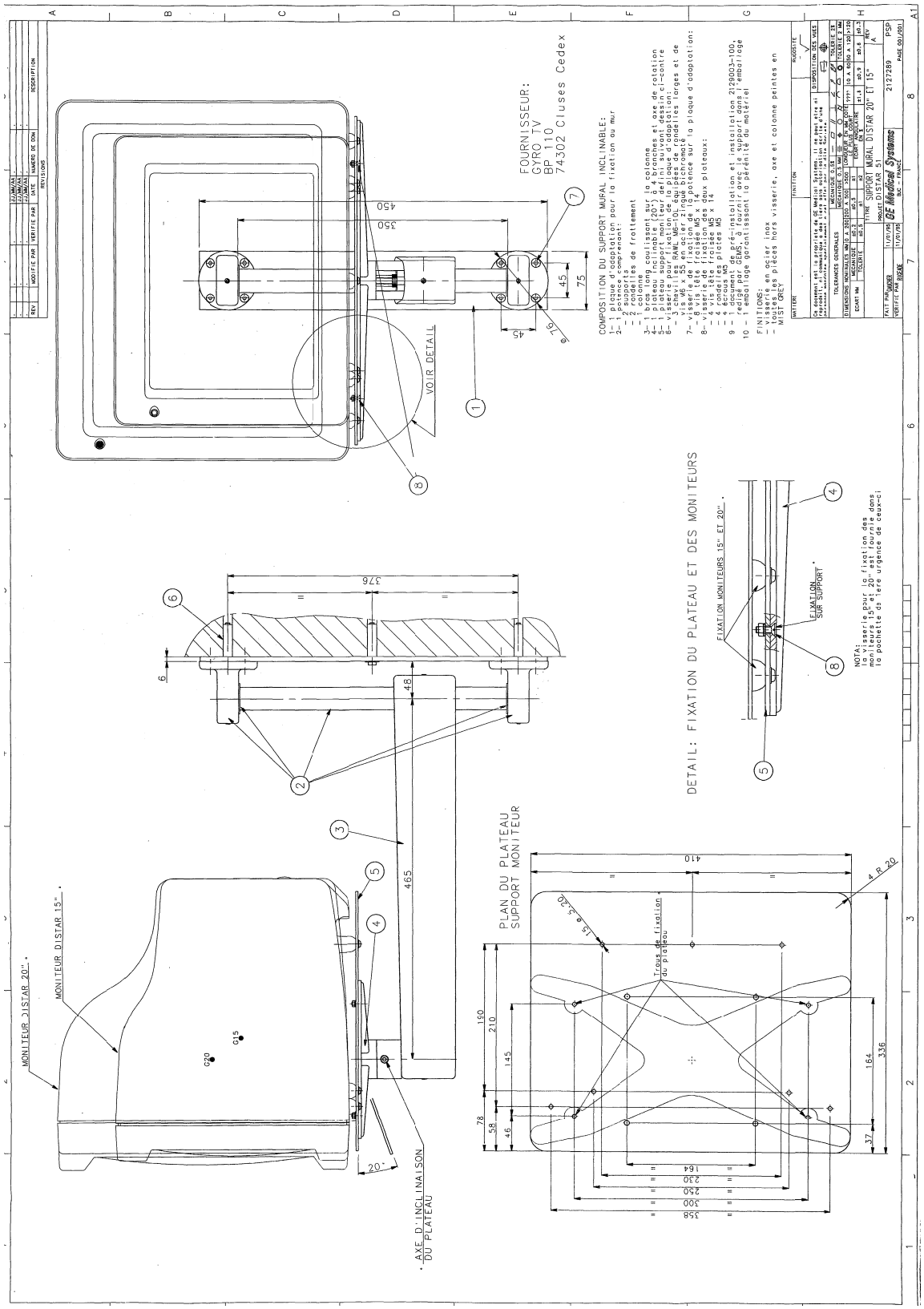


Figure 3-7 Wall Support Bracket (2127289PSP_s1_rA)

2.2.1.7 LCD Monitor and Mount

Figure 3-8 shows assembled monitor

Figure 3-8 Assembled Monitor

The relationship between the monitor and the wall mounting plate is given in Figure 3-9. This is a view looking into the wall.

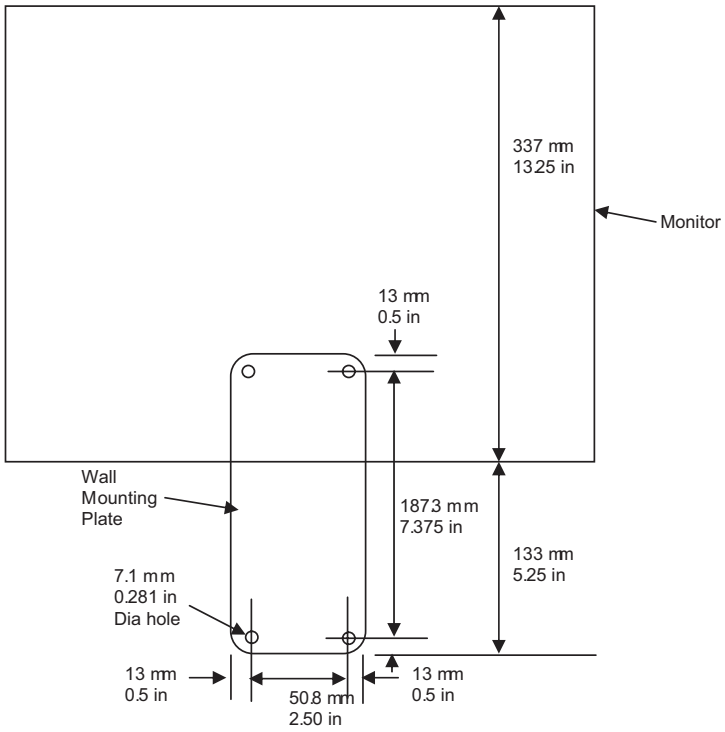


Figure 3-9 Wall Mounting Plate

The wall that the monitor is mounted on must be able to carry a vertical shear load of 10.9 kg (24 lbs) and a moment of 59 Nm (522 in-lbs). See Figure 3-10 for details. The factor of safety applied

over this shall be a minimum of 4. If a higher factor of safety or seismic loading is required per the local building codes, it shall be used to determine the mounting.

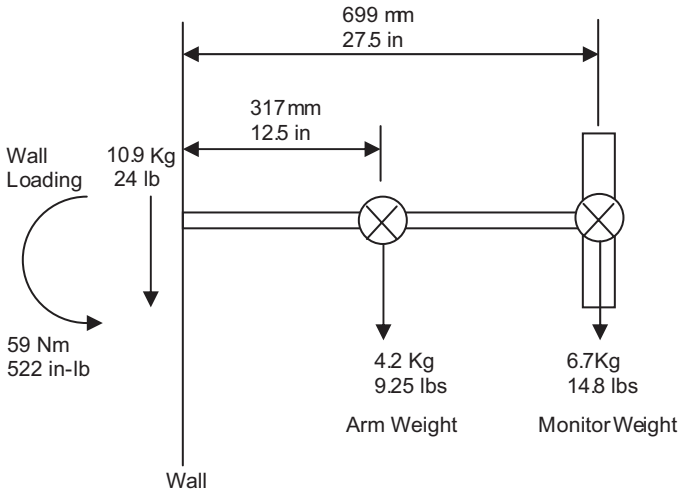


Figure 3-10 Wall Mounting Plate - Vertical Shear and Moment

The top view of the mounted monitor is shown in Figure 3-11.

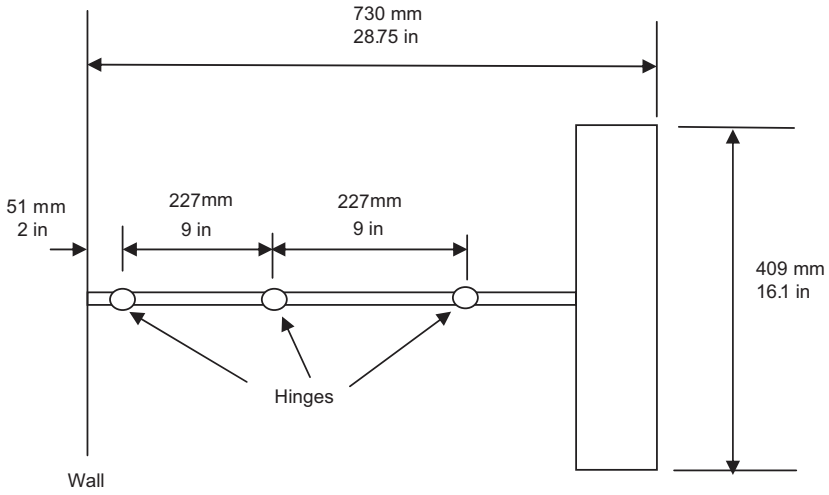


Figure 3-11 Wall Mounting Plate - Top View

Note: Fasteners are not shipped with system.

As part of the pre-installation process, the appropriate wall anchor must be installed prior to the arrival of the system. The associated fasteners (i.e., bolts) should also be made available to those performing the monitor installation. Fasteners are not provided with the system because physical characteristics of walls will vary from site to site.

2.2.2 Mobile LCD Monitor Cart

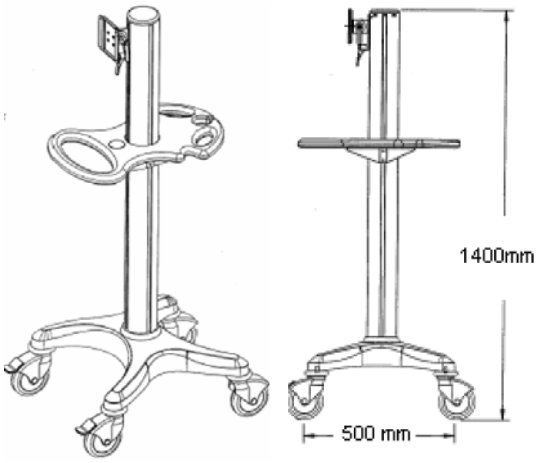
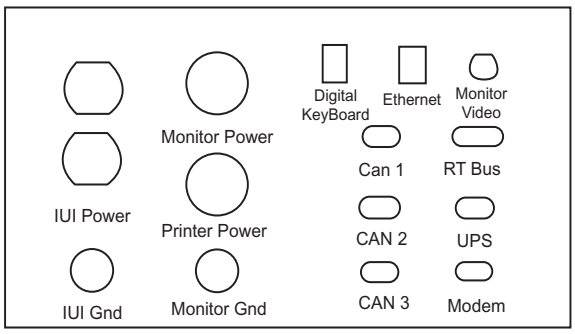


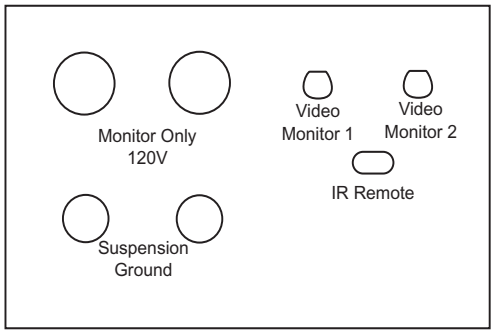
Figure 3-12 LCD Monitor Mobile Cart Dimensions

2.2.3 Wall Plates

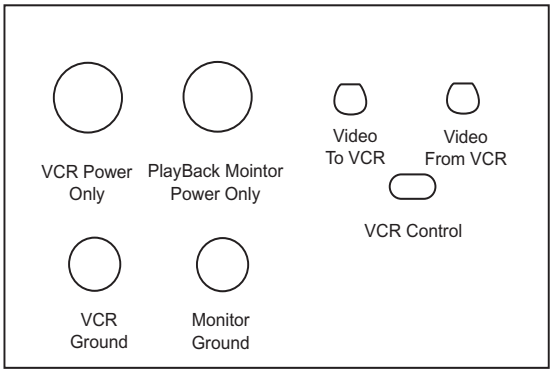
Note: The use of wall plates and boxes is required with this system. The cables used with this system are terminated with connectors that can only be used with these specific wall plates.



INTEGRATED USER INTERFACE WALLBOX
(12" x 6" Wallbox Required)
DIMENSIONS: 12 in (304 mm) X 6 in (152 mm)



Monitor WALLBOX (10" x 6" Walllbox Required)
DIMENSIONS: 10 in (254 mm) X 6 in (152mm)



VCR WALLBOX (10" x 6" Wallbox Required)
DIMENSIONS: 10 in (254 mm) X 6 in (152mm)

Figure 3-13 Monitor, VCR, And IUI Wallplate Dimensions

2.2.4 Positioner Cabinet

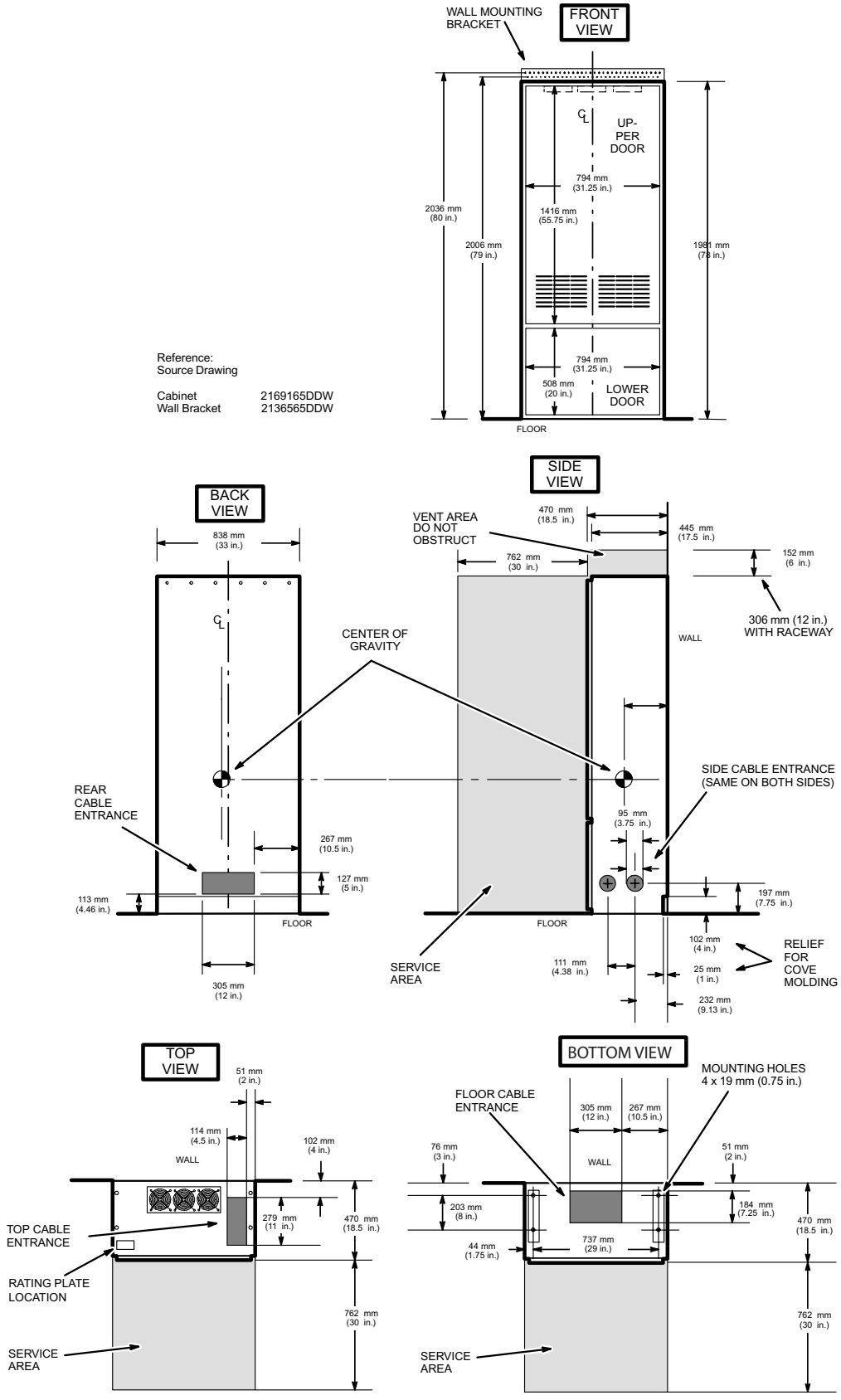


Figure 3-14 R&F Positioner Cabinet Dimensions

2.2.5 Systems Cabinet, 2336900

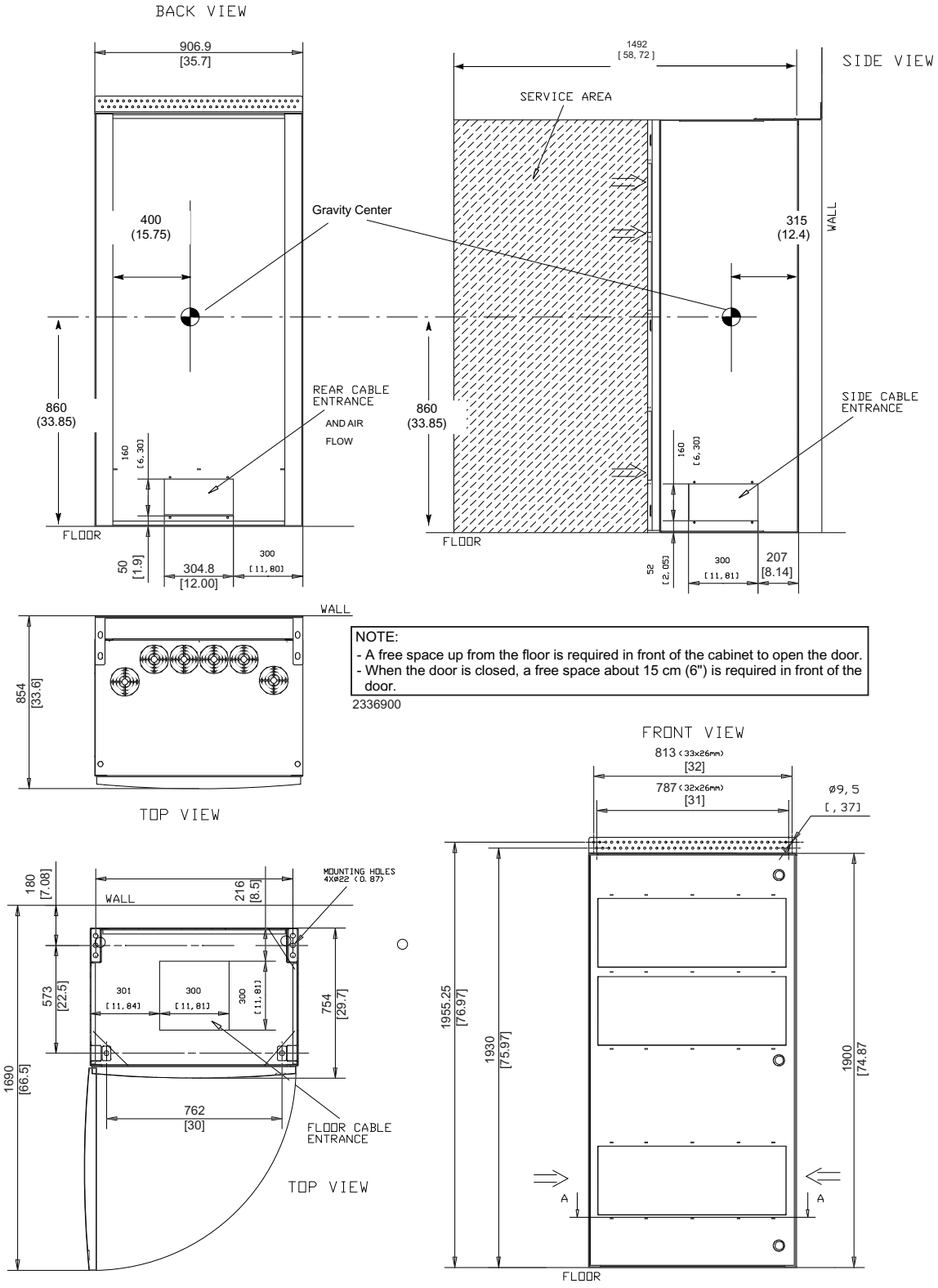


Figure 3-15 System Cabinet (2336900)

2.2.6 Table

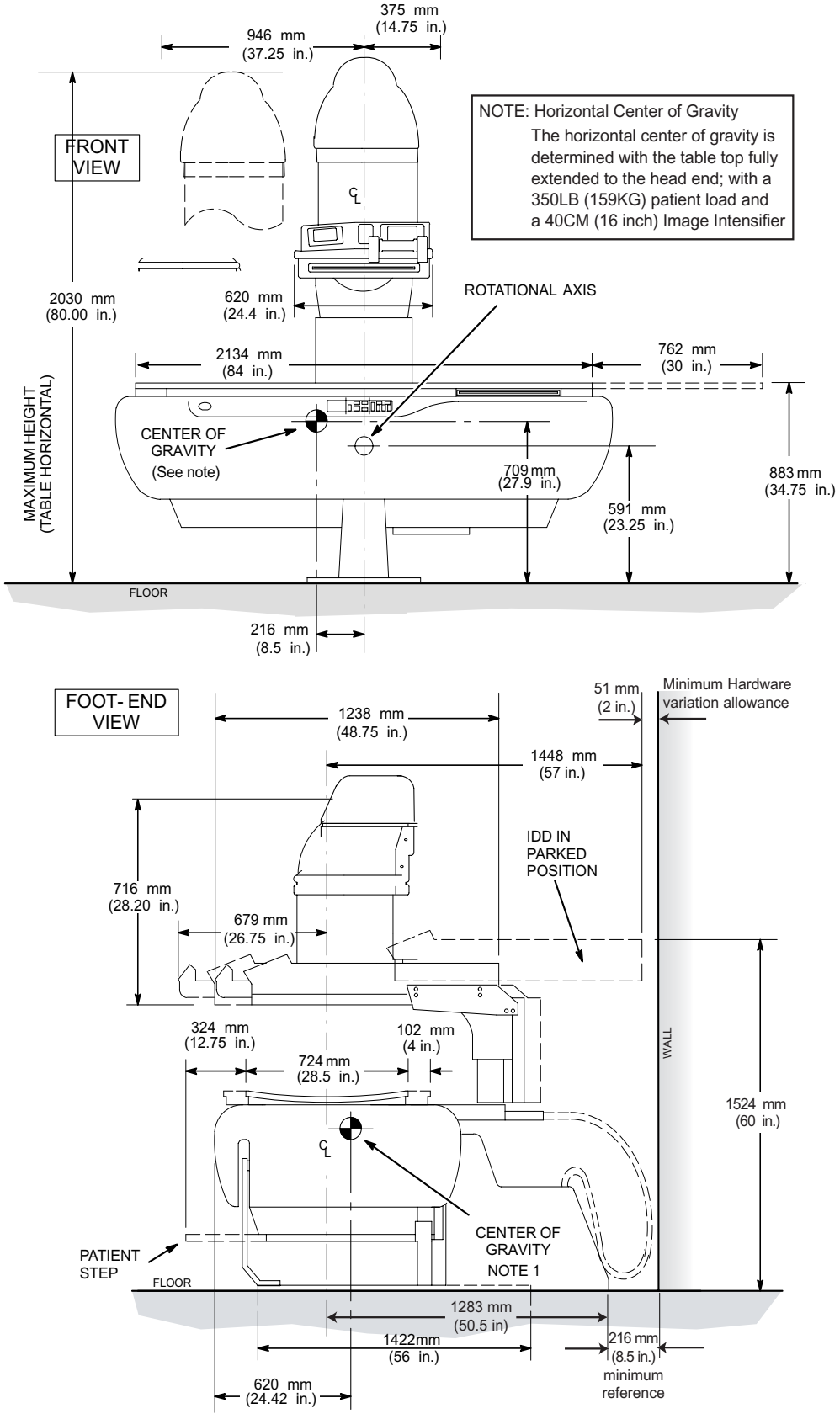


Figure 3-16 Table Dimensions (Front View and Foot-end View)

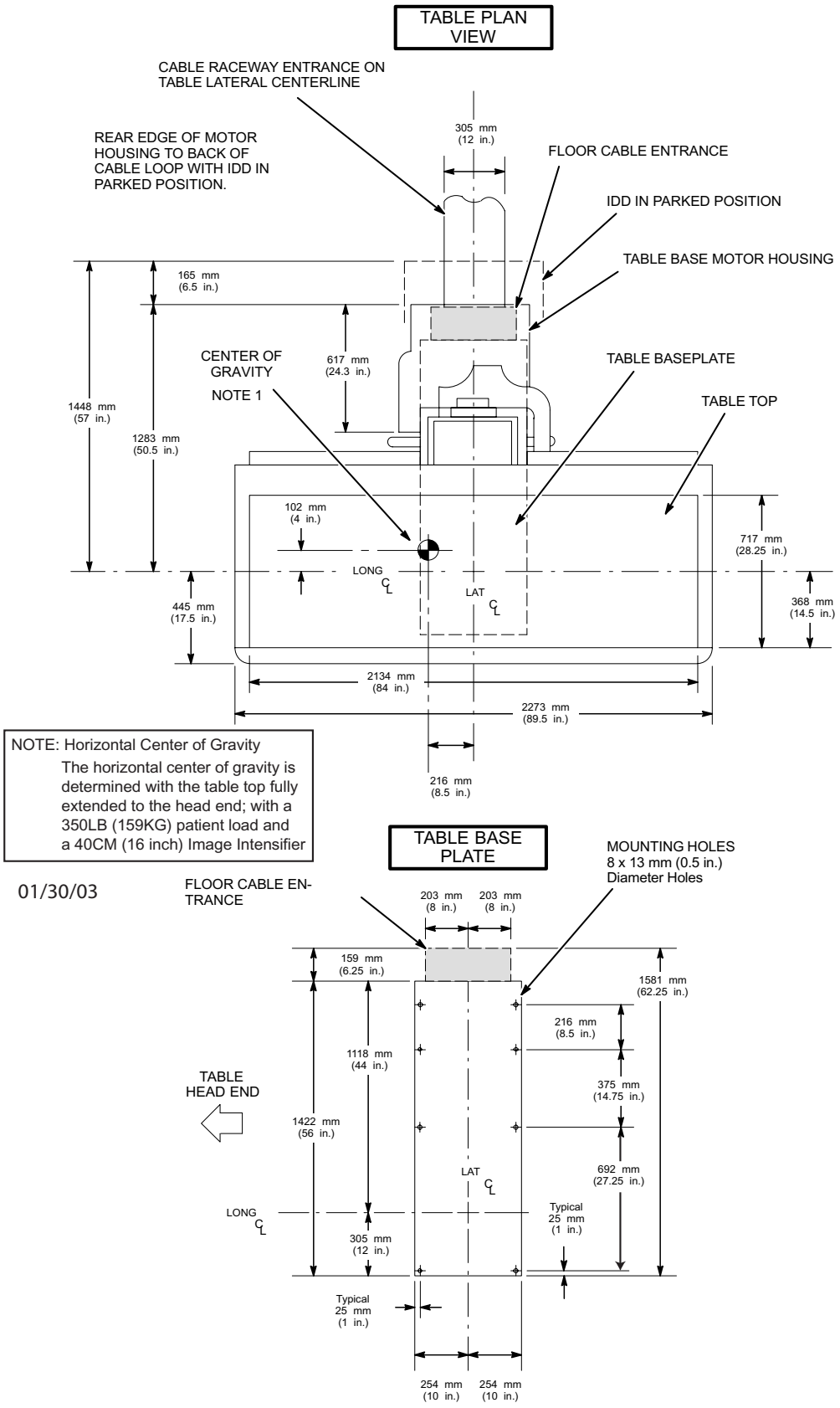
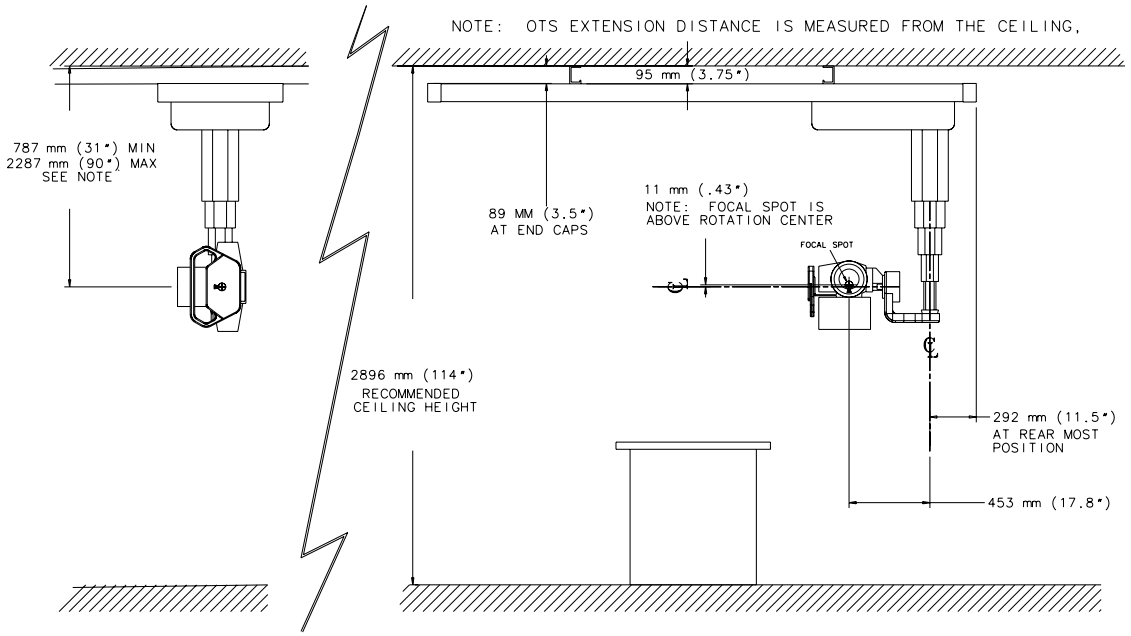
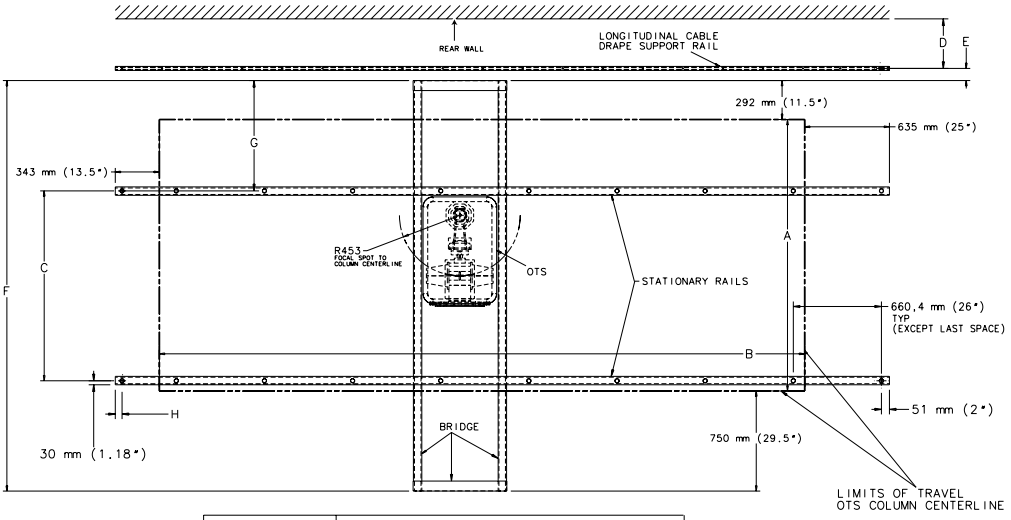


Figure 3-17 Table Dimensions (Table Base Plate and Table Plan View)

2.2.7 Over-Head Tube Support (OTS)





DIMENSION	3 METER (120") BRIDGE
A	2024 mm (79.7")
B	STATIONARY RAIL LENGTH MINUS 978 mm (38.5") (4812 mm (189.4") FOR 5790 mm (19') RAILS)
C	1422 mm (56") RECOMMENDED. 1270 mm (50") OR 1219 mm (48") TO MATCH EXISTING STRUCTURE.
D	100 mm (4") MINIMUM.
E	62 mm (2.4") TO MATCH EXISTING SPACING. NOTE: FOR NEW INSTALLS, A LARGER DISTANCE OF UP TO 280 MM (11") IS SUGGESTED
F	3061 mm (120.5")
G	820 mm (32.3") (SEE NOTE 1)
H	51 mm (2") EXCEPT FOR 162" AND 214" RAILS 102 mm (4") 162" AND 214" RAILS

NOTES: 1 THE OVERHANG OF THE BRIDGE (DIM. G) IS AFFECTED BY THE RAIL SPACING. IF THE RAIL SPACING IS LESS THAN 1422 mm (56") THE OVERHANG WILL BE GREATER THAN THE VALUE LISTED IN THE TABLE.

Figure 3-18 OTS Dimensions

2.2.8 Vertical "Bucky" Stands (VBS)

2.2.8.1 SG-60 VBS

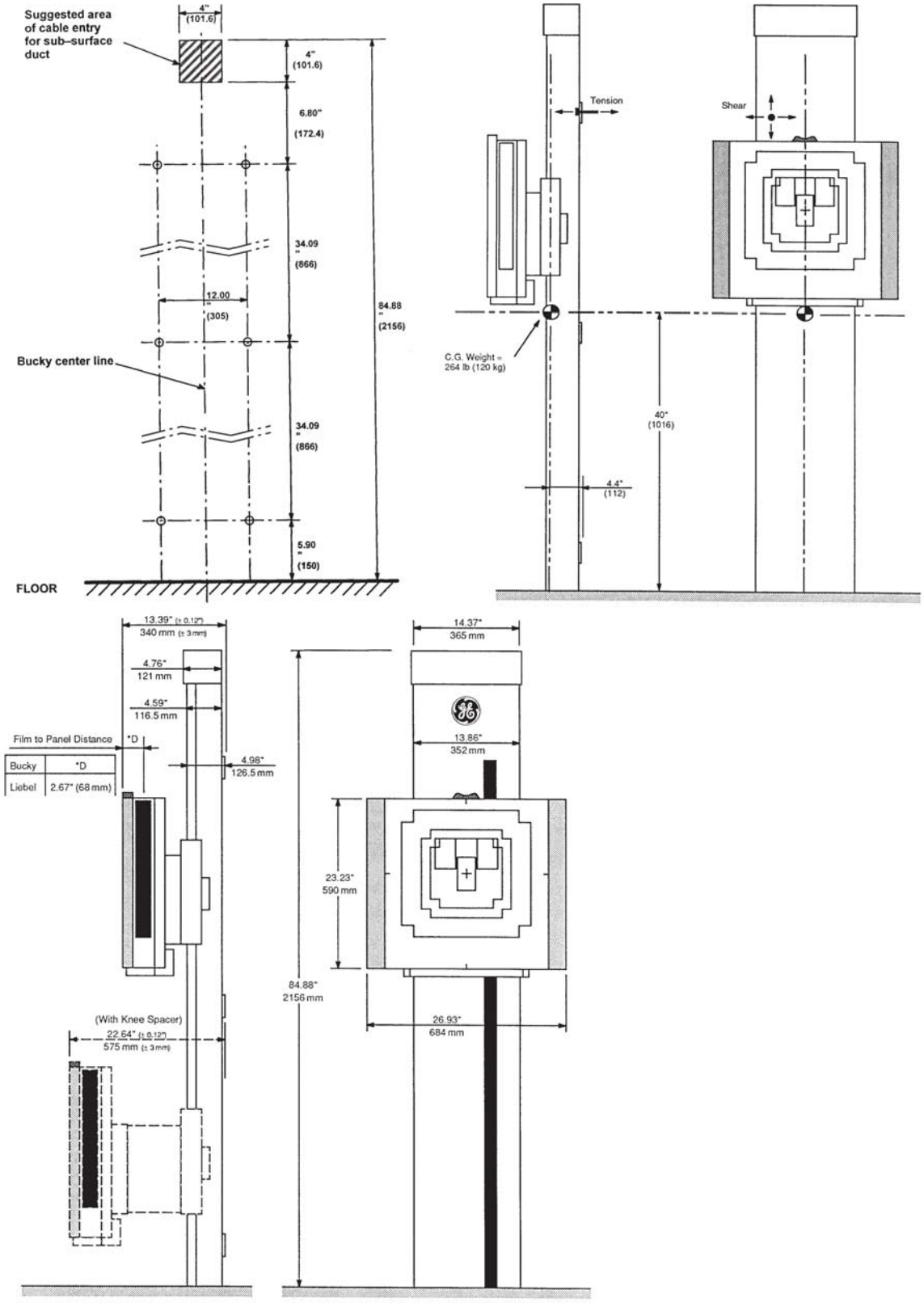


Figure 3-19 SG-60 (Anchor Holes, Center of Gravity and General Dimensions)

2.2.8.2 SG-100 VBS

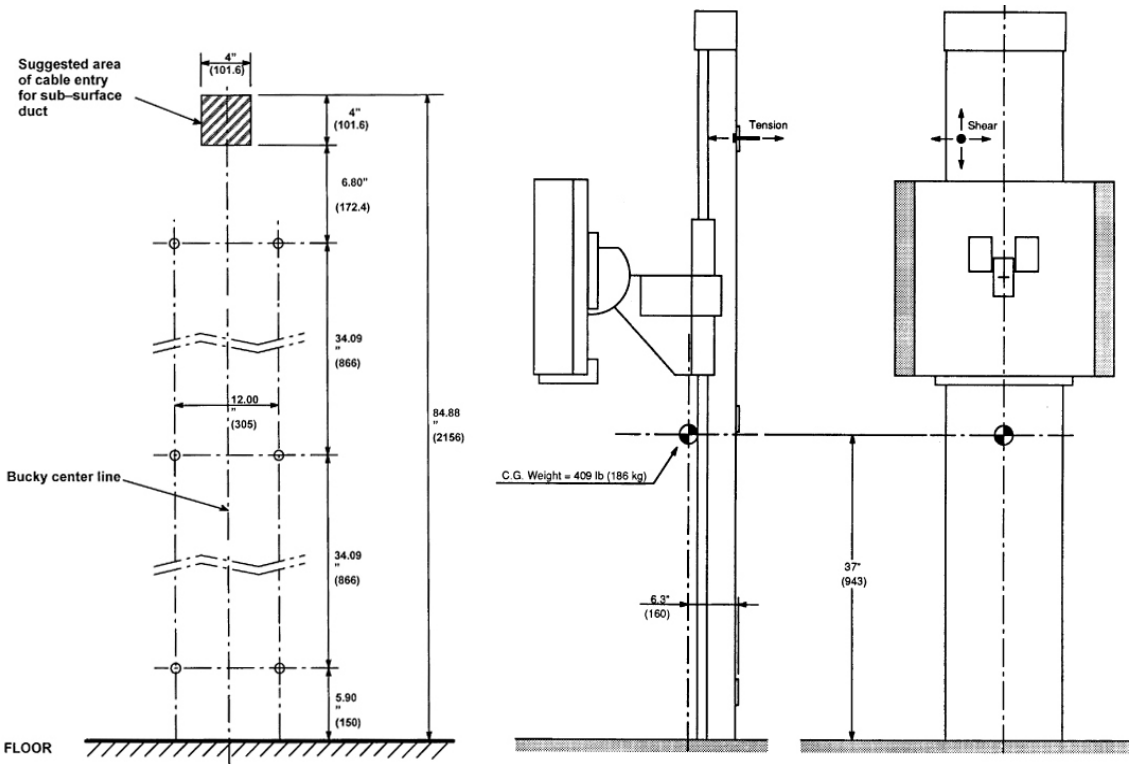


Figure 3-20 SG-100 (Anchor Holes and Center of Gravity)

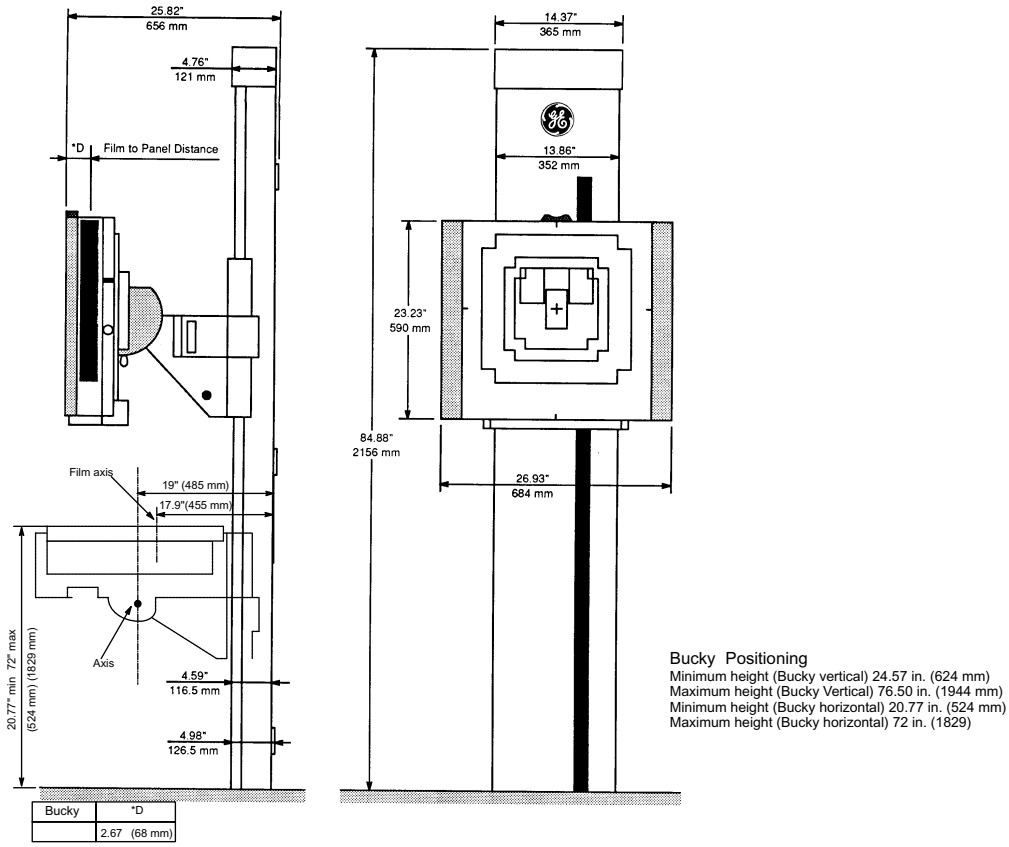


Figure 3-21 SG-100 General Dimensions

2.2.8.3 SG80 Wallstand

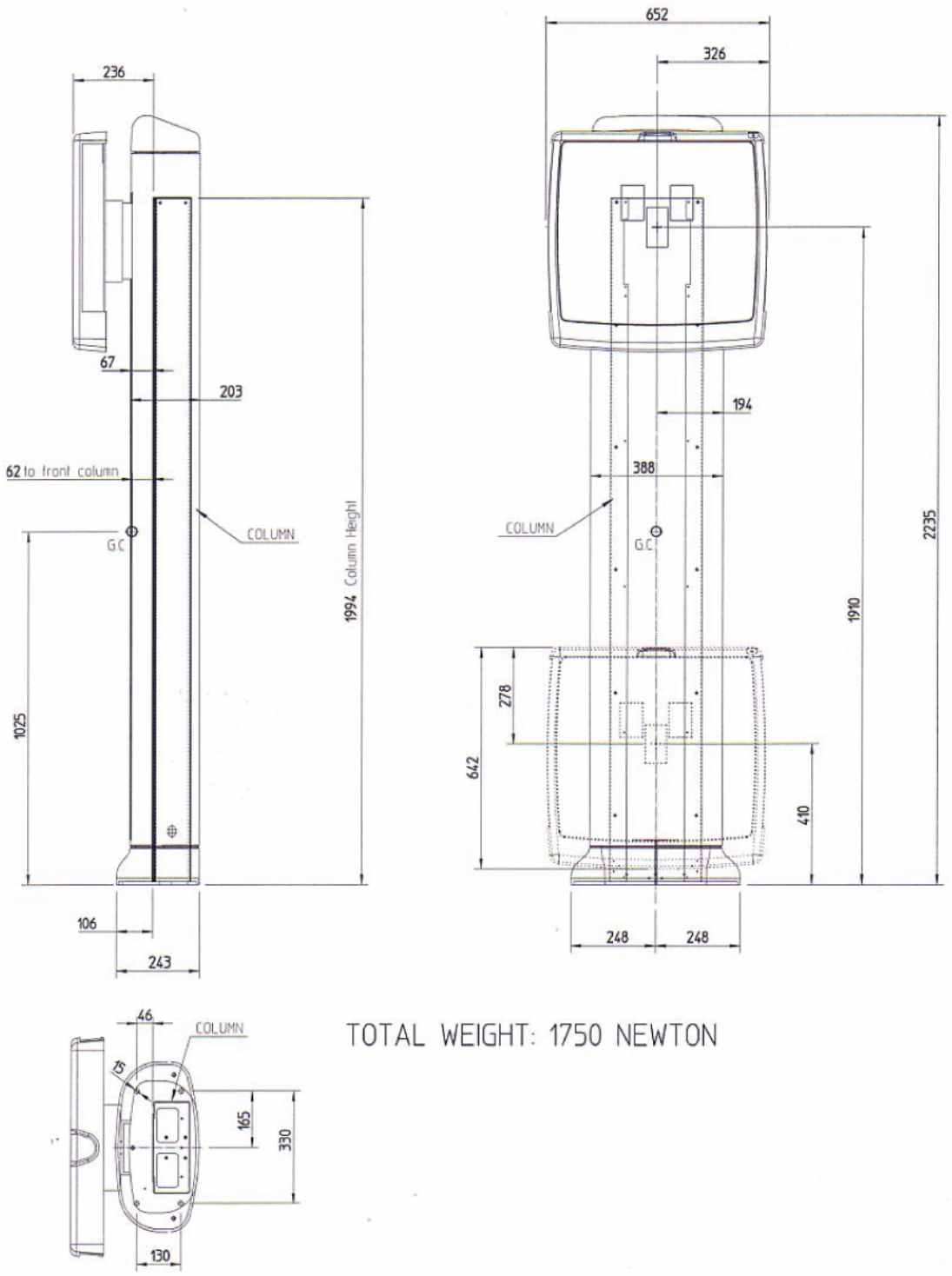


Figure 3-22 SG80 Dimensions

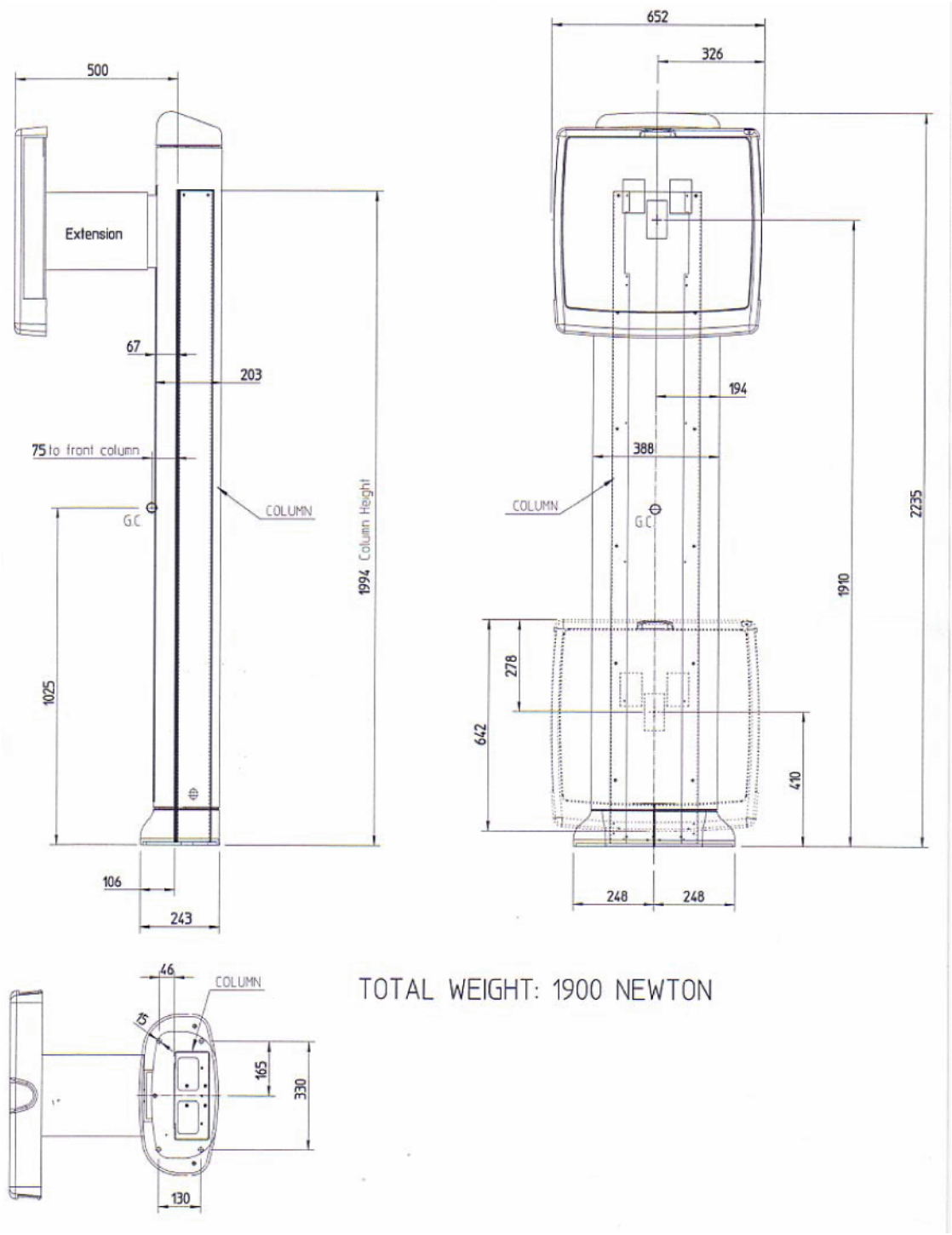


Figure 3-23 SG80 with Spacer Dimensions

2.2.8.4 SG120 Wallstand

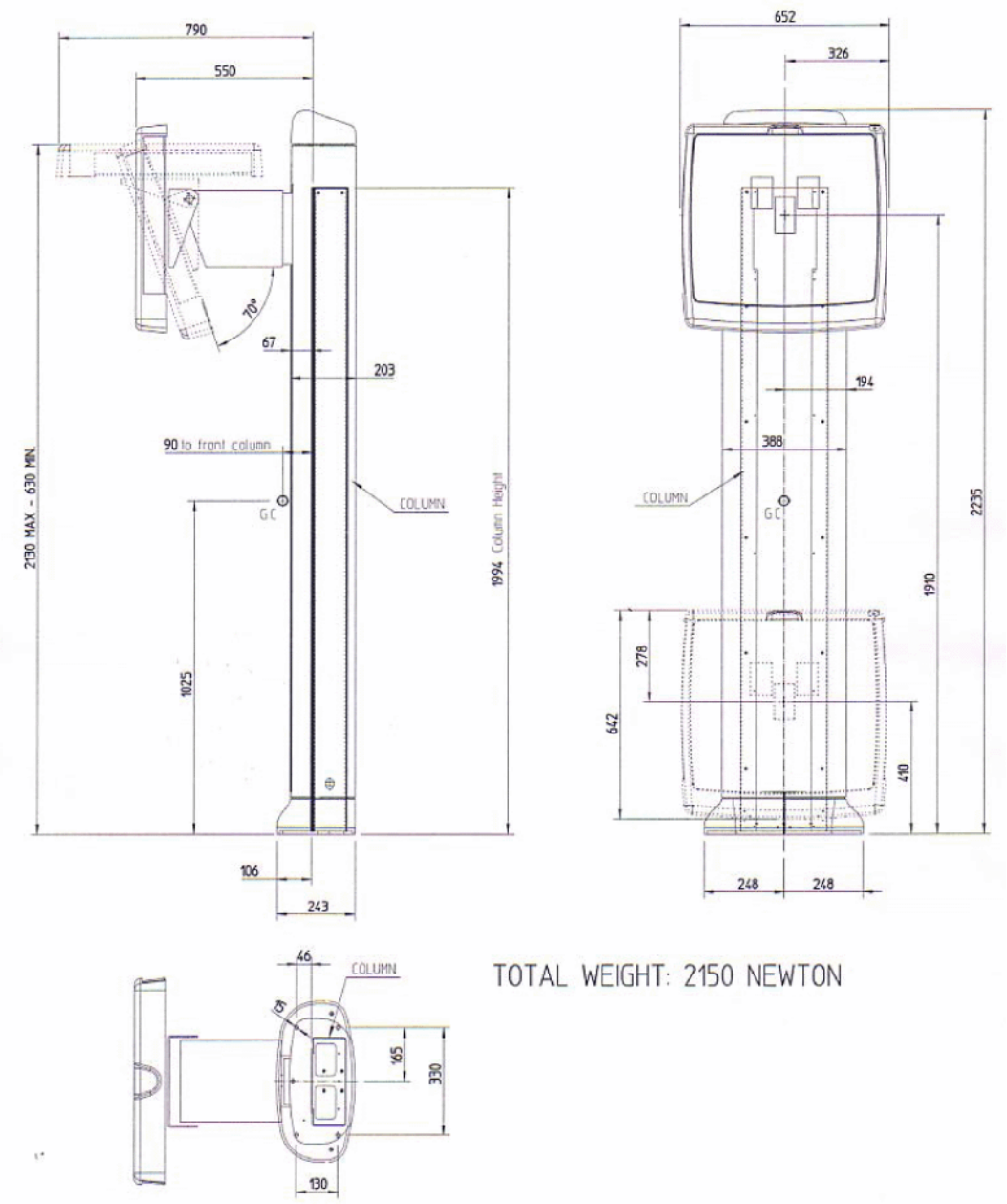


Figure 3-24 SG120 Dimensions

Section 3.0
Swept Volume Curves

Refer to this section for details on the mechanical curve dimensions for the Precision 500D R&F Table. These dimensions are the interference zones for the R&F Table.

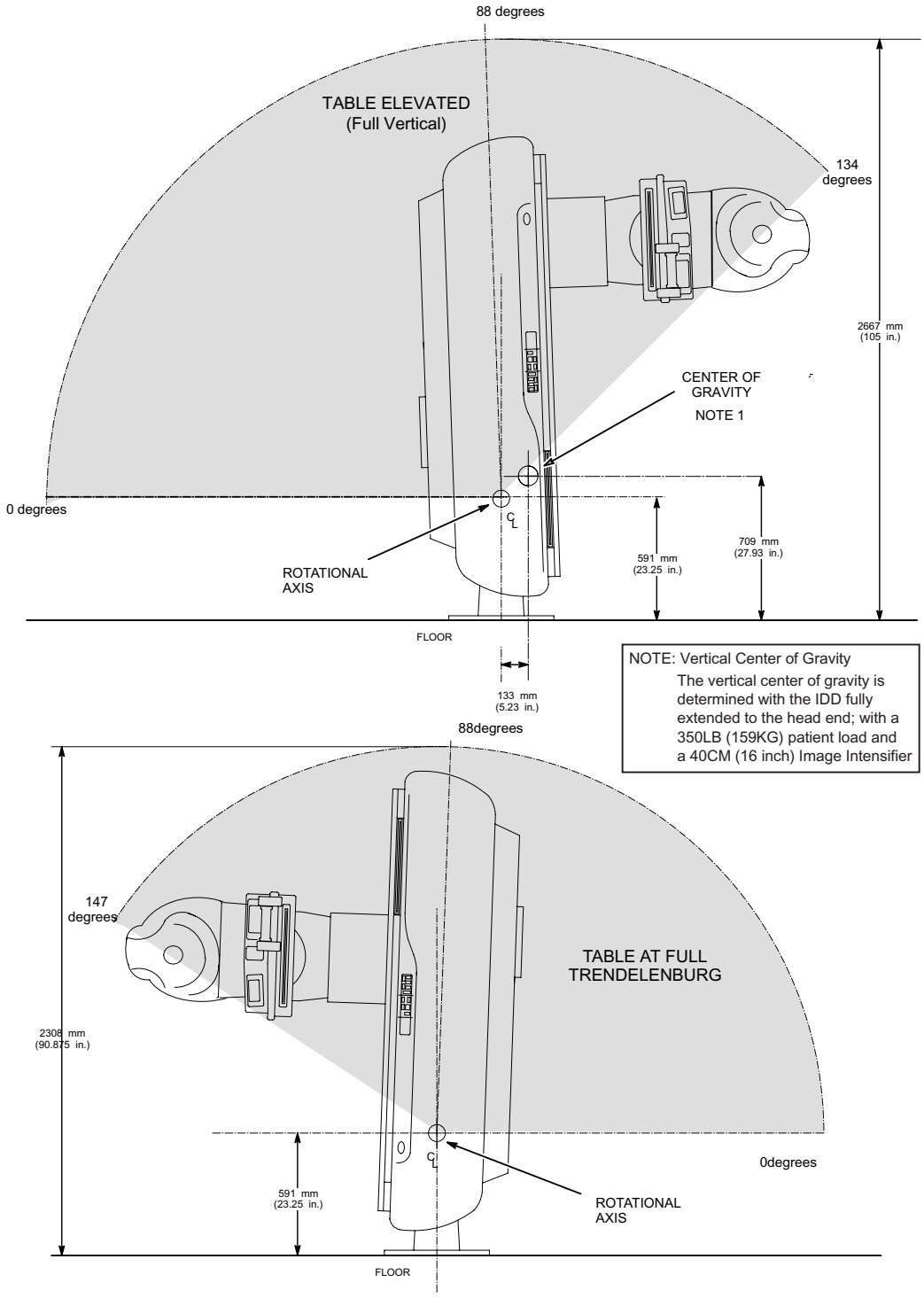


Figure 3-25 Table Swept Volume Curves (Frontal View w/40cm Image Intensifier)

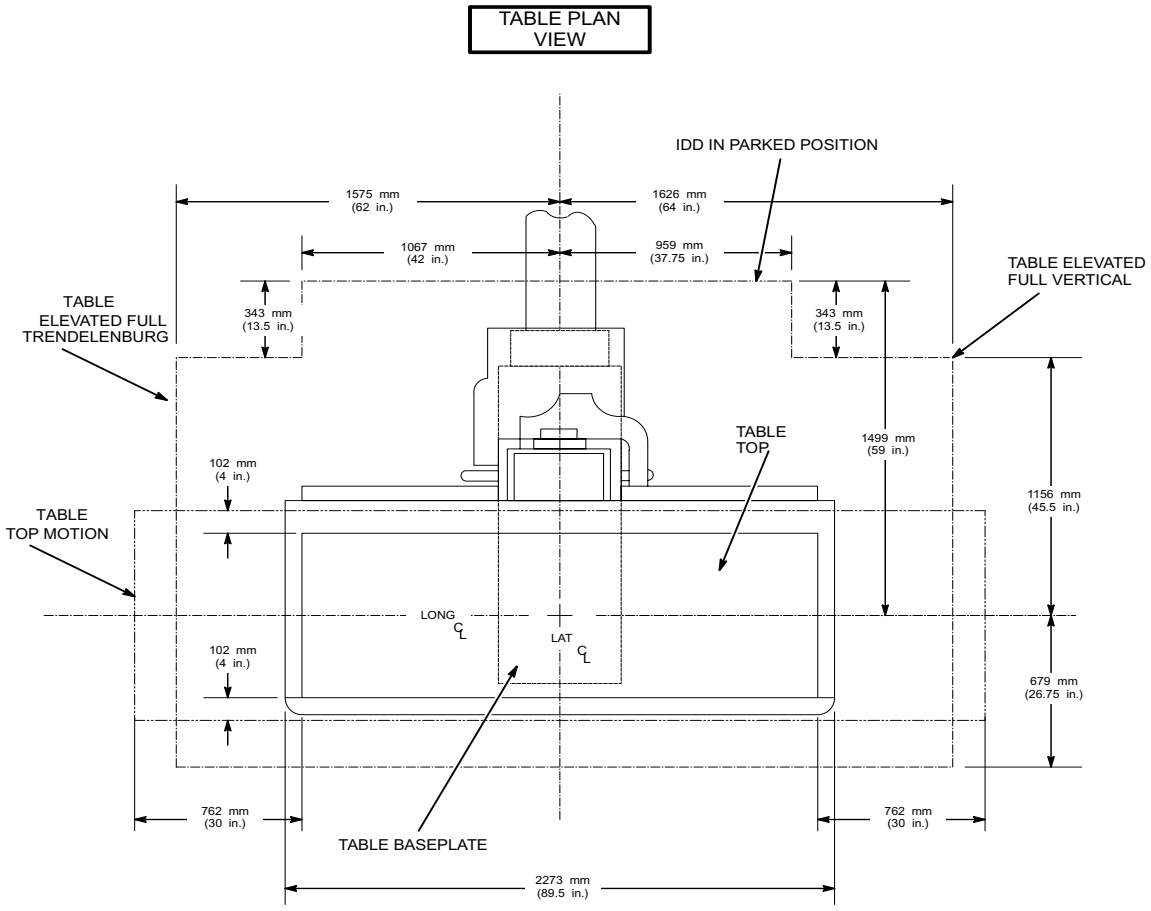


Figure 3-26 Swept Volume Curve (Plan View With 40cm Image Intensifier)

Section 4.0
Positioning and Mounting Equipment

4.1 Floor Loading and Recommended Mounting Methods

Product or Component	Net Weight	Dimensions			Load Bearing Area ft.^{2} (m^2)	Weight/ occupied area	Mounting Method
		Length	Width	Height			
Operator Console (IUI)	38 lbs. (17.24 kg)	See Figure 3-2					Wall mounted, Desk mounted, or on cart.
R&F Positioner Cabinet (RFP1)	685 lbs. (311 kg)	See Figure 3-14			4.01 ft.^{2} (0.37 m^2)	171 lbs/ft.^{2} (841 kg/m^2)	Recommended: •3/8 in. or 10 mm (4) anchors to floor •5/16 in. or 8 mm (2) anchors to wall ***(Mounting hardware not provided by GEMS)***
Systems Cabinet (SKL1)	950 lbs. (431 kg)	See Figure 3-15			4.01 ft.^{2} (0.37 m^2)	237 lbs/ft.^{2} (1162 kg/ m^2)	Recommended: •3/8 in. or 10 mm (4) anchors to floor •5/16 in. or 8 mm (2) anchors to wall ***(Mounting hardware not provided by GEMS)***
Precision 500D R&F Table (40 cm Image Intensifier & 350 lbs. or 159 kg Patient)	3444 lbs. (1562 kg)	See Figure 3-16, Figure 3-17, Figure 3-25 and Figure 3-26.			7.78 ft.^{2} (0.72 m^2)	443 lbs/ft.^{2} (2169 kg/ m^2)	Recommended: •3/8 in. X. 4 in. Anchors (8) ***(Mounting hardware not provided by GEMS)***

Table 3-4 Floor Loading, Weights, and Mounting Methods

4.2 Floor Preparation

The Precision 500D requires a cement-based underlayment for the table. A cement-based underlayment levels the floor, is very durable, and creates a flat and smooth surface for the table base. Floors must be primed before application of any cement-based underlayment.

A cement-based underlayment (ARDEX K15) for use with concrete floors is shipped with each Precision 500D system.

4.2.1 Materials

GE recommends using Ardex products exclusively. For more information, product availability and/or a distributor near you, contact:

Ardex Engineered Cements
400 Ardex Park Drive
Aliquippa, PA 15001
U.S.A.
Phone: (724) 203-5001
http://www.ardex.com

4.2.1.1 Primer

Primers that prepare the floor for the cement-based underlayment are **not supplied** with the Precision 500D system. Primers must be purchased separately. Choose a primer appropriate for your specific application and needs. ARDEX has cement-based underlayment primers for different types of floors:

- Absorbent Concrete floor; use ARDEX P51 Primer
- Non-porous and Wood floors; use ARDEX P82 Ultra Primer

4.2.1.2 Cement-Based Underlayments

Supplied with the Precision 500D System - Ardex K15

ARDEX K15 is a self-levelling Portland cement-based underlayment used to level and smooth interior concrete, terrazzo, quarry and ceramic tile substrates–on, above or below grade.

The cement-based underlayment supplied with each Precision 500D system is ARDEX K15. It's shipped as part of a kit (part number B0124JY), as shown Table 3-5.

Picture	Item	Part #	Description	Qty.	Notes
	Cement	46-220466P2	27 lb. pail of Ardex K-15 cement-based underlayment.	1	For clean concrete floors only.
	Masking Tape	46-170127P4	One 60 foot (55 m) roll, 3/4 inches (19 mm) wide.	1	Used to maintain foam tape integrity during building of grout dam.
	Floor Anchor	46-219624P1	Grade 5, 3/8"-16 x 4 inch pre assembled single unit sleeve anchor. RAWL Lok-Bolt.	8	Secures table to floor.
	Wood Dowel	46-195954P1	Wood Dowel; 0.5 in. (13 mm) diameter.	8	Prevents underlayment form filling anchor holes.

Table 3-5 Table Floor Preparation Kit (Kit # 46-195961G1; Catalogue # B0124JY) Parts List

Picture	Item	Part #	Description	Qty.	Notes
	Grease	46-125224P3	Three ounce tube of silicone grease.	1	Applied to wood dowels to prevent adhesion of underlayment during removal.
	Foam Tape	46-221505P4	Roll of Foam Tape; 1 inch (25 mm) wide x 1 inch (25 mm) thick; 25 foot (7.6 m) roll. “Used as grout dam for R&F Table Base grout pad.”	1	Used to build grout dam.
	Instructions	46-017488	“Grout Preparation” Document.	1	

Table 3-5 Table Floor Preparation Kit (Kit # 46-195961G1; Catalogue # B0124JY) Parts List

Not Supplied with Precision 500D Systems

Underlayments are not supplied for concrete floors with adhesive residues or wood floors. They must be purchased separately.

- ARDEX E25 Underlayment System for application over adhesive residues on concrete subfloors.
- MESH-REINFORCED ARDEX K15 Underlayment System for wood subfloors. Note: the subfloor must either be solid hardwood flooring, a minimum of 3/4” tongue-and-groove, APA-rated, Type 1, exterior exposure plywood, or OSB equivalent.

4.2.2 Sub-Floor Preparation

4.2.2.1 Cleaning

All concrete substrates must be solid, thoroughly clean and free of oil, wax, grease, asphalt, latex compounds, curing and sealing compounds, and any contaminant that might act as a bond breaker. If necessary, mechanically clean the floor down to sound, solid concrete by shot blasting, scarifying or a similar method. Overwatered, frozen, or otherwise weak concrete surfaces must also be cleaned down to sound, solid concrete by mechanical methods. Acid etching, the use of adhesive removers or solvents, and sweeping compounds are not acceptable means of cleaning the floor. The use of sanding equipment is not an effective method to remove curing and sealing compounds. Subfloors must be dry and properly primed for a successful installation. Floor temperatures must be a minimum of 50 degrees F, for the installation of any ARDEX product.

4.2.2.2 Priming

Standard absorbent concrete must be primed with ARDEX P51 Primer diluted 1:1 with water. Allow primer to dry to a clear, thin film (min. 3 hours, max. 24 hours).

Extremely absorbent concrete may require two applications of ARDEX P51 to avoid the formation of bubbles and pinholes in the ARDEX K 15. In such cases, make an initial application of ARDEX P51 diluted with 3 parts by volume of water. Let dry thoroughly (1 to 3 hours) and install a second application of ARDEX P 51 mixed 1:1 with water as stated above.

Non-porous substrates, burnished concrete, terrazzo, quarry and ceramic tile, and epoxy coatings must be primed with ARDEX P82 ULTRA PRIME. Allow primer to dry to a thin, slightly tacky film (min. 3 hours, max. 24 hours).

Section 5.0
Stationary Rails

Stationary rails are designed for top (ceiling) mounting. Rails can be ordered and are supplied in 4" (10.2 cm) increments between 134" (3.4 m) and 222" (5.64 m), plus a 228" (5.79 m) length totaling 24 different sizes. The choice of length depends on room size, configuration and the presence of obstructions.

Complete details of room dimensions must be known when planning an installation. Work with your architect or building engineer and obtain approval before proceeding.

Methods of support that permit attachment to structural steel or “through-bolts” in concrete construction are favored. Do not use anchors in direct tension.

Each rail has mounting holes on 26" (66 cm) centers with the first hole located 2" (5.1 cm) from the rail end. The last hole is located either 2" (5.1 cm) or 4" (10.2 cm) from the other end with a variable space of less than 26" (66 cm) between it and the second last hole.

⚠ CAUTION
Structure must support rails.

Rails are mounted on 1/2” (12.7 mm) bolts. Maximum load per bolt is 350 lbs. (159 kg); however, each mounting bolt must not “pull-out” or otherwise fail under a vertically downward “dead” load of 1,400 lbs. (636 kg).

Referring to the layout drawings, the +/- 1/8” (3 mm) requirement for parallelism of the stationary rails is critical. Therefore, great care must be exercised in locating the mounting points. Figures 3-27 and 3-28 outline requirements that the stationary rail mounting interface must meet.

For low ceiling height, the stationary rails may be mounted directly to the ceiling slab or to flush-mounted “Unistrut” or similar structure. For higher rooms in which a false ceiling is to be used, the stationary rails may be attached to rigid vertical members hung from the ceiling slab. A supplementary channel may be secured to the bottom of the vertical members to facilitate provision for mounting holes. A Unistrut system or equivalent is a convenient type of support to employ. Refer to Figure 3-28.

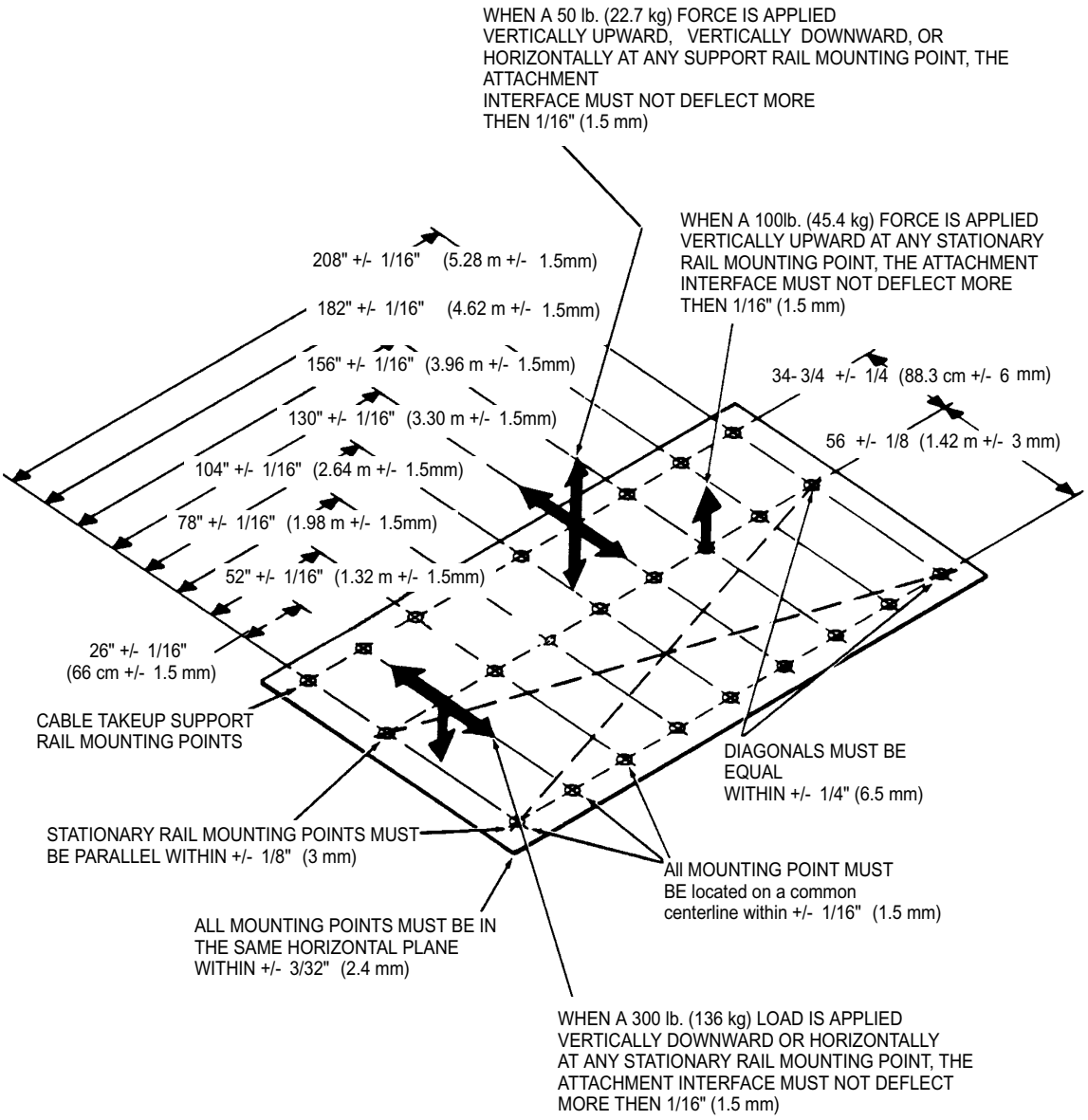


Figure 3-27 Specifications for a Typical 17'-10" (5.44 m), Stationary Rail Mounting Interface (Both Rails Ceiling Mounted)

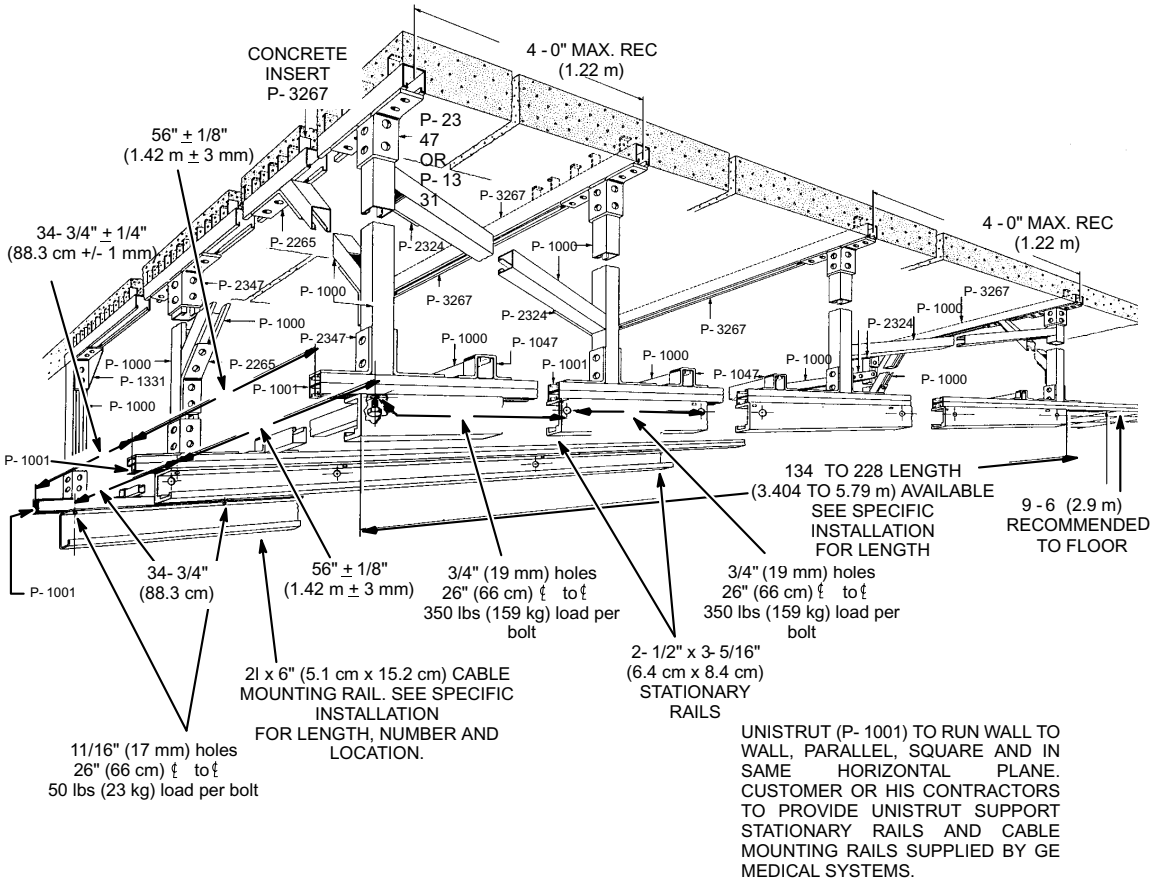


Figure 3-28 Suggested Unistrut Structure for OTS Suspension

Section 6.0
CRT Monitor Suspension

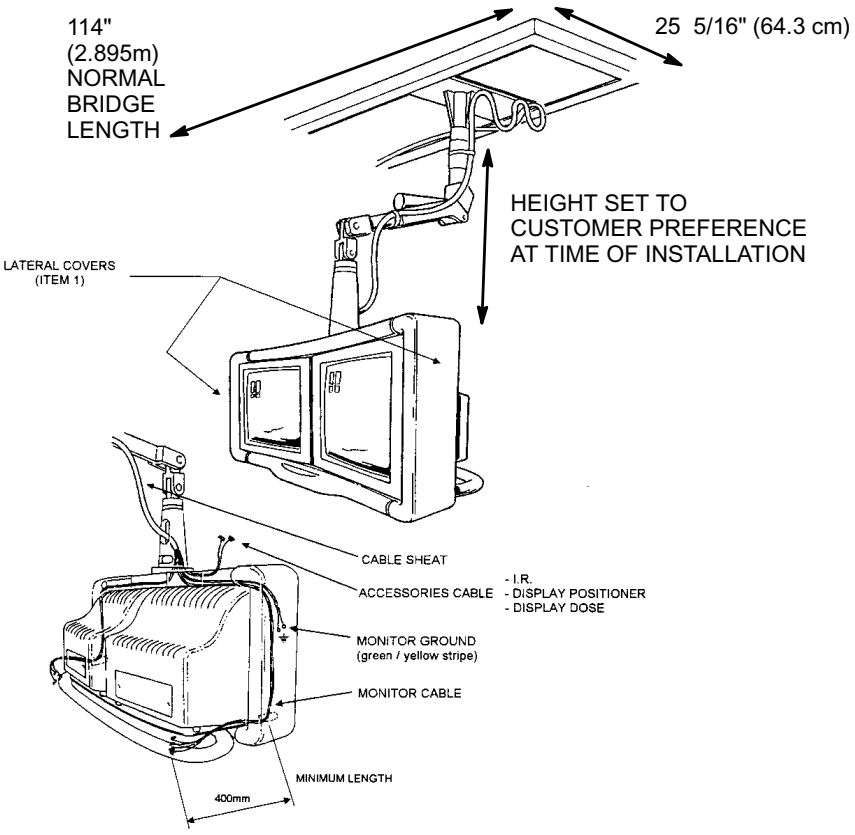


Figure 3-29 CRT Monitor Support

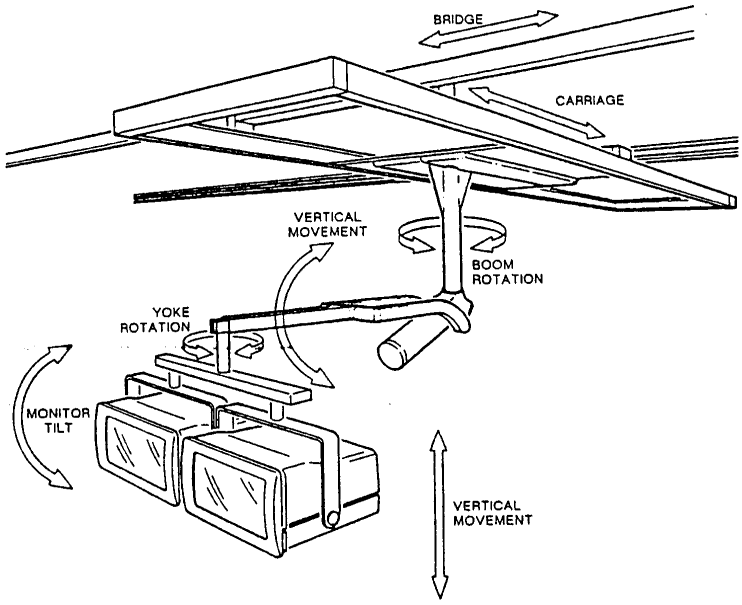


Figure 3-30 CRT Monitor Suspensions

Section 7.0
LCD Monitor Suspension

7.1 Before You Begin

Because of the balance nature of the counterbalanced boom, **only SIEMENS monitors specified by GE Medical Systems should be used**. Do not substitute other monitors without approval from GE Medical Systems.

7.2 Identification of Parts

MODEL NUMBER	DESIGNATION
Rails:	
From B0134JA to B0228JA	Inboard stationary rails (1 pair)
Bridge with carriage plate(1). Choices are:	
B2057AG	7'–9" (2,36 m) length, or
B2057AE	9'–6" (2,90 m) length.
Monitor Suspension:	
2385123	Single Suspension for 1 Siemens LCD Monitor
2385125	Single Suspension for 2 Siemens LCD Monitor.
Ceiling cable drape kit for Europe and Asia.	
B2054EK	

Note (1): B2057JB Sleeve selection 2283393 short or 2283392 long is supplied or can be ordered.

Table 3-6 Model Identification

7.3 Product Description

The basic configuration allows one or two 18.1" (46 cm) monitors to be mounted on a Monitor Suspension frame. A Monitor Suspension frame contains the following primary parts:

- Stationary rails (selectable length) for bridge and monitor support, "x" movement,
- Bridge with carriage plate as "y" movement,
- Monitor support (with counterbalanced boom), as "z" movement.
- Ceiling cable drape kit for handling cables on the suspension.

Suspension frame. is shown in Figure 3-31

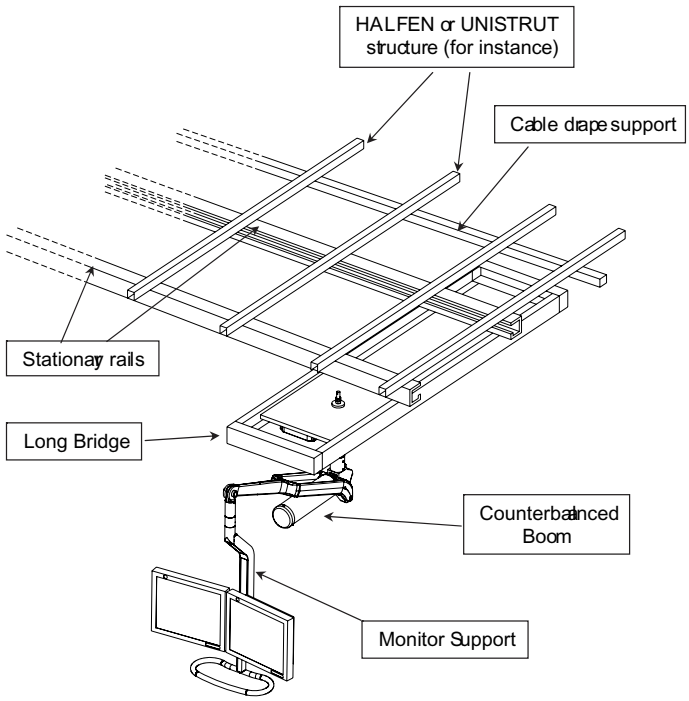


Figure 3-31 Suspension

Note: Only two types of monitors are currently supported: SIEMENS. The counter balance boom is normally adjusted and/or checked during the installation process.

7.4 Stationary Rail Selection

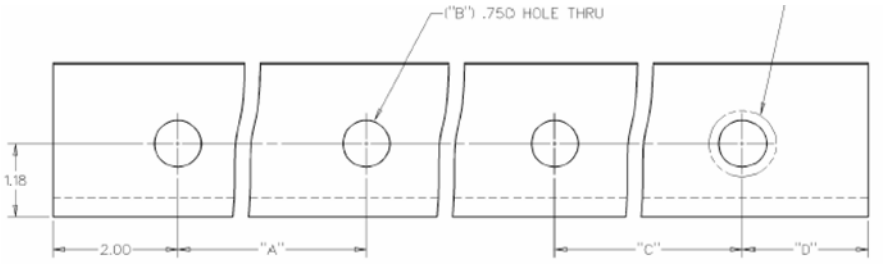


Figure 3-32 Rail Dimensions

Select rail lengths, ranging from 3.404 m (134 inches) to 5.791 m (228 inches), in increments of 4 inches (102 mm). Depending on the length, the origin of several holes is the same, but the ending may differ. It is recommended to check the reference number on the layout.

Rail length m (ft.)	A	C	D	INBOARD RAILS
3.404 (11’2”)	5*660.4=3,302	--	51	B0134JA
3.505 (11’6”)	5*660.4=3,302	102	51	B0138JA
3.607 (11’10”)	5*660.4=3,302	203	51	B0142JA
3.708 (12’2”)	5*660.4=3,302	305	51	B0146JA
3.810 (12’6”)	5*660.4=3,302	406	51	B0150JA

Table 3-7 Available Rails

Rail length m (ft.)	A	C	D	INBOARD RAILS
3.912 (12’10”)	5*660.4=3,302	508	51	B0154JA
4.013 (13’2”)	5*660.4=3,302	610	51	B0158JA
4.115 (13’6”)	6*660.4=3,962	—	102	B0162JA
4.216 (13’10”)	6*660.4=3,962	152	51	B0166JA
4.318 (14’2”)	6*660.4=3,962	254	51	B0170JA
4.420 (14’6”)	6*660.4=3,962	356	51	B0174JA
4.521 (14’10”)	6*660.4=3,962	457	51	B0178JA
4.623 (15’2”)	6*660.4=3,962 559		51	B0182JA
4.724 (15’6”)	7*660.4=4,623	—	51	B0186JA
4.826 (15’10”)	7*660.4=4,623	102	51	B0190JA
4.928 (16’2”)	7*660.4=4,623	203	51	B0194JA
5.029 (16’6”)	7*660.4=4,623	305	51	B0198JA
5.131 (16’10”)	7*660.4=4,623	406	51	B0202JA
5.232 (17’2”)	7*660.4=4,623	508	51	B0206JA
5.334 (17’6”)	7*660.4=4,623	610	51	B0210JA
5.436 (17’10”)	8*660.4=5,283	—	102	B0214JA
5.537 (18’2”)	8*660.4=5,283	152	51	B0218JA
5.639 (18’6”)	8*660.4=5,283	254	51	B0222JA
5.791 (19’)	8*660.4=5,283	406	51	B0228JA

Table 3-7 Available Rails

7.5 Room Requirements

7.5.1 Environmental

Environmental specification are determined by the monitored installed. Check the documentation provide with the monitor for the following specifications:

- Room climate
- Equipment heat output
- Magnetic field sensitivity
- Electric field sensitivity

7.5.2 Structural

7.5.2.1 Floor

None

7.5.2.2 Ceiling

The stationary rails for a monitor suspension are designed to support a double monitor suspension, including monitors.

Attachment of Rails to Structure

Attach stationary rails to structural steel using through–bolts into a concrete ceiling. Do not use screw anchors in direct tension.

Mount stationary rails directly to the ceiling slab or to flush–mounted UNISTRUT or HALFEN structures. In higher rooms with false ceiling, mount stationary rails to rigid vertical members hung from ceiling slab.

Securing a supplementary channel to the bottom of the vertical members and mounting the stationary rails to this channel can greatly reduce the number of vertical members. The stationary rail support structure must be levelled before installation can begin. Do not assume that any support structure is level within specified tolerances, particularly after removing suspensions from an existing room.

Bolt Specifications

The maximum load per bolt will not exceed 350 lbs (1557 N). Each bolt must not “pull out” or otherwise fail under a vertically downward “dead” load of 1440 lbs (6227 N).

Mounting Requirements

The stationary rail hole accepts bolts normally used with HALFEN or UNISTRUT (12 mm (or 1/2 inch) diameter).

SAE Bolts

Special SAE 1/2–13 bolts for mounting stationary rails are furnished with each pair of suspension rails. In all countries requiring metric, they must be obtained locally. Bolts used must be case hardened” Whiz–lock” flange bolts, requiring no separate flat washer or lock washer. Bolts of this type must be used to obtain adequate clearances and permit unrestricted longitudinal movement of the bridge along the rails: substitution is not recommended.

The furnished bolts are 1–1/2” long (GE part No. 59136). For lengths other than this, you may contact:

MacLean–Fogg Lock Nut Company

1000 Allanson Road

Mundelein, Illinois 60060

Phone 312–566–0010

(thread length from 3/4’ to 2’ available).

Metric Bolts

Special metric bolts are not supplied. Local Field Service supplies them according to the additional structure mounted on site. (UNISTRUT or HALFEN parts).

Rails

All stationary rails are chosen with a select length process. Detail of available length is illustrated in Section 7.4 (page 65).

Sources of Additional Information

For additional details on ceiling requirements for stationary rails, refer to Direction 46–019639, Advantx (VHLA) Stationary Rails Installation and Adjustment.

7.5.2.3 Wall requirements

None.

7.5.2.4 Minimum Room Door Size

Minimum door size is 0.8 m (32 inch) width and 1.4 m (56 inch) height. Minimum door sizes also apply to hallways and elevators.

7.5.3 Electrical Requirements

Electrical specifications are determined by the monitor(s) used. Please consult your monitor's documentation for the following specific electrical requirements.

- Line voltage specification
- Line frequency specifications
- Measured kVA load characteristics
- Input impedance
- Fuse or circuit breaker rating

7.6 Physical Dimensions

7.6.1 LCD Suspension Arm Assembly Dimensions

Dimensions and layout of the Double Monitor Suspension are shown in Figure 3-33.

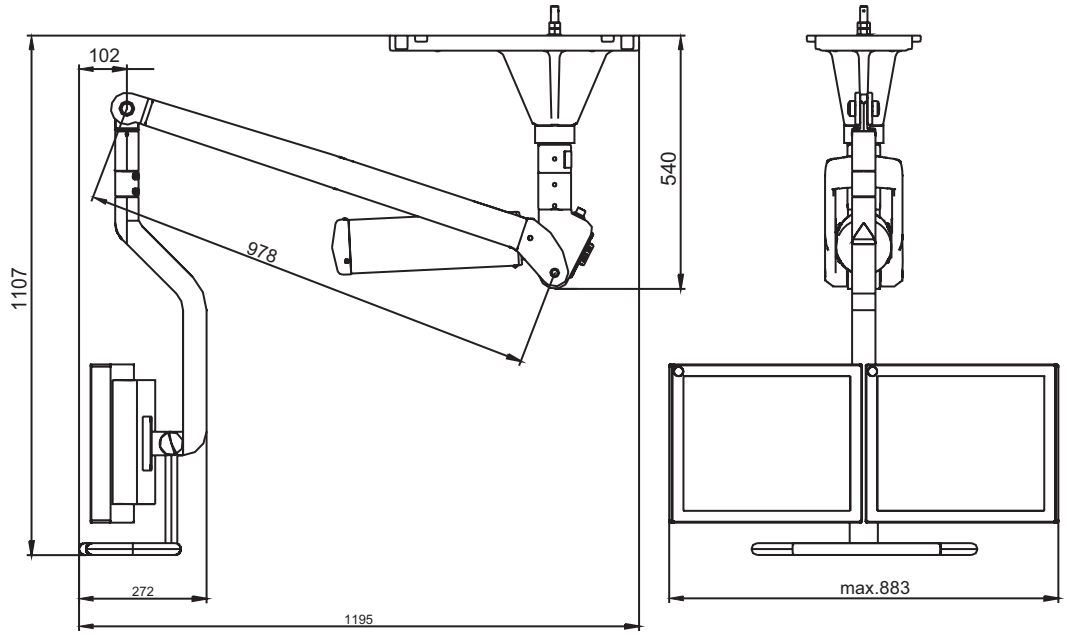


Figure 3-33 Double Monitor

Dimensions and layout of the Single Monitor Suspension are shown in the Figure 3-34

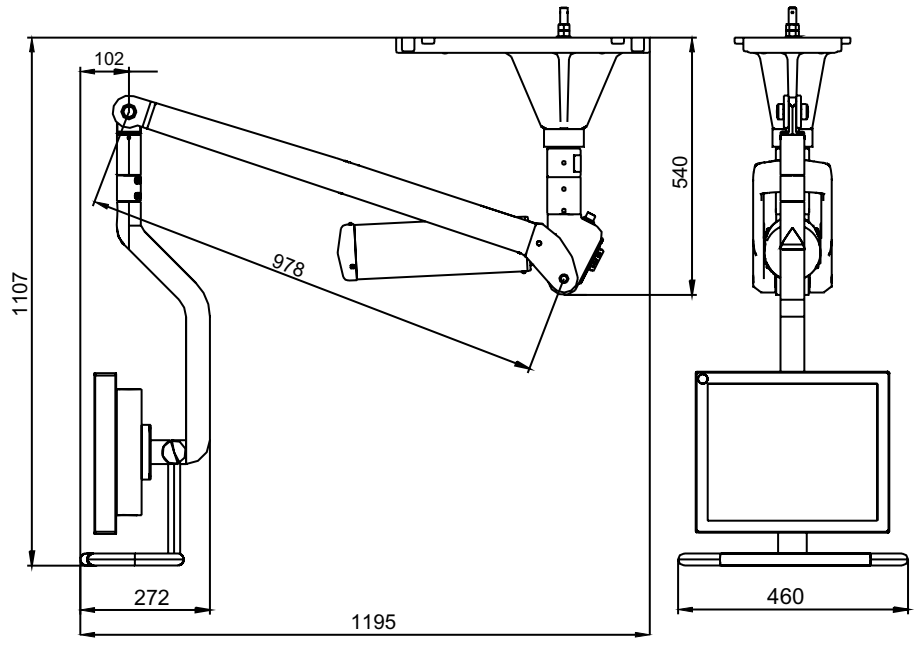


Figure 3-34 Single Monitor

7.6.2 LCD Suspension Weight w/o Monitor(s)

The weights below **DO NOT** include the monitor, cable and accessory's weight.

- Double Monitor Suspensions models: 60 kg
- Single Monitor Suspension models: 56 kg

7.6.3 LCD Suspension Assembly Dimensions

PRODUCT/COMPONENT	DIMENSIONS			WEIGHT kg (pound
	Length mm (inch)	Width mm (inch)	Height mm (inch)	
Inboard stationary rails	5791(1) (228)	63 (2.5)	84 (3.3)	
Short bridge with carriage plate	2390 (94.10)	652 (25.67)	155 (6.10)	
Long bridge with carriage plate	2916 (114.80)	652 (25.67)	155 (6.10)	
Monitor Suspension with counterbalanced boom and two LCDs	1195 (27.2)(2)	883 (62.0)	1107(42.72)	75 (300)

Note:

(1) Selection from 3404 mm (11 ft 2 in) to 5791 mm (19 ft).

(2) Depth instead of length (support)

Table 3-8 Length, Width, Height and Weight

7.7 Mounting Specifications

7.7.1 In-all Installations (America, Europe and Asia)

1.) Through bolts with a diameter of 12 mm (or 0.5 inch) must be used.

2.) In normal usage, each part of the ceiling rails must be fixed at the correct level.

3.) Tolerance of the fit is + or – 1.5 mm (0.06 inch).

7.7.2 European Installations

⚠ CAUTION

Potential for Suspension Failure.

Failure of suspension system can cause injury or death. If the correct plate(s) are not used, there's potential for the suspension to fail unexpectedly. Always use the correct plate.

In Europe, as required by Halfen, several different threaded plates with springs are provided. Note that they are different. European parts supplied by HALFEN.

Size	HALFEN Reference	UNISTRUT MARK		WITHOUT SPECIFIC MARK **	
		LOAD kg (lbs)	TORQUE WRENCH Nm (lbs-ft.)	LOAD kg (lbs)	TORQUE WRENCH Nm (lbs-ft.)
M12	PT 2128 or PT 2114*	700 (1,543)	55 (40.6)	500 (1,102)	36 (26.55)

Note: * Threaded plate, ** New parts

Table 3-9 Halfen Supplied Parts

Check parts supplied before beginning installation of the suspension. Examples of UNISTRUT or HALFEN parts are shown in Figure 3-35.

Figure 3-35 UNISTRUT or HALFEN parts identification

7.7.3 Physical Dimensions

Figure 3-36 shows the physical dimensions of the Monitor Suspension with a long bridge.

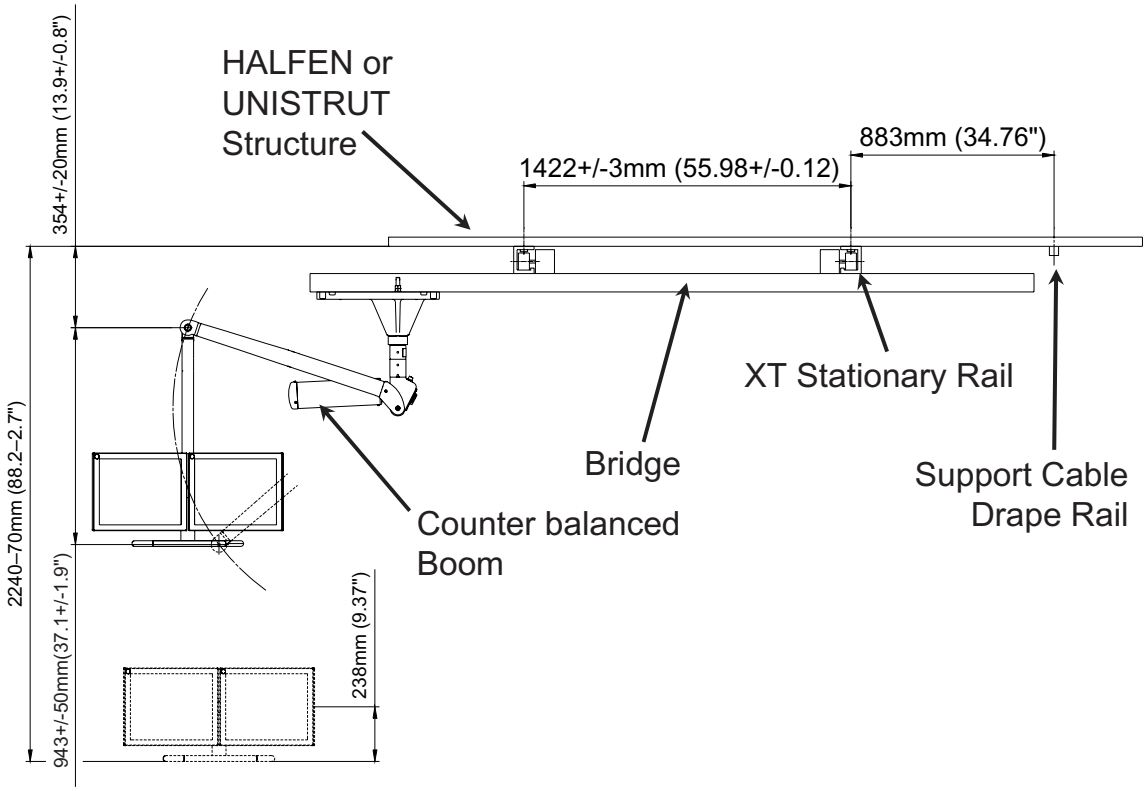


Figure 3-36 Side View

Figure 3-36 shows the limits for ceiling structures in normal use. Middle of screen distance cannot be greater than 2000 mm (6.56 ft.). This means that ceiling height is approximately 3 m (9.8 ft.).

Figure 3-37 shows the Monitor Suspension (with Long bridge) dimensions in top view.

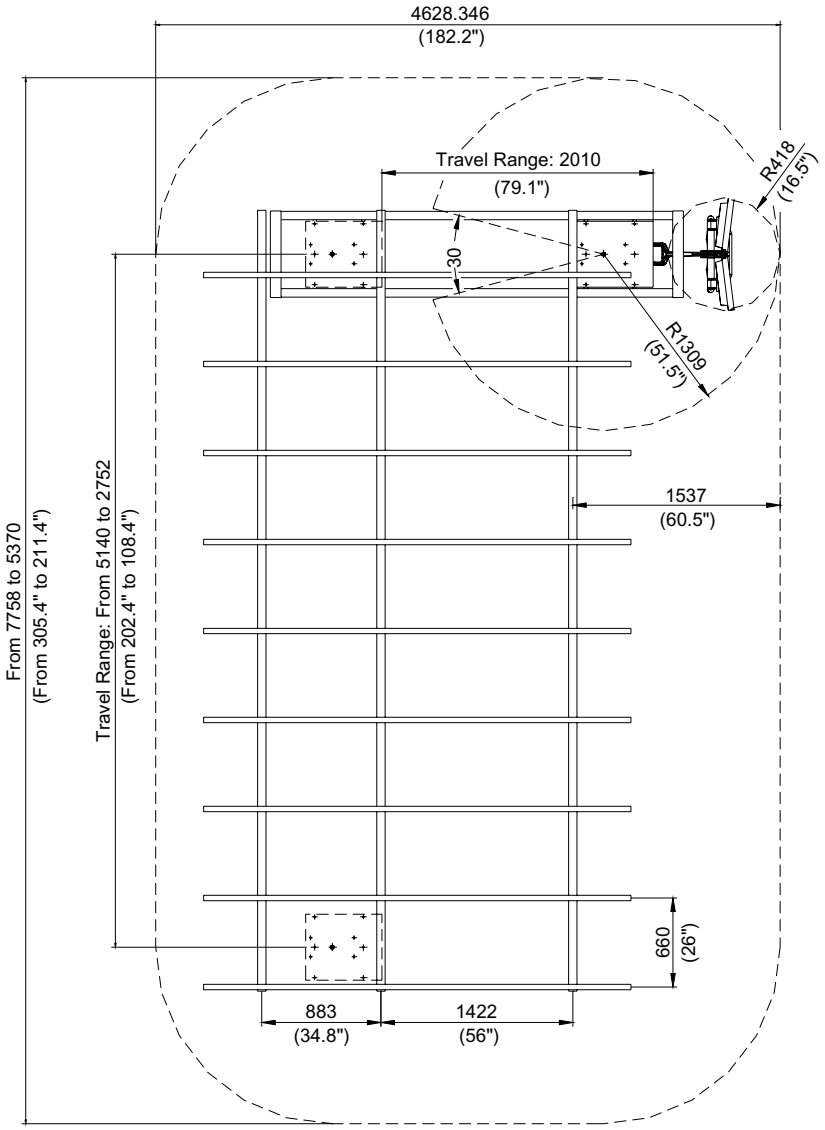


Figure 3-37 Top View

7.8 Product Delivery Information

Table 4-1. Gives weights and dimensions of the equipment delivered.

PRODUCT/ COMPONENT	HEIGHT/WIDTH/LENGTH mm (INCHES)	WEIGHT KG (LBS)	METHOD OF SHIPMENT
Pair of stationary rails	130 x 205 x 5920 (5.1 x 8.1 x 233)	63 (139)(2)	Wood box
Bridge	180 x 730 x 2950 (7.1 x 28.8 x 116.2) (2)	90 (195) (2)	Card board box
Counterbalanced boom and monitor support	1280 x 670 x 1410 (1) (50.4 x 26.4 x 55.5)	60 (132.3)	Card board box on Pallet
Cable drape 3 x B2054EK B2055ED	60 x 2670 (2.4 x 105.2) 65 x 185 x 3000 (2.6 x 7.3 x 118.2		Card board box

Note: (1) Depth instead of length, (2) Maximum dimensions and weight

Table 3-10 Shipping Dimensions and Weights

Figure 3-38 and Figure 3-39 show the suspension's packaging.

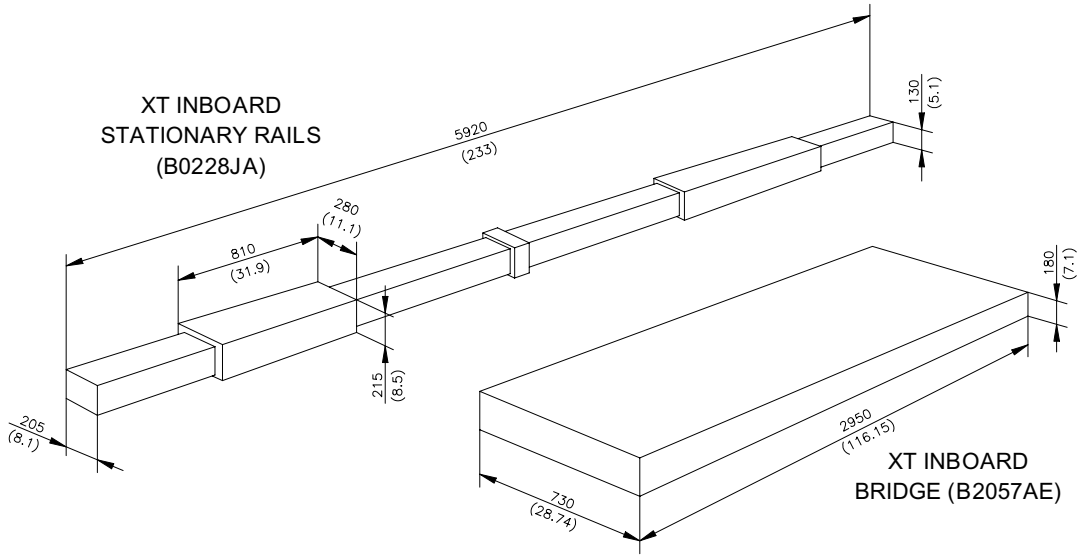


Figure 3-38 Suspension Shipping Package

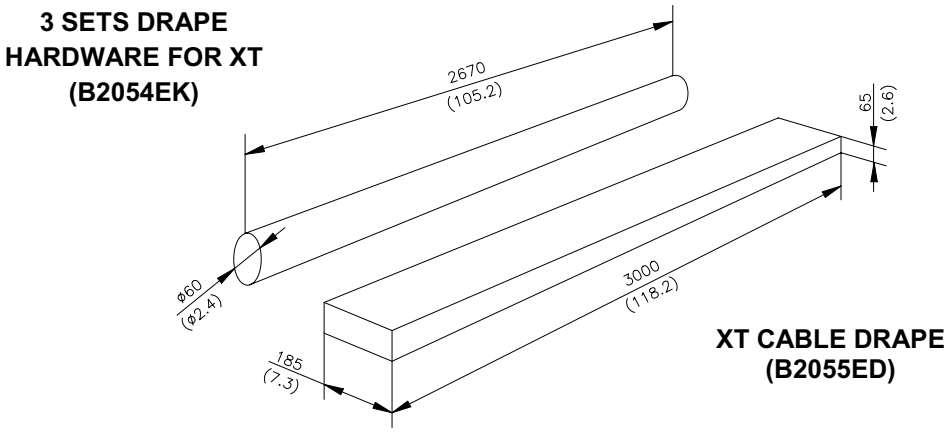


Figure 3-39 Suspension Shipping Package

The package size of the Counterbalanced Boom with Monitor Suspension is shown in Figure 3-40.

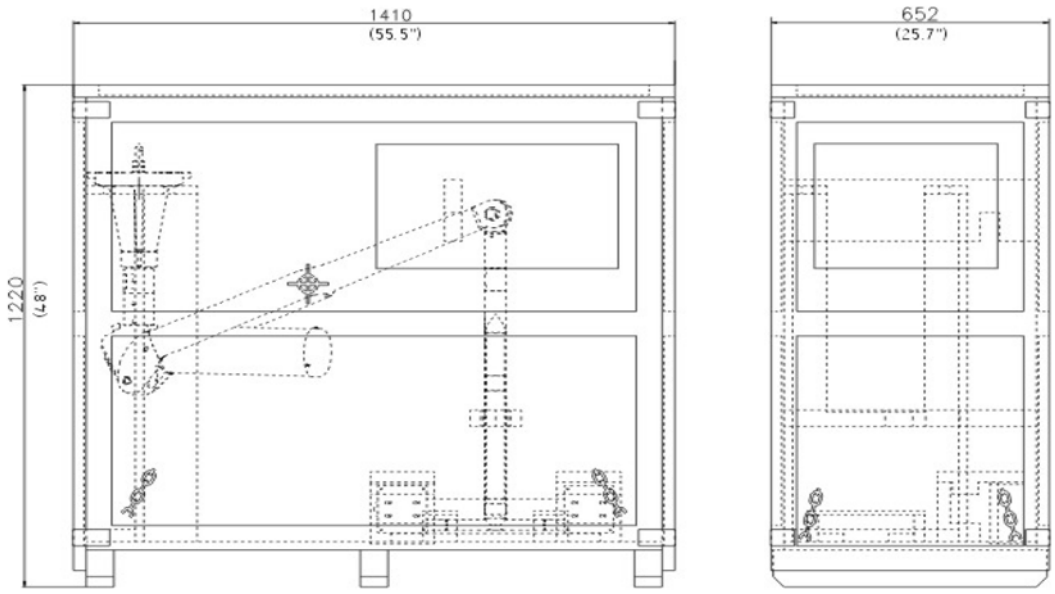


Figure 3-40 Boom Packaging

Section 8.0
OTS Suspension

The OTS comprises a system for suspending and supporting an X-ray tube unit, a collimator and TV monitors. It employs a spring counterpoise mechanism to balance these loads. The OTS's main components are the stationary rails, the bridge and the support column.

The stationary rails utilize extruded aluminum channels which are ceiling mounted. Depending on room length, these stationary rails can be ordered in any 4" (10.2 cm) incremental length between 11'-2" (3.4 m) and 19' (5.8 m). The spacing between these stationary rails accommodates an overhead mounted bridge structure.

The bridge length is 10'-1/2" (3.06 m) and the bridge width is 25" (63.5 cm). The bridge end caps are 25-5/16" (64.3 cm) wide excluding two 1/4" (6.4 mm) high fastener heads.

Cables to and from the OTS Suspension are attached to the OTS bridge and stationary rails by a cable drape system.

The TV Monitor Support is designed to support one monitor at a single fixed height above the floor or four monitors at a single fixed height above the floor or one or two monitors counterpoised with variable height above the floor.

8.1 Weights

COMPONENT	NET WEIGHT (LBS.)	NET WEIGHT (KGS.)
2 STATIONARY RAILS [19' LONG (5.79 m)]	138	62.6
BRIDGE AND CARRIAGE DOLLY	148	67.1
CARRIAGE AND COLUMN ASSEMBLY	243	110.2
TUBE SUPPORT	27	12.2
X-RAY TUBE UNIT	65	29.5
AUTO COLLIMATOR	31	14.1
CABLES AND MISCELLANEOUS PARTS	45	20.4
TOTAL	697	316.1

Table 3-11 OTS RAD Suspension Weights

COMPONENT	NET WEIGHT (LBS.)	NET WEIGHT (KGS.)
BRIDGE AND CARRIAGE DOLLY	143	64.9
CARRIAGE, FIXED HEIGHT SUPPORT AND MONITOR CRADLE	40	18.1
17" TV MONITOR	55	25
TOTAL	265	120.2

Table 3-12 TV Monitor Suspension Weights

8.2 Dimensions and Layout

Figure 3-41 shows basic overall dimensions for an OTS Suspension. Figure 3-29 and Figure 3-30 show basic overall dimensions for a TV Monitor Suspension. Figure 3-42 through Figure 3-28 give layout dimensions for a typical OTS Suspension System. The equipment arrangements shown are

generally preferred since they result in good utilization of equipment for the most commonly used procedures.

Table 3-15 lists major layout factors and concerns which need to be considered. Carefully check room layouts for adequate radiographic coverage, necessary clearances and provision for related equipment. Good judgement is required to avoid compromising important features. There must be ample maneuvering space allowed for the hospital cart and for personnel around the table. Also, the number of bridges on the same set of stationary rails determines overall travel capability for any one of them.

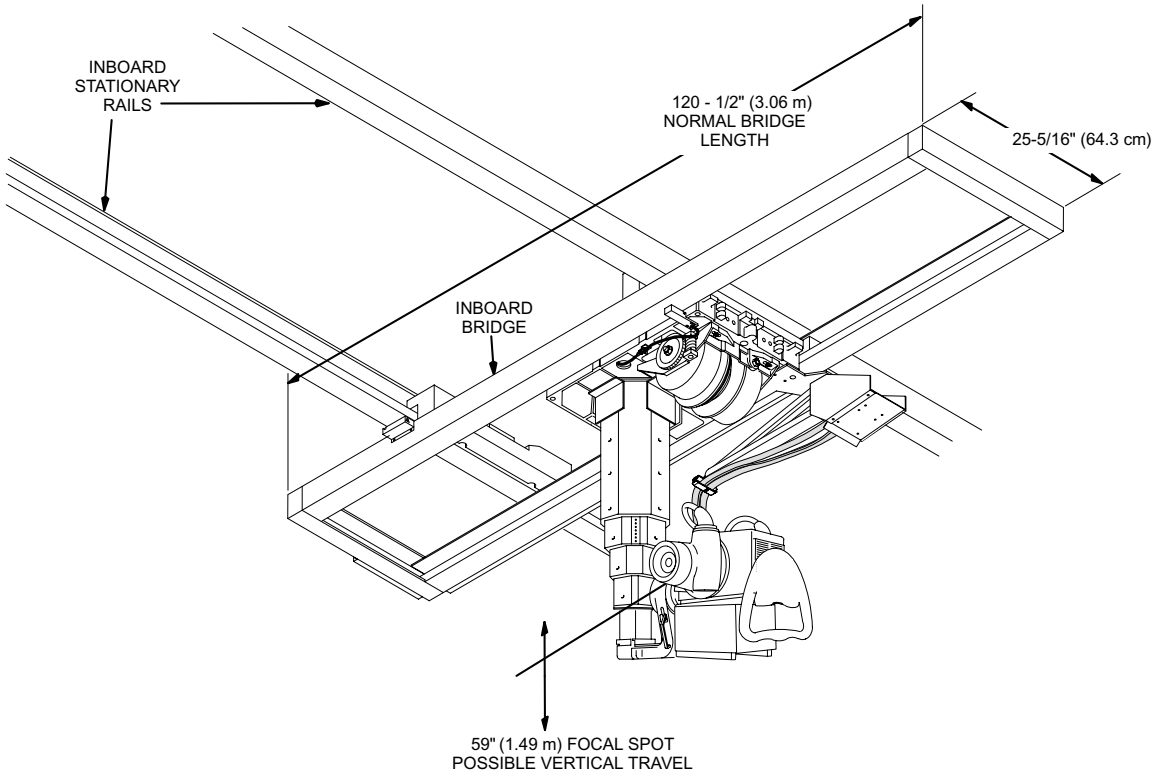
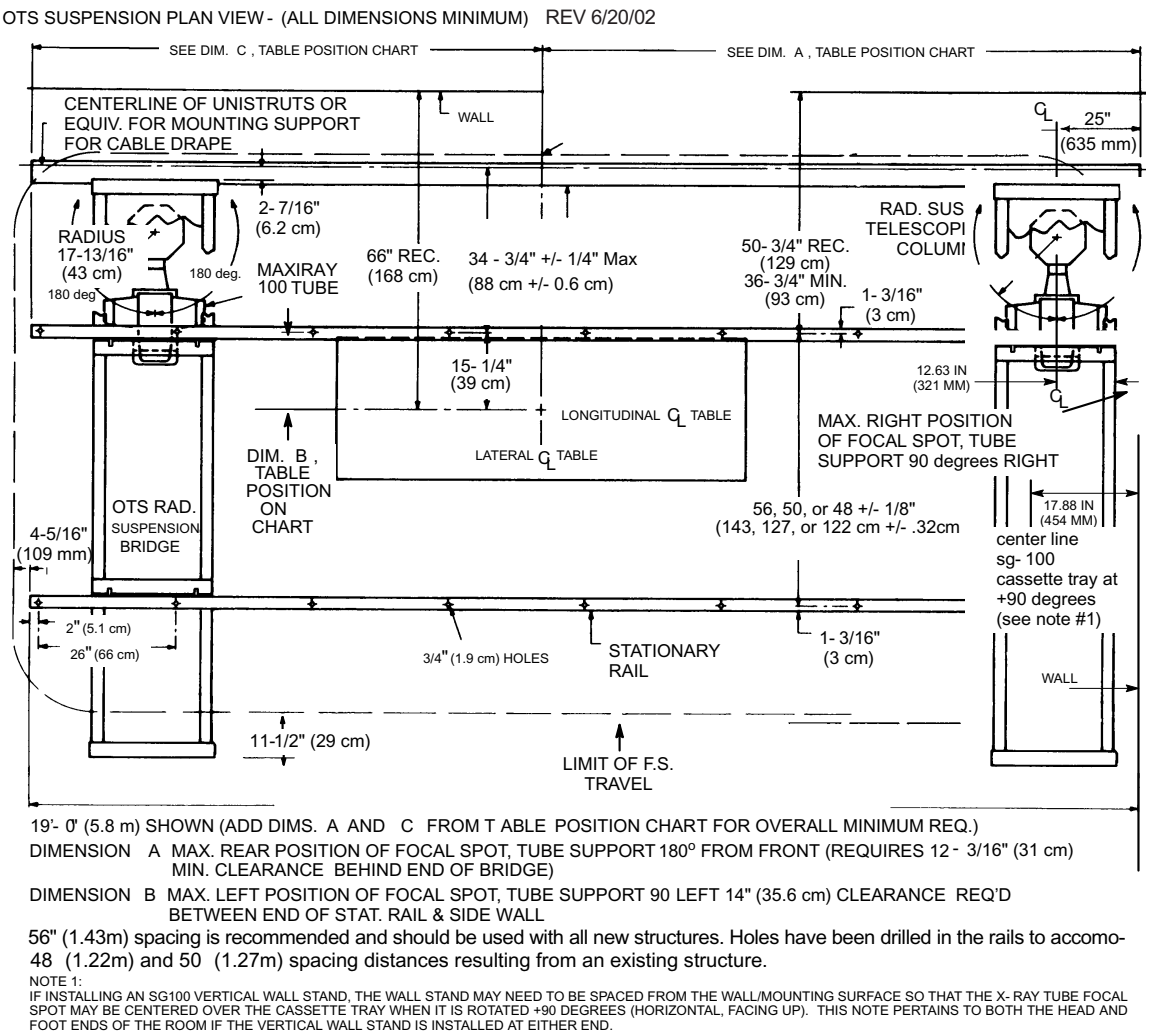


Figure 3-41 OTS Suspension



19'- 0' (5.8 m) SHOWN (ADD DIMS. A AND C FROM T ABLE POSITION CHART FOR OVERALL MINIMUM REQ.)

DIMENSION A MAX. REAR POSITION OF FOCAL SPOT, TUBE SUPPORT 180° FROM FRONT (REQUIRES 12 - 3/16" (31 cm) MIN. CLEARANCE BEHIND END OF BRIDGE)

DIMENSION B MAX. LEFT POSITION OF FOCAL SPOT, TUBE SUPPORT 90 LEFT 14" (35.6 cm) CLEARANCE REQ'D BETWEEN END OF STAT. RAIL & SIDE WALL

56" (1.43m) spacing is recommended and should be used with all new structures. Holes have been drilled in the rails to accomo- 48 (1.22m) and 50 (1.27m) spacing distances resulting from an existing structure.

NOTE 1:
IF INSTALLING AN SG100 VERTICAL WALL STAND, THE WALL STAND MAY NEED TO BE SPACED FROM THE WALL/MOUNTING SURFACE SO THAT THE X- RAY TUBE FOCAL SPOT MAY BE CENTERED OVER THE CASSETTE TRAY WHEN IT IS ROTATED +90 DEGREES (HORIZONTAL, FACING UP). THIS NOTE PERTAINS TO BOTH THE HEAD AND FOOT ENDS OF THE ROOM IF THE VERTICAL WALL STAND IS INSTALLED AT EITHER END.

Figure 3-42 OTS Suspension Plan View - (All Dimensions Minimum)

	ALL DIMENSIONS MINIMUM FOR CONDITIONS SPECIFIED	DISTANCE
A	44" SID with table vertical and cable draped.	67" (170.2 cm)
B	36" Focal Spot to table center line (cross table, rear to front).	17.25" (43.8 cm)
C*	Required to park the OTS Suspension - table @ 15° Trendelenburg.	73.75" (187.3 cm)
C*	Required to park the OTS Suspension - table @ 30° Trendelenburg.	79.5" (202 cm)
C*	Required for table @ 35° and Intelligent Digital Device @ 40" SID.	60" (152 cm)
* TO AVOID COLLISION WITH Intelligent Digital Device.		

Table 3-13 R&F Table Position Chart

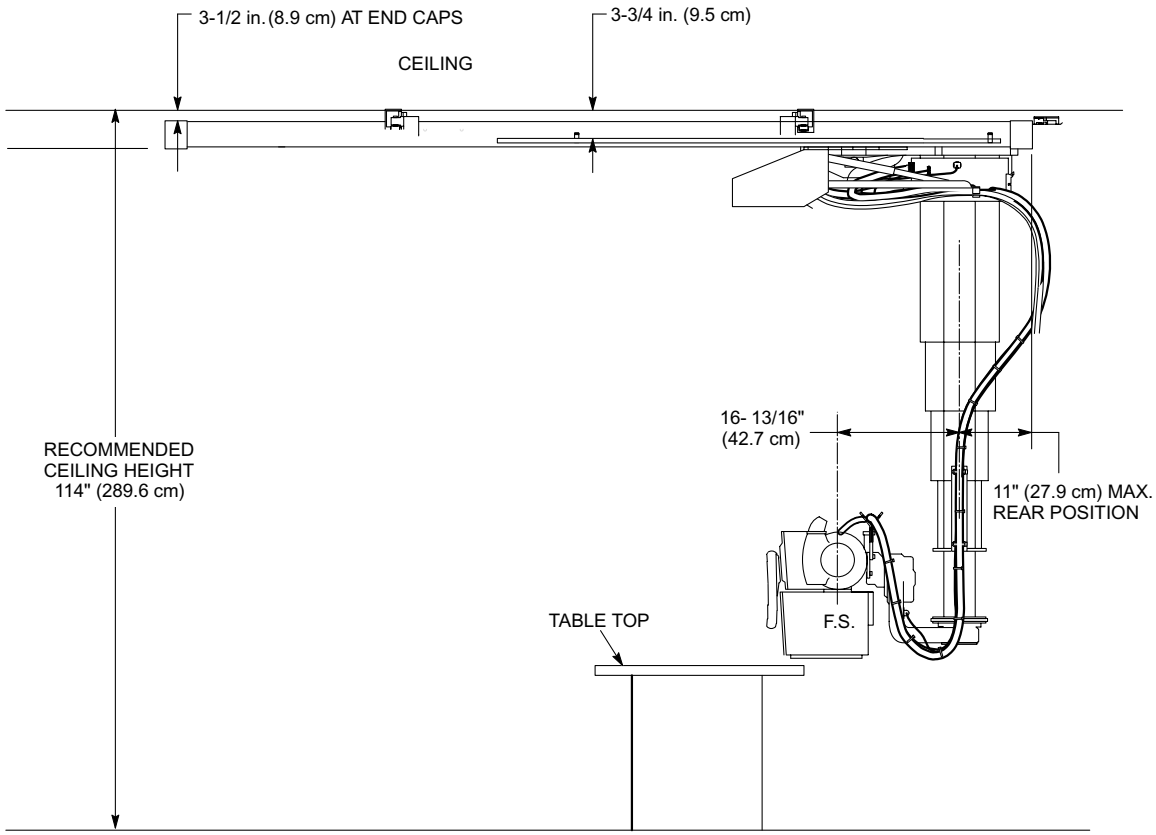


Figure 3-43 OTS Suspension - Foot End View

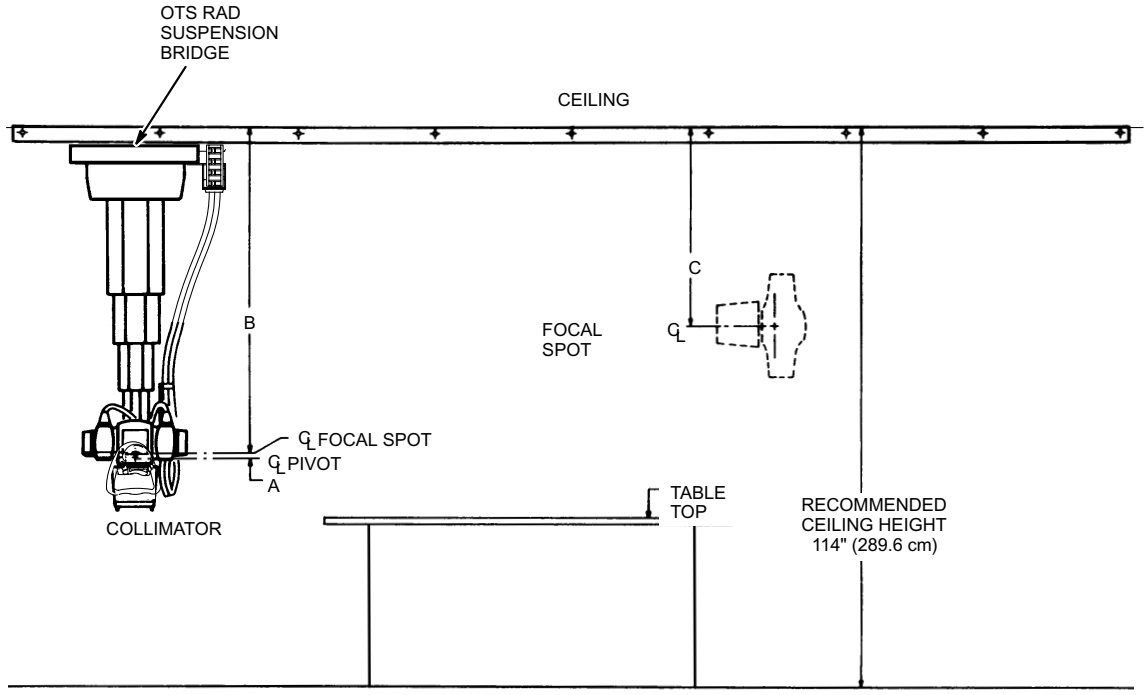


Figure 3-44 OTS Suspension Side View

TRAVEL LOCATION	DIMENSIONS WITH THE MAXIRAY 100 TUBE UNIT	MIN.	MAX.
A	FOCAL SPOT ABOVE TUBE PIVOT POINT	13/16" (2.1 cm)	
B	COLLIMATOR POINTED DOWN (VERTICAL)	28-1/16" (71.3 cm)	87-1/16" (221.1 cm)
C	COLLIMATOR POINTED SIDEWAYS (HORIZONTAL)	28-7/8" (73.3 cm)	87-7/8" (223.2 cm)

Table 3-14 OTS Suspension Vertical Travel Limits

FACTORS TO BE CONSIDERED	PERTINENT INFORMATION
1.) Vertical operating range of OTS Suspension.	Generally, a 9'-6" (2.9 m) stationary rail height is recommended. At 9'-6" (2.9 m), the OTS Suspension has these vertical limits (with Maxiray 100 Tube Unit): Max. Source-to-Image Distance = 85-15/16" (2.18 m). Min. Source-to-Image Distance = 26-15/16" (68.4 cm).
2.) Table top extension towards ceiling.	At lower stationary rail heights, table top extension with the table vertical should be curtailed to avoid collision with the suspension bridges.
3.) Distance between center lines of ceiling mounting bolt holes in stationary rails. 56" (1.43m) spacing is recommended and should be used with all new structures. Holes have been drilled in the rails to accommodate 48" (1.22m) and 50" (1.27m) spacing distances resulting from an existing structure.	56" (1.4 3 m), or 50" (1.27 m), or 48" (1.22 m) Adjustment is provided to permit a +/-1/4 inch (+/- 6 mm) variation of this span; however, this tolerance does not have anything to do with degree of parallelism of the stationary rails, which must be held to +/- 1/8" (+/- 3 mm)
4.) Minimum overall room dimension, front-to-back, without modifying basic structure.	124-1/4" (3.2 m)
5.) 36" (91.4 cm) focal spot to table center-line distance for cross table radiography, rear to front.	50" (1.27 m) minimum required from longitudinal center line of table to center line of support rail for cable drape or concealment.
6.) When using 3-1/2" X 3-1/2" (8.9 cm X 8.9 cm) posts (Cat. #B2054FH) and structural steel channel to support stationary rail.	Allow for width of channel between wall and stationary rail. Overall length must include stationary rail length plus columns at each end. Minimum recommended channel size 2"x 8" x 11.5 Lb./Ft. (5.1 cm x 20.3 cm x 17.1 kg/m).
7.) Clearance for longitudinal shift top excursion. Allow clearance for film changer or cart work at head end of the table.	Preferably, there should be walking space between the end of the extended table top and any obstruction.

Table 3-15 OTS Suspension Layout Factors

FACTORS TO BE CONSIDERED	PERTINENT INFORMATION
8.) Clearance at end of stationary rail for RAD tube unit 90 degrees from front.	14" (35.6 cm) clearance required between end of stationary rail and side wall. (Requirements decrease if cable covers are used).
9.) Number of bridges on the same set of stationary rails.	Each bridge adds 25-1/2” (64.8 cm) to the overall length requirement. Also, each bumper used between these bridges will add 1" (25 mm).
10.) Heat from overhead spotlights.	Caution should be taken to avoid excessive heat from overhead spotlights. Damage can occur to ceiling-mounted components and wiring if high wattage bulbs are used. Recommend low wattage bulbs no higher than 75 watts and use dimmer controls. Do not mount lights directly above areas where ceiling mounted accessories will be parked.

Table 3-15 OTS Suspension Layout Factors

Chapter 4
Planning Electrical Connections

Section 1.0
Routing Cables

1.1 General

Whenever possible, keep high-voltage and power cables away from any other cables. Use separate trough in duct system. Minimize cable length between the line disconnect and the system cabinet power unit to reduce voltage regulation problems and wiring costs.

For information about the cables supplied with your system, please refer to Chapter 8.

1.2 Conduit

Using conduit imposes some important considerations when used with this system. Of primary concern, the majority of cables used are pre-terminated. Pre-termination greatly simplifies interconnection but makes cable-pulling difficult because of the added dimensions of the connectors.

Conduit must be large enough to pass the cable and connector through with all other cables already in the conduit. Also, the size of conduit chosen must allow for future growth. There's the possibility of additional cables being added later as the system is developed and options are added.

The use of conduit is recommended for cables running overhead between rooms, especially when a diagonal run provides the shortest cable path.

1.3 Floor Ducts

Floor ducts have advantages when used with a single room or two adjacent rooms. Floor duct combines cabling in a neat, functional appearance with accessibility and room for expansion. The disadvantage is the amount of work required to install it, which is generally prohibitive in existing installations. For the same reason, it is impractical to attempt to add on to existing floor duct systems.

1.4 Raceways

GE Medical Systems offers "Raceways", which have some unique advantages. It's very practical for existing structures, since it is surface-mounted. There is no problem with pre-terminated cables, since the entire raceway system can be opened. They are easy to expand, compared to other means of routing cables. Our equipment cabinets have been designed for extensive interfacing with raceway.

Note: Additional Material Exists

For more information on raceway systems, refer to the following: Direction 46-014232, *Surface Raceway System.*

1.5 Power Distribution

R&F System power distribution consists of two major components that must either be customer supplied or GE Medical Systems supplied. These are:

- Feeder power from Hospital distribution center to R&F System cabinet load power unit (SKL1).
- Power distribution from the R&F System cabinet load distribution power unit (SKL1) to all the components in the R&F system room.

Usually the feeder power from the Hospital distribution center is customer supplied and the power distribution within the R&F system is supplied by GEMS.

Note: Additional Reference Material Exists

For hospital facility feeder power and ground requirements to the Precision 500D R&F system power unit, refer to: Chapter 6 - System Facility Power & Grounds.

For R&F system power distribution from the System cabinet power unit, refer to the following:

- Direction 2308534-100, *Precision 500D R&F System MIS Map*
- Direction 2307489-100, *Precision 500D R&F System Schematics*

1.6 Emergency Power

R&F rooms may be used as critical care areas. Primary power to the patient table auxiliary outlets should be distributed from the customer's emergency power branch. The auxiliary outlets may have life-support devices plugged in that must remain on during a power failure in the main branch. This will require a separate, independent circuit breaker so service personnel can remove all power from the table during installation and servicing without removing power from the room outlets. Always check local codes for emergency power requirements.

Section 2.0
Master Interconnect System (MIS)

System interconnect cables are described in MIS (Master Interconnect System) documents shipped with the system. These documents specify all interconnections between components within the system and its options.

Note: Additional Reference Material Exists

For specific Precision 500D R&F system interconnect maps and connection details, please refer to the following Service Manuals:

- Direction 2308534-100, *Precision 500D R&F System MIS Map*
- Direction 2307489-100, *Precision 500D R&F System Schematics*

Section 3.0
Hospital Network Connections

Systems are supplied with Broadband Ethernet hardware for use with Service diagnostics or placing electronic images on the Hospital image Ethernet Network. It's the purchaser's sole responsibility to provide an Ethernet connection to the system as shown in Figure 4-1 and Figure 4-2.

Several system hardware variations have been produced to date. Initially, Precision 500D systems were produced and delivered with media converters. **Recent design changes have eliminated the need for a media converter and therefore these systems no longer have media converters.** The following drawings show the ethernet connections to the hospital network for both systems; those that have a media converter and those that do not.

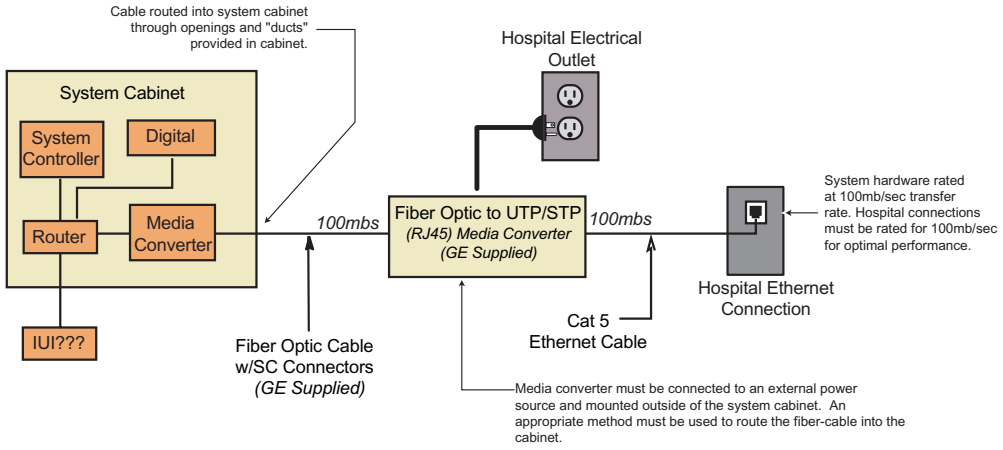


Figure 4-1 Ethernet Connections to Hospital Network with media converter

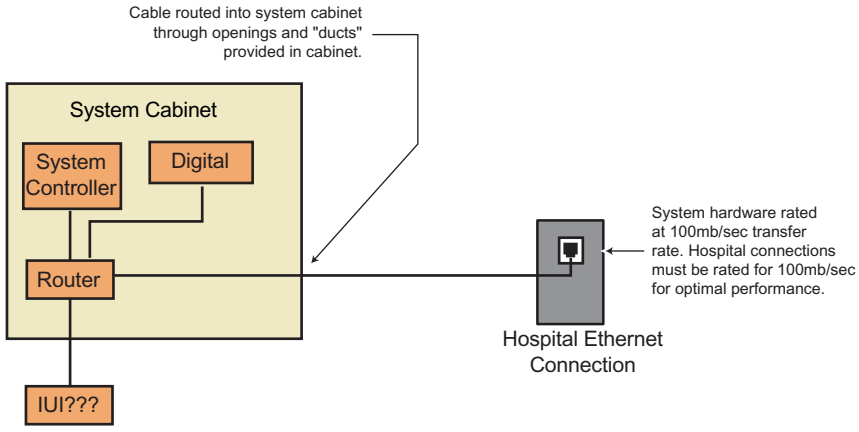


Figure 4-2 Ethernet Connections to Hospital Network without media converter (Current)

CUSTOMER REQUIREMENTS

- Customer must provide an electrical outlet of appropriate voltage rating within 3 feet (0.91 meters) of the System cabinet, if media converter is used.
- Customer must provide an ethernet connection and RJ45 connection within 3 feet (0.91 meters) of the System cabinet.
- Customer must provide a dedicated telephone connection within 3 feet (0.91 meters) of the IUI (Interactive User Interface) for use with a modem.

Chapter 5
Laying Out the Room

Section 1.0
Considerations

1.1 Radiation Protection

Because X-ray equipment produces radiation, you may need to take special precautions or make special site modifications. GE Medical Systems does not make recommendations regarding radiation protection. It is the purchasers responsibility to consult a radiation physicist for advisement on radiation protection in X-ray rooms.

Remember to locate the User Interface per local codes and regulations. The IUI must not be located anywhere there's a possibility of exposing the operator to radiation during use. This includes operation of the system using the handswitch. The handswitch is on the right side of the unit, and cannot be relocated to the left side.

1.2 Service Access

Allow appropriate space for service access of equipment. Consult component pre-installation directions for clearance information.

1.3 Clinical Access

Make sure that you plan the room with the following clinical access requirements:

- Provide easy access to the patient table. Stretchers and other mobile hospital equipment must reach the table quickly.
- Clinicians at the patient table must be able to communicate with assistants in the control area monitoring equipment from the R&F table.
- Operators in the control area must have easy access to the control console. However, position the controls (including hand switches) so the operator cannot take exposures while looking around or standing outside the control booth's lead glass window.
- Operators in the control area must have easy access to video recorders and injector programmers, film and video storage cabinets, and service and operating manuals.
- Consult customer on the number and location of nonelectrical lines (air, oxygen, vacuum, water, etc.) in the R&F room.

1.4 Peripheral Equipment

Consult hospital personnel regarding additional space requirements for the following types of hospital equipment:

- storage cabinets
- sinks
- oxygen stations
- IV apparatus

- injectors
- heart monitoring equipment
- crash cart

Section 2.0
HV Cables and Transformer

The HV transformer (located in the System Cabinet) should be positioned where minimum practical length of HV cables will be required. Cable lengths of over 80’ (24.39 m) are not recommended.

To derive cable lengths:

1.) Allow 23.2' (7.09 m) from the tube unit to the exit point on the bridge.

2.) Add the distance along the stationary rail. For exit from the end, allow the entire length of the stationary rail plus 1.5’ (45.7 cm).

3.) Add the distance from the end of the stationary rail to the HV transformer. Allow cable length for entry through the back of the transformer to the receptacles. Be sure the entire length of cable raceways is included.

Section 3.0
Typical Room Layout

See Figure 5-1 for an example of a typical room layout using a 40 cm Image Intensifier.

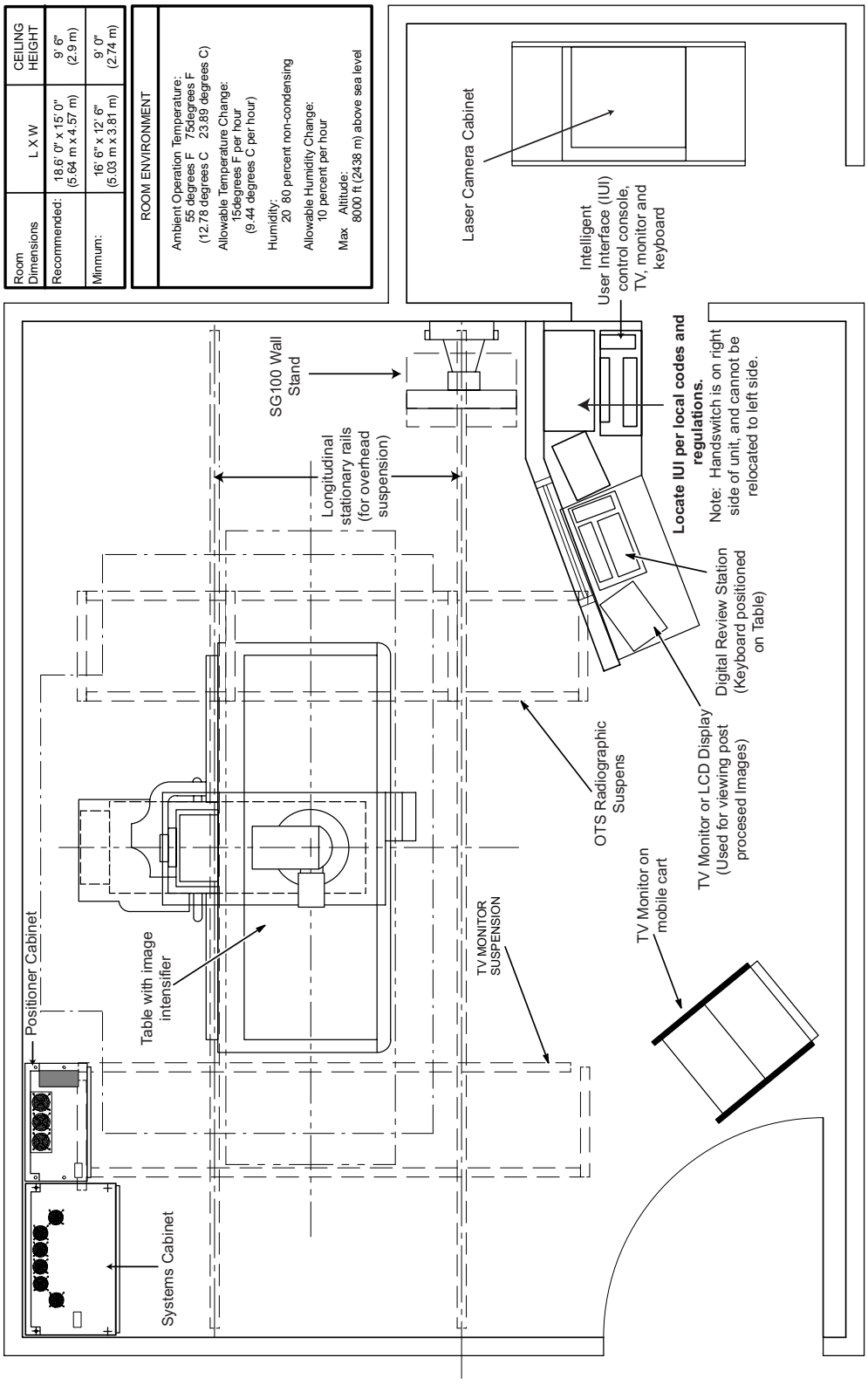


Figure 5-1 Typical Room Layout w/ 40cm II

Chapter 6
System Facility Power & Grounds

Section 1.0
Introduction

The purpose of this chapter is to ensure that the product is properly powered and grounded. Thus ensuring the proper operation of the product installed. The information in this chapter should be adhered to, unless there are written deviations approved by GE Medical Systems.

This chapter gives the sizes and procedures, on how to power and ground your system. If these power and grounding instructions are not adhered to, proper operation cannot be guaranteed. Any cost associated and found to be a result of non-conformity, as stated in this chapter, may result in additional cost charged back to the institution and/or their contractor.

Section 2.0
Electrical Power and Disconnects

2.1 Power Quality

The electrical power, from its origination to the system, must adhere to the wire size and transformer sizes, as prescribed in the installation drawings. The feeder voltage-drops as well as the supplying power must be within the given parameters. Sizing for feeder is usually calculated for a maximum of 2% voltage drop at the minimum voltage range. The actual feeder sizing may vary from the installation drawing for a facilities voltage.

Calculate feeder losses before you begin. Total feeder losses must be calculated to ensure that the losses are less than those specified in the installation drawings. Calculating the recommended minimum transformer sizing for feeding a system, ensures the transformer losses are less than half of the maximum regulation for the system.

Regulation is the calculated voltage losses for the entire power distribution system (No-Load Voltage minus Full-Load Voltage) divided by the no-load voltage minus the system losses (Full-Load Voltage):

$$\text{Regulation} = \frac{\text{NoLoadVoltage} - \text{FullLoadVoltage}}{\text{FullLoadVoltage}} \times 100$$

In the X-ray room, there must be a lockable facility power disconnect. It must be installed electrically before the equipment, for the purpose of locking out the power. This must be done before service to the high voltage is performed.

2.2 Electrical Requirements

All system components obtain their power from the power distribution unit (PDU) in the System cabinet. **Providing power and ground cables to the PDU are the responsibility of the**

customer. As an aid, wire sizes for various lengths of the power supply cable are shown in the following tables.

2.2.1 Generator Electrical Requirements

Note: Under Voltage trip circuit breaker required.

The main circuit breaker supplied by the customer must be sized in accordance to local regulations and have remote (under voltage) trip.

2.2.1.1 Generator Power Specifications

NOTICE

Potential for Equipment Damage.

Only WYE connected power source are currently permitted, due to current system (generator) design.

Input Voltage	380/400/415/440/460/480 VAC 3-Phase and ground without neutral
Daily Voltage variations	+/- 10% (VAC) In this range, the generator will operate without any de-rating in accuracy.
Nominal line frequency (Hz)	50 Hz / 60 Hz
Daily frequency variation (Hz)	+/- 3%
Line Impedance	The apparent line impedance guaranteed by the customer should be equal or less than the values indicated below, according to the voltage value and the commercial power of the generator. **Voltage range (V)Line Impedance (ohms)** **3 phase65KW 80KW** 380 0.118 0.096 400 0.131 0.100 415 0.138 0.113 440 0.154 0.125 480 0.185 0.150 Note: 400-480 VAC impedance values are based on IEC 601-2-7 standard. Values are interpolated from values in standard.
Inrush current	1000 Amp
HV cable type	USA: 22mm DSI (<= 165 pF/m) HV cable connector = Federal standard
Ground wire	Same as power cable

Table 6-1 Generator Power Specifications - JEDI

2.2.1.2 65kW Generator Wire Sizes & kVA Load Characteristics

WIRE RUN LENGTH	INPUT VOLTAGE					
	342-418 380	360-440 400	373-456 420	396-484 440	414-506 460	432-528 480
15m (50 ft.)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)
30m (100 ft.)	3 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)
46m (150 ft.)	2 (1/0)	2 (1/0)	2 (1/0)	3 (1/0)	3 (1/0)	4 (1/0)
61m (200 ft.)	1/0 (1/0)	1 (1/0)	1 (1/0)	2 (1/0)	2 (1/0)	2 (1/0)
77m (250 ft.)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1 (1/0)	1 (1/0)	1 (1/0)
92m (300 ft.)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1/0 (1/0)	1/0 (1/0)
107m (350 ft.)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)
122m (400 ft.)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)
138m (450 ft.)	300M (300M)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)

Table 6-2 JEDI Generator 3-Phase 65 kW - Minimum Wire Size

Item	Specification					
Phase	Three Phase					
Nominal line voltage (Vac)	380	400	420	440	460	480
Voltage range (Vac)	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%
Momentary line current (Amp)	147	140	133	127	122	117
Continuous line current (Amp)	7	6.7	6.2	6	5.7	5.5
Power demand (kVA)	97	97	97	97	97	97
Line frequency (Hz)	47/53 Hz and 57/63 Hz					

Table 6-3 JEDI Generator 3-Phase 65 kW - kVA Load Characteristics

2.2.1.3 80kW Generator Wire Sizes & kVA Load Characteristics

WIRE RUN LENGTH	INPUT VOLTAGE					
	380 VAC	400 VAC	415 VAC	440 VAC	460 VAC	480 VAC
15m (50 ft.)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)
30m (100 ft.)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)
46m (150 ft.)	1/0 (1/0)	1 (1/0)	1 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)
61m (200 ft.)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1/0 (1/0)	1 (1/0)	1 (1/0)
77m (250 ft.)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1/0 (1/0)
92m (300 ft.)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)
107m (350 ft.)	300M (300M)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)
122m (400 ft.)	350M (350M)	300M (300M)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)
138m (450 ft.)	400M (400M)	350M (350M)	300M (300M)	250M (250M)	250M (250M)	4/0 (4/0)

Table 6-4 JEDI Generator 3-Phase 80 kW - Minimum Wire Size

Item	Specification					
Phase	Three Phase					
Nominal line voltage (Vac)	380	400	420	440	460	480
Voltage range (Vac)	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%
Momentary line current (Amp)	190	180	170	163	156	150
Continuous line current (Amp)	7	6.7	6.2	6	5.7	5.5
Power demand (kVA)	125	125	125	125	125	125
Line frequency (Hz)	47/53 Hz and 57/63 Hz					

Table 6-5 JEDI Generator 3-Phase 80 kW - kVA Load Characteristics

2.2.2 Recommended Wall “Circuit-Breaker” Ratings

Power / Voltage	65 kW	80 kW
380 V	74 A / 600 V	95 A / 600 V
400 V	70 A / 600 V	90 A / 600 V
415 V	67 A / 600 V	85 A / 600 V
440 V	64 A / 600 V	82 A / 600 V
460 V	61 A / 600 V	78 A / 600 V
480 V	59 A / 600 V	75 A / 600 V

Table 6-6 Wall Breaker Parameter (Theoretical Current Values)

2.2.3 Wiring Electrical Power and Disconnects

This section provides additional data regarding power circuits and internal electrical circuits necessary to supply the correct power to the Precision 500D R&F system. Figure 6-1 shows the room power supply installed.

United States Key	Description
1	Feeder wire and grounding cable supplied by the customer. Wires are to be provided by customer with inlet to SKL1 with 2 meters or 79 inches for internal cabinet routing).
E/O[Note]	Emergency Off button. Typically located near a room access door and 1.5 meters (59inches) above floor. E/O supplied by GE and located in Catalog item A8091JH shipped with system.
XRL1	Yellow X-ray emission indicator lamp above the room access door. 220 V in Europe/120 V in USA with 25 W max. bulb (per local regulations). Wires and light fixtures must be supplied by customer.
DLK1[Note]	Open-door detector (as required per local regulations). SKL1 provides 24 VDC. Use cable supplied with system, if applicable.·
RML1	Room Light control, wires, and light fixtures must be supplied by customer.
CB	Circuit breaker with remote trip (under voltage) capabilities must be supplied by customer.

Note Use only a multi conductor, shielded, PVC/PVC, UL TYPE CM cable Alpha Wire. This wire is found in GE Catalog Item A8091JH as a “bulk” roll of wire (60 Meters). Material consists of two 16 awg (19/0.0117 strand) conductors. Shields must be grounded at both ends.

Table 6-7 Legend for Figure 6-1

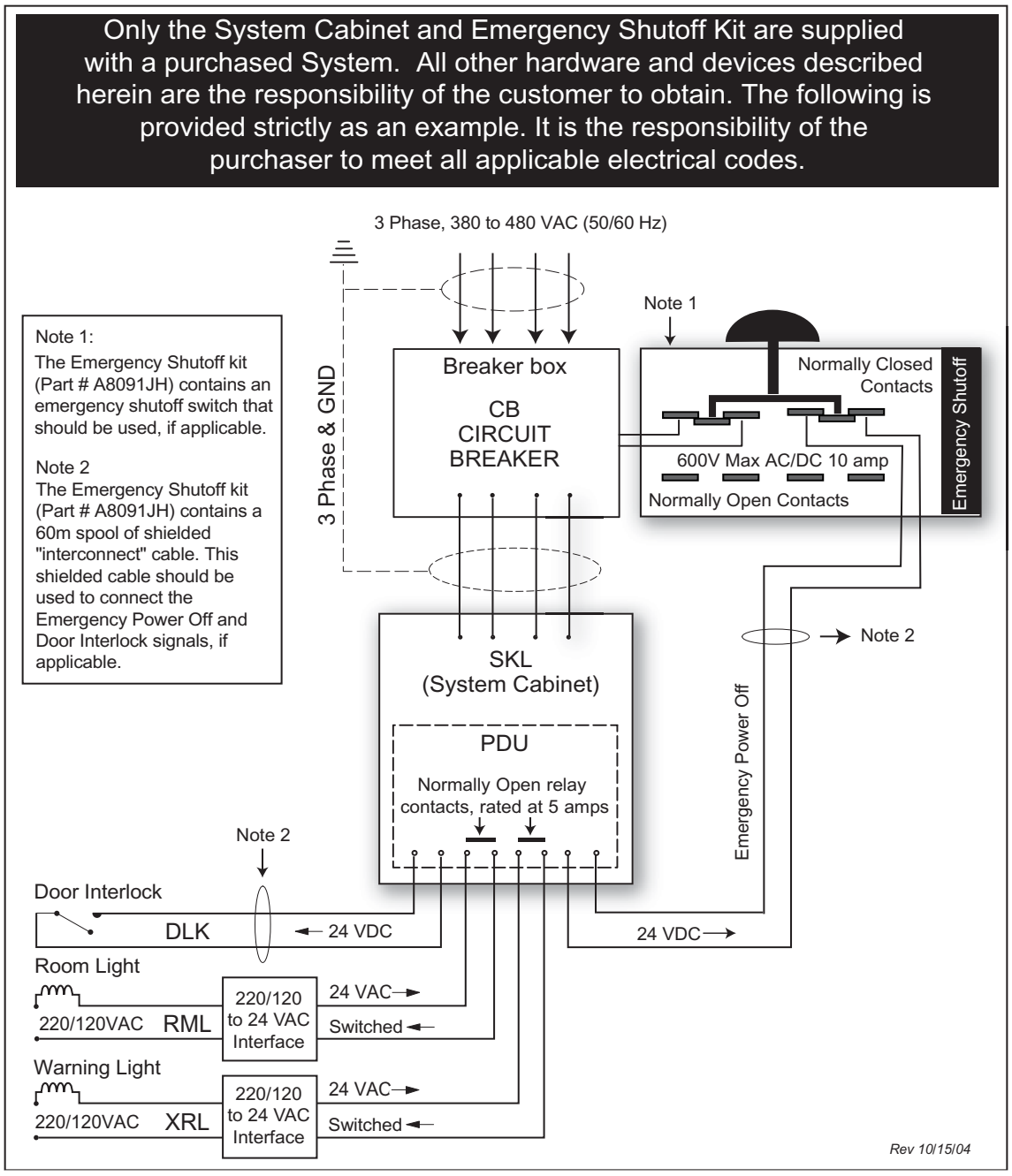


Figure 6-1 Room Power Supply

2.3 Multiple Emergency "OFF" Switches

Figure 6-2 shows how multiple Emergency Power Off switches could be wired.

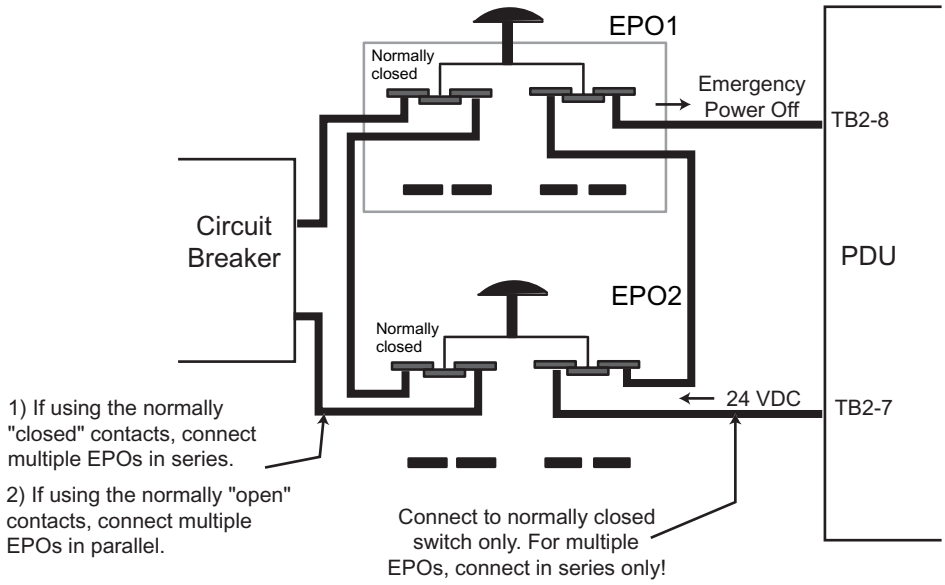


Figure 6-2 Wiring Multiple "Emergency OFF" (E/O) Switches

Section 3.0
Electrical Grounds

3.1 System and Facility Grounds

The ground for this system must originate at the system's power source and be continuous (i.e., transformer or first access point of power into a facility, and be continuous to the system power disconnect in the room). Ground connection at the power source must be at the grounding point of the "Neutral/Ground" if a "Wye" transformer is used, or typical grounding points of a separately derived system. In the case of an external facility, it must be bonded to the facility ground point at the electrical service entrance.

The "system" ground can be spliced using "High Compression Fittings" but must be properly terminated at each distribution panel it passes through. When it's terminated, it must be connected into an approved grounding block. Incoming and outgoing grounds must terminate at this same grounding block. Grounds must only be terminated to approved grounding blocks. Grounds must never connect directly to the panels, frames or other materials in a cabinet or distribution panel (refer to Figure 6-4).

3.2 Recommended Ground Wire Sizes

The ground wire must be copper and never smaller than 1/0 AWG.

The ground wire impedance from the system disconnect (including the ground rod) measured to earth, must not exceed 2 ohms (as measured by one of the applicable techniques described in Section 4 of ANSI/IEEE Standard 142 - 1982). Refer to Figure 6-5 and Figure 6-6 for typical equipment and methods to measure the different portions of the 2 ohm impedance.

3.3 Grounding the Invasive Procedure Room

Invasive procedure room shall have all exposed metal parts *that are likely to become energized,* grounded to an approved grounding bus located near the patient ground point (room ground point). Parts that are likely to become energized include such things as high intensity lights or injectors but would not include door frames or monitor booms. All room outlets and emergency power sources in the room shall have isolated ground receptacles with the primary grounding coming from the power source and a secondary ground bonded to the room ground point. For the receptacle or electrical box which powers the injector power module there must be one ground wire back to the room ground point even if the power module is in a separate room. The ground wire between the room ground point and the patient ground point shall be copper wire of AWG #2 and no more than 10 feet long.

Where a ground fault circuit is used for room outlets, the ground wire to the room ground point shall be connected on the primary ground of the ground fault detector to prevent tripping the detector. All ground wire impedances shall be less than 0.1 ohms, when measured to the room ground point.

3.4 Grounding Critical Care Areas (Rooms)

Typically, R&F rooms are used as a critical care area and require a special grounding system for patient safety. An equi-potential grounding system is recommended for meeting patient safety requirements.

Note: Additional Reference Material Exists

For general system grounding requirements and information on establishing an equi-potential grounding system, refer to:

- Direction 46-014505, *Electrical Safety - Equipment Grounding*
- Direction 46-014546, *Electrical Safety - Leakage Currents*

For specific system grounding requirements and information on establishing an equi-potential grounding system, refer to: Chapter 6 - System Facility Power & Grounds. For specific Precision 500D R&F system grounding maps and connection details, refer to the following:

- Direction 2308534-100, *Precision 500D R&F System MIS Map*
- Direction 2307489-100, *Precision 500D R&F System Schematics*

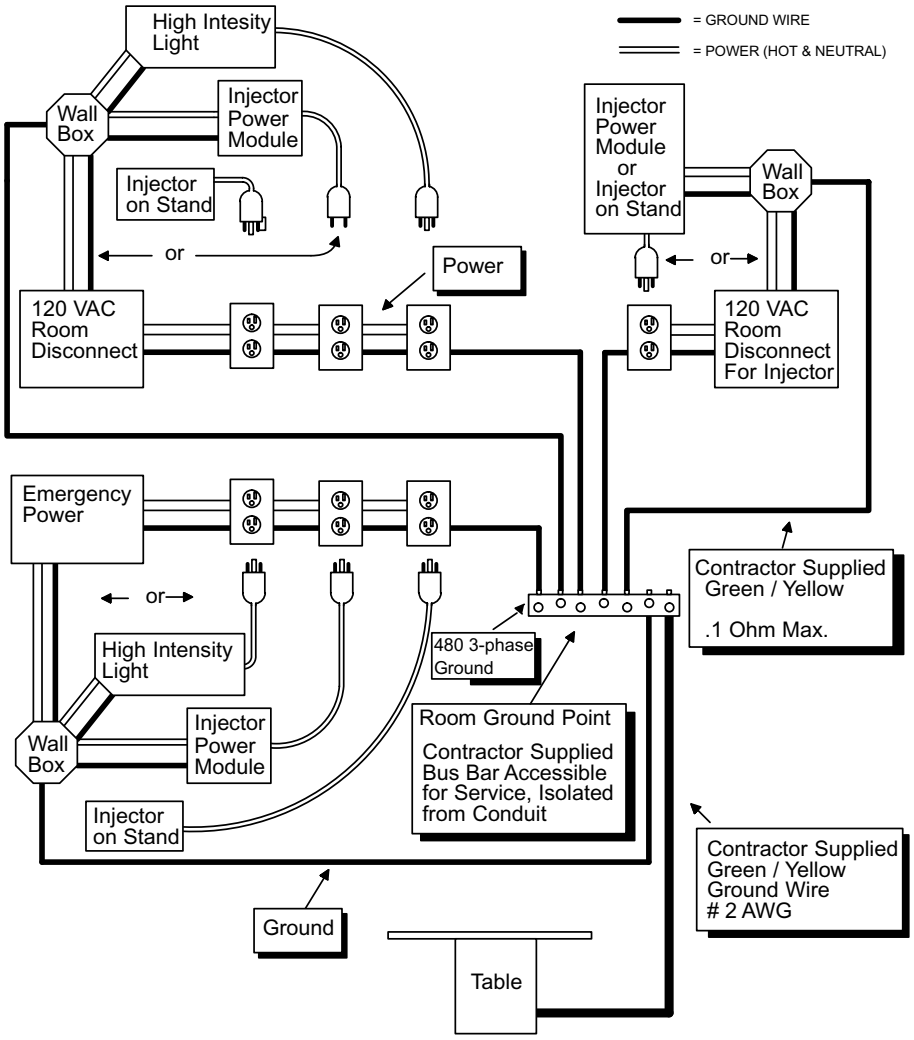


Figure 6-3 Room Ground Point Description

3.5 Final Checks, Before System Installation Can Begin

The customer must provide GE Medical Systems or its representative (installation specialist) evidence that grounds and electrical power meet GE Medical Systems' specifications.

Prior to product installation, a local service or installation specialist, to be determined by GEMS, will do a physical walk through of the exam suite to ensure the following:

1.) Ground wires are of the same size as the power feeder or AWG 1/0, whichever is larger.

2.) Grounds at junction points are connected properly and securely to an approved ground bus.

3.) Grounds within an enclosure are tied together by copper wire or to an appropriate buss bar (i.e., separate buss bars within an enclosure must be tied together with copper wire of appropriate size).

4.) Grounds originate at the power source (i.e., transformer or entrance panel into facility).

5.) Ground wires measure less than 2 ohms to earth.

You may use the following form to record the results of that inspection.

GROUND IMPEDANCE MEASURED TO BE _____ OHMS

Inspector's Name and Date: _____

Customer's Name and Date: _____

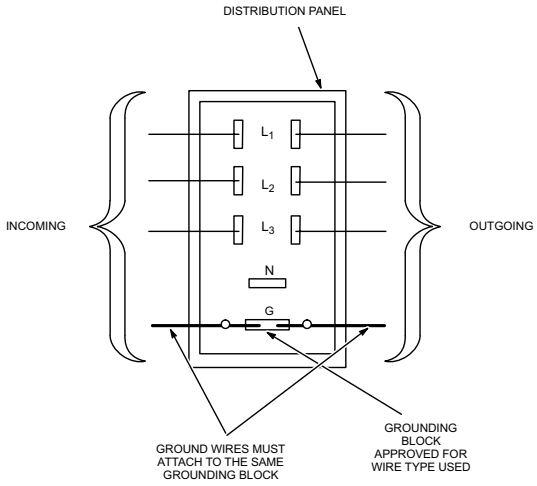


Figure 6-4 Ground Connection at Distribution Panel

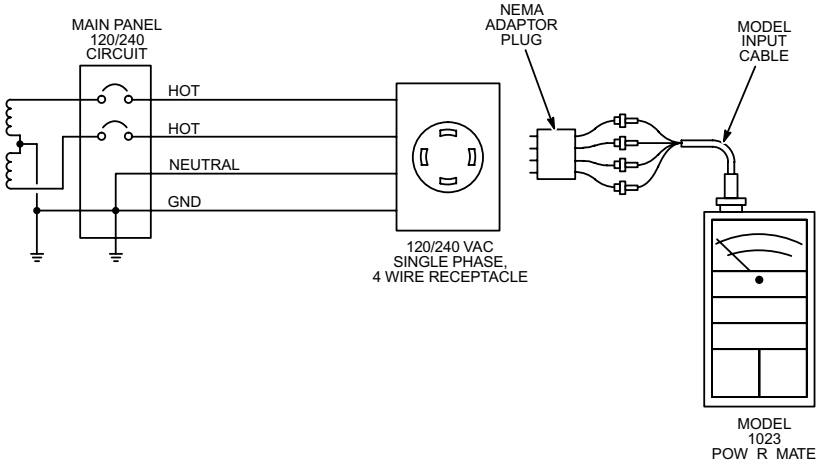


Figure 6-5 Wire Impedance Test

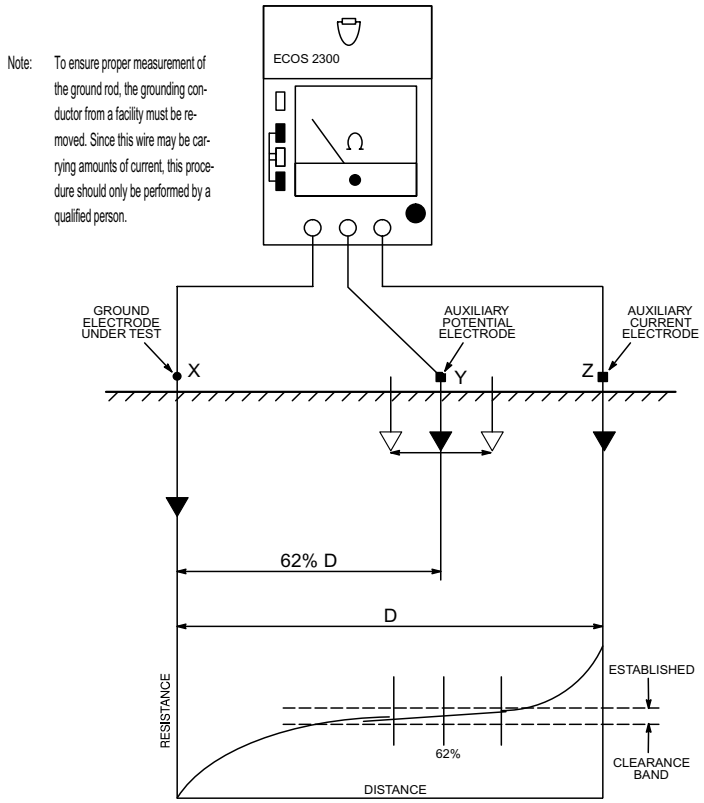


Figure 6-6 Ground Rod Impedance Test

Chapter 7
Planning Aids

Section 1.0
Delivery Information

Product or Component	Dimensions			Weight	Method of Shipment
	Height	Width	Depth		
R&F Table RFP3	55 in. (1.4 m)	42.2 in. (1.07 m)	100 in. (2.54 m)	2182 lbs. (990 kg)	Shipping Dolly
R&F Table Motor Base	62 in. (1.57 m)	37 in. (0.94 m)	33 in. (0.84 m)	1060 lbs. (481 kg)	Shipping Dolly
Intelligent Digital Device	28.25 in. (0.72 m)	51 in. (1.30 m)	31.5 in. (0.80 m)	300 lbs. (136.1 kg)	Box on Table
R&F Positioner Cabinet RFP1	81 in. (2.06 m)	52 in. (1.32 m)	29 in. (0.74 m)	901 lbs. (409 kg)	Shipping Dolly See Figure 7-1
40 cm (16 in.) Image Intensifier	33.5 in. (0.85 m)	34.6 in. (0.88 m)	41.3 in. (1.05 m)	-	Secured to Table Top
System Cabinet SKL1 P/N 2336900	75 in. (1.90 m)	35.7 in. (0.9 m)	29.7 in. (0.75 m)	1166 lbs. (529 kg)	Shipping Dolly See Figure 7-1.
Operator IUI	36 in. (0.91 m)	36 in. (0.91 m)	36 in. (0.91 m)	83 lbs. (37.6 kg)	Box
SG100 Vertical Bucky Stand	34.65 in. (880 mm)	89.16 in. (2265 mm)	33.07 in. (840 mm)	616 lbs. (280 kg)	Box
Overhead Tube Support OTS includes: carriage, collimator, tube and UIF	43 in. (1092 mm)	37 in. (940 mm)	47.5 in. (1207 mm)	490 lbs. (223 kg)	Crate/skid
Mobile LCD Monitor Cart	59 in. (1500 mm)	22 in. (560 mm)	22 in. (560 mm)	37 lbs. (17 kg)	Box
LCD Suspension	See Chapter 3 - System Physical Characteristics, Section 7.8 on page 73				
SG80 Wall Stand	37.01 in (940 mm)	94.88 in (2410 mm)	35.04 in (890 mm)	396.9 lbs (180 Kg)	Crate
SG80 Wall Stand with Spacer	37.01 in (940 mm)	94.88 in (2410 mm)	35.04 in (890 mm)	427.8 lbs (194 Kg)	Crate
SG120 Wall Stand	37.01 in (940 mm)	94.88 in (2410 mm)	35.04 in (890 mm)	485.1 (220Kg)	Crate

Table 7-1 R&F System Packing

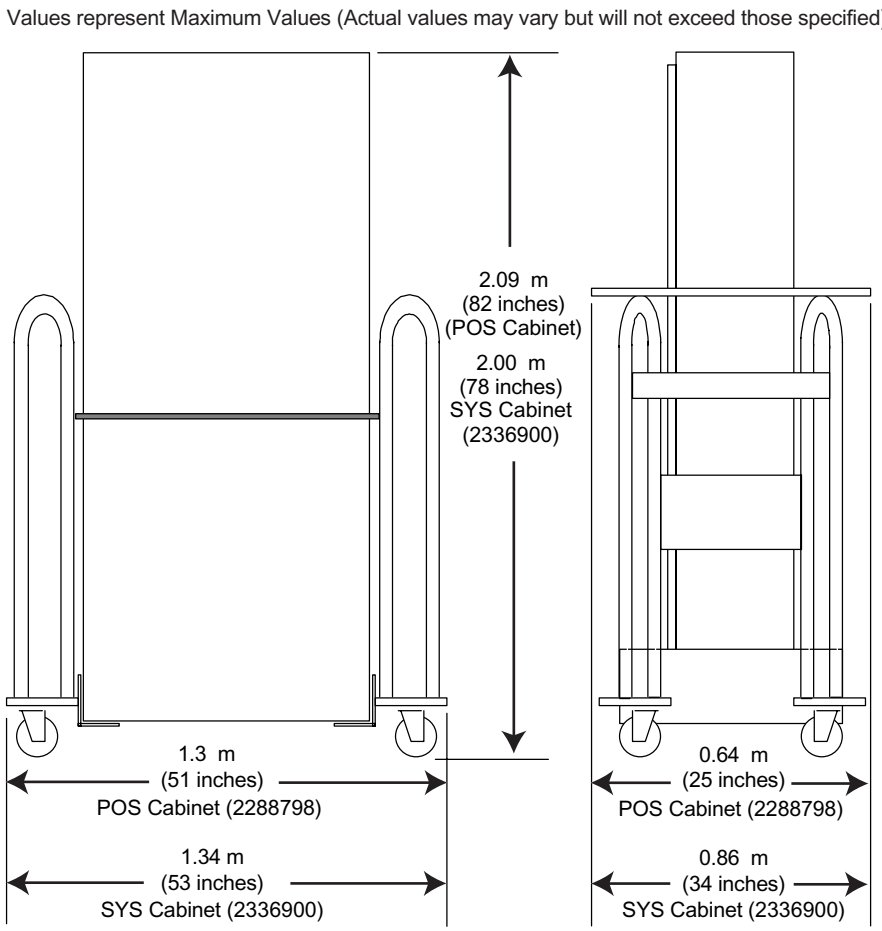


Figure 7-1 Positioner and System Cabinets on Shipping Dolly

Section 2.0
Materials and Tools

2.1 Tools and Materials Needed But Not Shipped With The Product

The following tools and material are needed to install the product:

- Assorted sizes of drywall “toggle” bolts (1/4”, 3/8”, and 1/2”)
- Floor anchors (Hilti™ HSL or equivalent, 3/8” x 2"; 1/4” x 2"; 3/4” x 5"; and 3/4” x4”)
- Plastic wall anchors
- Assorted hardware for termination of electrical connections (solder-less ring lug terminals and butt splices, AWG 2-18)
- Tie wraps, electrical tape and wire markers
- Tags for labelling incomplete work in accordance to OSHA and regulatory requirements
- Tag and lock-out equipment
- Assorted sockets (SAE and metric), drives, wrenches and torque wrench (Nm and ft.-lbs)
- Electric and hammer drill. Assorted masonry and high-speed bits in both metric and SEA sizes
- Assorted sizes of tongue and grove pliers, hammers, hex wrenches (metric and SEA), screw drivers and metal files

- Assorted sizes of wire cutters and strippers, ratchet and standard crimpers (AWG 0 and upwards), and a 75 watt soldering iron
- Heat and electrical tape
- Chalk line, plumb bob and assorted alignment tools (including squares, torpedo and 6-foot levels)
- Movers dollies, ladders, shop vacuum and push-broom
- Hacksaw and Sawzall™
- Level (Laser recommended)

2.2 Materials Provided with Product

The following items are provided with the product *(as part of the pre-install kit):*

- Grout and grout “dam” material
- Transformer oil and high voltage insulating grease
- Touch-up paint
- Wallstand (Optional) Baseplate Template

Section 3.0
Preparing the Delivery Route

1.) Step One – Sketch out the Route

Begin preparing Route Survey by sketching the area of the hospital or clinic which will receive the equipment. Include all areas on the delivery route from outside of building to destination. See sample sketch below.

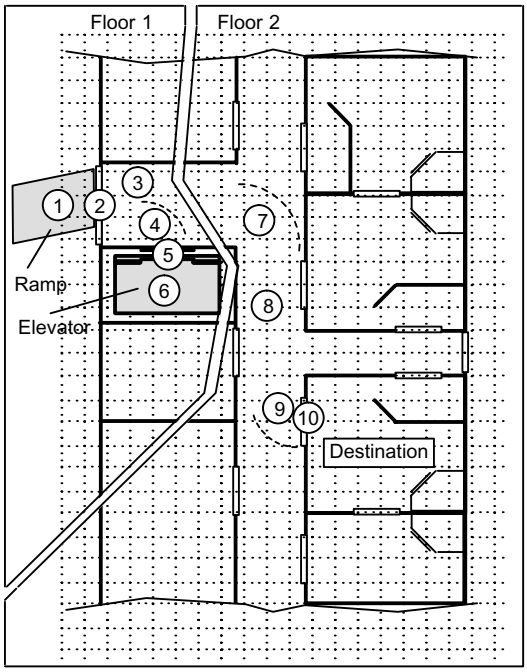


Figure 7-2 Sample Route

2.) Step Two – Survey the Route

Record all loading capacities, corridor widths, door openings, turning radii, flooring materials, elevator sizes, obstructions and so on for reference.

3.) Step Three – Check the Route

Verify equipment can actually be transported via the route determined in step 1.

Section 4.0
Pre-Installation Checklist/Worksheet

Delivery Date: _____ Sales Person: _____

Customer: _____ FDO No.: _____ Room # _____

Equipment: _____

Physical Requirements of Site	Completed
1.) Room size adequate for intended equipment configuration?	☐
2.) Floor and ceiling is strong enough for intended equipment and mounting methods approved – seismic regulatory codes considered?	☐
3.) Delivery route accommodates all intended equipment?	☐
4.) Radiation physicist consulted?	☐
5.) Necessary alterations made to circumvent obstructions?	☐
6.) Modifications to room finished?	☐
7.) Supports, platforms, suspensions, ceiling materials been provided?	☐
8.) Support structures installed for floor, ceiling, and wall mounted equipment?	☐
9.) Ceiling supports leveled?	☐
10.) Has floor been modified for cable ducts?	☐
11.) If drop-in ceiling is not used, is access panel provided (3 x 2 ft. minimum)?	☐
12.) Electrical service in place – at the ratings specified in pre-installation documentation?	☐
13.) Power available to operate power tools?	☐
14.) All non-electrical lines (air, water, oxygen, vacuum) installed?	☐

Interconnections	Completed
1.) Signal cable, power and grounding plans produced?	☐
2.) Necessary interconnection hardware, such as junction boxes, conduit or raceways, and fittings provided?	☐
3.) Interconnection hardware installed?	☐

Interconnections	Completed
4.) Flexible, stranded wire provided for System input power connection?	☐
5.) System “feeder” power cables pulled and sufficient length available at disconnect box for connections?	☐
6.) Interconnecting cables continuity checked, and labeled?	☐
7.) All high voltage cable lengths verified?	☐
8.) Interface information available for equipment?	☐

General	Completed
1.) Ceiling, walls, and floor clear of all obstructions?	☐
2.) Walls finished?	☐
3.) Finished floor installed?	☐
4.) Room lights installed?	☐
5.) Dust-creating work completed?	☐
6.) Old equipment within room removed?	☐
7.) Component positions clearly marked on floor?	☐
8.) Space available to store equipment?	☐
9.) Lock on door, or locked room available?	☐
10.) Room IP Addresses for DICOM and Broadband identified?	☐
11.) Dedicated inbound “dialup” phone line provided for InSite connection?	☐
12.) Optional media converter power supplies obtained (for UK or continental Europe)? *Media Converter - The power adaptor currently supplied with the Allied Telesyn media converter (AT-FS202) is rated for 120VAC operation only. For UK and continental European sites requiring 240 VAC input, the adaptor must be customer supplied. Contact Allied Telesyn ((see contact information supplied in Allied Telesyn installation guide, or find equivalent 240VAC to 12VDC/0.5A adapter.*	☐

Comments: _____

_____

_____

_____

_____

Inspection Date(s): _____

Chapter 8
System Cable Information

Section 1.0
Introduction

There are several variations of Precision 500 hardware. Use the cable tables that apply to the subsystem model numbers that are present.

Use the information to plan cable routing. In Section 2.0, lengths and characteristics by cable run number (run #) are described. Make sure you have the proper length cables before you begin the installation. In 2.2, termination characteristics are described. They allow you to determine whether the cable routes you plan can accommodate the cable dimensions.

Remember, cables must always be routed and connected in accordance to all governing laws and regulations that apply to your site.

Section 2.0
Systems w/Table, 2403791 and Positioner Cabinet, 2401181

2.1 Cable (Cbl.) Lengths and Characteristics

Systems w/Table, 2403791 and Positioner Cabinet, 2401181

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
1 VCR w/ Video Switch	11658A	C1601RT	9.9	3	2304977-60	No alternate length available				Control Cable	1354	CMX	30	9	80	.24	6
	11659A				2304977-61					Ground Cable	1028	MTW	600	0	10	.26	7
	11660A				2304977-62					Power Cable	817	SJT	300	120	90	.35	9
	11684A				2304977-63					Video Cable	1354	CMX	30	9	80	.24	6
	11747A				2304977-73												
	11748A				2304977-74												
	11749A				2304977-75												
2 SysCab to VCR Box	11652A	C1601PN	20.5	6.25	2304977-52	C1601PP	55.9	17.05	2304977-56	9 Pin Sub D	2464	CMX	30	9	80	.31	8
	11653A				2304977-53				2304977-57	Ground Cable	1028	MTW	600	0	105	.26	7
	11654A				2304977-54				2304977-58	Power Cable	817	SJT	300	120	90	.35	9
	11682A				2304977-55				2304977-59	Video Cable	1354	CMX	30	9	80	.24	6
3 Monitor to Wallbox	11661A	C1601PY	20.0	6.1	2304977-7	No alternate length available				Ground Cable	1028	MTW	600	0	105	.26	7
	11662A				2304977-5					Video Cables	1354	CMX	30	9	80	.24	6
	11663A				2304977-6					Power Cable	817	SJT	300	120	90	.35	9
	11667A				2304977-8					Control Cable	2919	CMG	30	9	80	.25	6
	11664A	Not in Catalog			2330445					Video Cable	1354	CMX				.24	6
	11665A				2330445-3					Power Cable	817	SJT	300	120	90	.35	9
	11666A				2330445-2					Ground Cable	1028	MTW	600	0	105	.26	7
4 SysCab to Monitor Wallbox	11645A	C1601PG	20.5	6.25	2304977-4	C1601PH	46.8	14.25	2304977-12	Ground Cable	1028	MTW	600	0	105	.26	7
	11646A				2304977				2304977-9	Video Cable	1354	CMX	30	9	80	.24	6
	11647A				2304977-2				2304977-10	Power Cable	817	SJT	300	120	90	.35	9
	11648A				2304977-64				2304977-67	Video Cable	1354	CMX	30	9	80	.24	6
	11649A				2304977-65				2304977-68	Power Cable	817	SJT	300	120	90	.35	9
	11650A				2304977-66				2304977-69	Ground Cable	1028	MTW	600	0	105	.26	7
	11651A				2304977-3				2304977-11	9 Pin Sub-D Cable	2464	CM	300	24	80	.31	8

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

Systems w/Table, 2403791 and Positioner Cabinet, 2401181

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
7 SysCab to IUI Wallbox	11671A	C1601PL	40.2	12.25	2304977-35	C1601PM	55.9	17.05	2304977-47	Power Cbl.	817	SJT	300	120	90	.35	9
	11672A				2304977-36				2304977-49	Ground Cbl.	1028	MTW	600	0	105	.26	7
	11674A				2304977-31				2304977-44	26 Pin HD Sub-D Cbl.	2464	CM	300	24	80	.39	10
	11655A				2304977-28				2304977-41	Video Cbl.	1354	CMX	30	24	80	.26	6
	11656A				2304977-27				2304977-40	Ground Cbl.	1028	MTW	600	0	105	.26	6
	11657A				2304977-26				2304977-39	Power Cbl.	817	SJT	300	120	90	.35	9
	11681A				2304977-29				2304977-42	Patch Cord	2919	CMG	30	7.5	80	.25	6
	11713A				2304977-37				2304977-50	9 Pin Sub-D Connector	2464	CM	300	24	80	.31	8
	11718A				2304977-71				2304977-72	Ground Cbl.	1028	MTW	600	0	105	.26	7
8 IUI Wallbox to IUI, Control Room Monitor and Modem	11676A	A8010KY (A8010KY contains these cables, along with other parts)	9.8	3.0	2304977-22	No alternate length available				Power Cbl.	817	SJT	300	120	90	.35	9
	11676A				2304977-21												
	11677A				2304977-23					Ground Cbl.	1028	MTW	600	0	105	.26	7
	11679A				2304977-18					26 Pin HD Sub-D	2464	CM	300	24	80	.39	10
	11668A				2304977-15					Video Cbl.	1354	CMX	30	24	80	.26	6
	11669A				2304977-14					Ground Cbl.	1028	MTW	600	0	105	.26	7
	11670A				2304977-13					Power Cbl.	817	SJT	300	120	90	.35	9
	11683A				2304977-16					Shielded Patch Cord	2919	CMG	30	7.5	80	.25	6
	11714A				2304977-24					9 Pin Sub-D	2464	CM	300	24	80	.31	8
9 Pos to Sys Cab	11746A	C1601RJ	3.3	1.0	2405156	C1601RK	23.3	7.1	2405156-2	Power Cbl.		SJ00W	300	240	90	.9	22
	11694A				2315964				2315964-5	CAN Cbl.	2919	CM	300	24	80	.4	10
	11698A				2315964-2				2315964-6	26Pin HDSub-D	2464	CL2	150	24	80	.4	10
	11699A				2315964-3				2315964-7	CAN Cbl.	2919	CM	300	24	80	.34	8

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

Systems w/Table, 2403791 and Positioner Cabinet, 2401181

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
10 OTS to System Cabinet	11709A	B2055YG	12.9	3.93	2322129-2	B2055YF	26.0	7.92	2322129	I/O PWB CANopen	2464	CMG	300	9VDC	90	.31	8
	11708A				2322137-2				2322137	OTS Power Cbl.	E3462	SJT		120		.35	9
	11710A				2322137-4				2322137-3	Tube Control & Stator Cbl.	2095/ 2463	CM	300/ 600	115/ 500	75/80	.24/ .56	6/14
	11691A				2308046-4				2308046-8	HV Cbl.	GE120	GHVC	94kV	94kV	75	.67	17
	11690A				2308046-3				2308046-7								
	11711A				2322137-6				2322137-5	Ground Cbl.	1028	MTW	600	0	105	.26	7
11 Table to System Cabinet	11687A	C1601PE	16.4	5.0	2308250-2	C1601PF	50.9	15.5	2308250-7	CAN P.S Beldin 8312 Cbl.	2464	GMG	300	24	80	.48	12
	11695A				2308250-3				2308250-8	Video Cbl.	2919	N/A			55	.36	9
	11685A				2308250-4				2308250-9	Tube/Stator Cbl.	2095/ 2463	CM/	300/ 500	115/ 500	75/80	.24/ .56	6/14
	11686A				2308250				2308250-6	Connector Cbl.	N/A	CL3	300	15	80	.32	8
	11697A				2308250-5				2308250-10	Ground Cbl.	1028	MTW	600	0	105	.264	6.7
	11689A	Not in Catalog			2308046-2				2308046-6	HV Cbl.		GHVC	94	75	75	.68	17
	11688A				2308046				2308046-5								
12 Table to POS Cabinet	11693A	C1601SA	30.0	9.15	2308251-2	C1601SB	50.0	15.25	2308251-5	Power Cbl. 3 pos NML	N/A	N/A	600	120	105	.28	7
	11194A				2206480-2				2206480-9	15 Pin Sub-D Connector Cbl.	N/A	CL3	300	26	75	.4	10
	11195A				2206480-3				2206480-10	50 Pin M Series Connector Cbl.	2464	CM		120		.68	17
	11196A				2206480-4				2206480-11								
	11198A				2206480-6				2206480-13	25 Pin Sub-D Connector Cbl.	N/A	CL3		26		.48	12
	11696A				2308251-3				2308251-6	Ground Cbl.	1028	MTW	600	0	105	.264	6.7
	11717A				2308251-7				2308251-8	15 Pin Sub-D Com. Cbl.	N/A	CL3	300	24	80	.4	10
	11745A				2308251-9				2308251-10	CAN Cbl.	2919	CM					

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

Systems w/Table, 2403791 and Positioner Cabinet, 2401181

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
13 Wallstand (VBS) to Pos. Cabinet	11234A	C1601RA	50.0	15.25	2327385	C1601RB	69.7	21.25	2327385-6	External Cbl.	N/CL3	3	300	24	80	.34	9
	11235A				2327385-2				2327385-7	I/O Cbl.	CL3	3	300	24	80	.34	9
	11236A				2327385-3				2327385-8	Connector Cbl.	2464	CM	300	24	80	.50	12
	11715A				2327385-4				2327385-9	Power Cbl.	1015	TEW	300	120	80	.50	12
	11716A				2327385-5				2327385-10	Ground Cbl.	1028	MTW	600	0	105	.26	7
14 SysCab to IUI	11743A	-	85.0	25.9	2383856	-	-	-	-	Shielded Patch Cord	Cat 6	CMR	300	7.5	75	.37 x .17	9.4 x 4.3

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

2.2 Cable (Cbl.) Terminations

SYSTEMS W/TABLE, 2403791 AND POSITIONER CABINET, 2401181

Run#	MIS#	"One" End Information					"Other" End Information				
		Designator	Used in Cabinet[1]		Maximum Dimensions		Designator	Used in Cabinet[1]		Maximum Dimensions	
			Feet	Meters	Inches	mm		Feet	Meters	Inches	mm
1	11658A	VCR	N/A	N/A	2.2	35	WBV1	N/A	N/A	22	35
	11659A				.38	9.5				.6	15
	11660A				4.1	28				1.4	35
	11684A										
	11747A				.5	13				.5	13
	11748A										
	11749A										
2	11652A	WBV1	1.0	0.3	1.4	35	SKL	8.0 Note 2	2.45 Note 2	1.4	35
	11653A				.38	9.5				.53	13.4
	11654A				.35	9				1.2	30
	11682A				.5	13				.5	13
3	11661A	MON1	N/A	N/A	.38	9.5	WB1	N/A	N/A	.6	15
	11662A				.5	13				.5	13
	11663A				1.1	28				1.4	35
	11664A	MON3			.5	13				.5	13
	11665A				1.1	28				1.4	35
	11666A				.38	9.5				.6	15
	11667A				1.4	35				1.4	35
4	11645A	WB1	1.0	0.3	.38	.95	SKL	8.0 Note 2	2.45 Note 2	.53	13.4
	11646A				.5	13				.5	13
	11647A				.35	9				1.2	30
	11648A	IR			.5	13				.5	13
	11649A	WB1			.35	9				1.2	30
	11650A				.38	9.5				53	13.4
	11651A				1.4	35				1.4	35

[1] From bulkhead to access point. (n/a means not applicable or (0) length; cable connection is to exterior of unit).

[2] Includes 3 feet to allow cabinet to be moved away from wall.

[3] Includes 3 feet to allow cabinet to be moved away from wall only for long length cables. For standard length cables, the SKL and RFP1 cabinets are side by side and the cables route through the cabinet side ports (so 3 feet is NOT added).

SYSTEMS W/TABLE, 2403791 AND POSITIONER CABINET, 2401181											
		"One" End Information					"Other" End Information				
Run#	MIS#	Designator	Used in Cabinet[1]		Maximum Dimensions		Designator	Used in Cabinet[1]		Maximum Dimensions	
			Feet	Meters	Inches	mm		Feet	Meters	Inches	mm
7	11671A	SKL	8.0 Note 2	2.45 Note 2	1.2	30	WB2	1.0	0.3	.35	9
	11672A				.38	9.5				.53	13.4
	11674A				1.8	45				1.8	45
	11655A				.5	13				.5	13
	11656A				.38	9.5				.53	13.4
	11657A				1.2	30				.35	9
	11681A				.6	15				.6	15
	11713A				1.4	35				1.4	35
8	11676A	IUI WB	N/A	N/A	1.4	35	IUI	N/A	N/A	1.1	28
	11677A				1	25				.3	7
	11679A				1.8	45				1.8	45
	11668A				.5	13				.5	13
	11669A				1	25				.3	7
	11670A				1.4	35				1.1	28
	11683A				.6	15	Splitter			.6	15
	11714A				1.4	35	Remote Mouse			1.4	35
9	11746A	SKL	8.0 Note 3	2.45 Note 3	1.2	30	RFP1	8.0 Note 3	2.45 Note 3	1.2	30
	11694A				1.4	35				1.4	35
	11698A				1.8	45				1.8	45
	11699A				1.4	35				1.4	35
10	11709A	SKL	13.1 Note 2	4.0 Note 2	1.4	35	OTS1	13.1	4.0	1.4	35
	11708A				1.2	30				1.2	30
	11710A				1.6	40				N/A	N/A
	11691A				8.27	210				8.27	210
	11690A				8.27	210				8.27	210
	11711A				N/A	N/A				N/A	N/A

[1] From bulkhead to access point. (n/a means not applicable or (0) length; cable connection is to exterior of unit).

[2] Includes 3 feet to allow cabinet to be moved away from wall.

[3] Includes 3 feet to allow cabinet to be moved away from wall only for long length cables. For standard length cables, the SKL and RFP1 cabinets are side by side and the cables route through the cabinet side ports (so 3 feet is NOT added).

SYSTEMS W/TABLE, 2403791 AND POSITIONER CABINET, 2401181

Run#	MIS#	"One" End Information					"Other" End Information				
		Designator	Used in Cabinet[1]		Maximum Dimensions		Designator	Used in Cabinet[1]		Maximum Dimensions	
			Feet	Meters	Inches	mm		Feet	Meters	Inches	mm
11	11687A	SKL	13.1 Note 2	4.0 Note 2	2.2	55	RFP3	14.8	4.5	2.2	55
	11695A				2.8	70				2.8	70
	11685A				1.6	40				1.6	40
	11689A				2.9	73				2.9	73
	11688A				2.9	73					
	11686A				1.8	45				1.8	35
	11697A				.5	12.7				.5	12.7
12	11693A	RFP1	8.0 Note 2	2.45 Note 2	1.2	30	RFP3	2.0	0.6	1.2	30
	11194A				1.8	45				1.8	45
	11195A				2.8	70				2.8	70
	11196A				2.8	70					
	11198A				2.2	55				2.2	55
	11192A										
	11696A				.5	12.7				.5	12.7
	11717A				1.7	45				1.7	45
	11745A				1.4	35				1.4	35
13	11234A	RFP1	8.0 Note 2	2.45 Note 2	1.6		SG100 VBS	1.0	0.3	1.8	47
	11235A				1.8	42				1.8	47
	11236A				1.6					1.6	42
	11715A				1.1	28				.5	12
	11716A				.38	9.5				.26	7
14	11743A	SKL	15.0	4.6	.6	15	IUI	N/A	N/A	.6	15

[1] From bulkhead to access point. (n/a means not applicable or (0) length; cable connection is to exterior of unit).

[2] Includes 3 feet to allow cabinet to be moved away from wall.

[3] Includes 3 feet to allow cabinet to be moved away from wall only for long length cables. For standard length cables, the SKL and RFP1 cabinets are side by side and the cables route through the cabinet side ports (so 3 feet is NOT added).

Section 3.0
Systems w/Table, 2305472 and Positioner Cabinet 2288798 (original version)

3.1 Cable (Cbl.) Lengths and Characteristics

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
1 VCR w/ Optional Monitor or	11658A	C1601PT	9.9	3	2304977-60	No alternate length available				Control Cbl.	1354	CMX	30	9	80	.24	6
	11659A				2304977-61					Ground Cbl.	1028	MTW	600	0	105	.26	7
	11660A				2304977-62					Power Cbl.	817	SJT	300	120	90	.35	9
	11684A				2304977-63					Video Cbl.	1354	CMX	30	9	80	.24	6
1 VCR w/ Video Switch	11658A	C1601RT	9.9	3	2304977-60	No alternate length available				Control Cbl.	1354	CMX	30	9	80	.24	6
	11659A				2304977-61					Ground Cbl.	1028	MTW	600	0	10	.26	7
	11660A				2304977-62					Power Cbl.	817	SJT	300	120	90	.35	9
	11684A				2304977-63					Video Cbl.	1354	CMX	30	9	80	.24	6
	11747A				2304977-73												
	11748A				2304977-74												
	11749A				2304977-75												
2 SysCab to VCR Box	11652A	C1601PN	20.5	6.25	2304977-52	C1601PP	55.9	17.05	2304977-56	9 Pin Sub D	2464	CMX	30	9	80	.31	8
	11653A				2304977-53				2304977-57	Ground Cbl.	1028	MTW	600	0	105	.26	7
	11654A				2304977-54				2304977-58	Power Cbl.	817	SJT	300	120	90	.35	9
	11682A				2304977-55				2304977-59	Video Cbl.	1354	CMX	30	9	80	.24	6
3 Monitor to Wallbox	11661A	C1601PY	20.0	6.1	2304977-7	No alternate length available				Ground Cbl.	1028	MTW	600	0	105	.26	7
	11662A				2304977-5					Video Cbl.	1354	CMX	30	9	80	.24	6
	11663A				2304977-6					Power Cbl.	817	SJT	300	120	90	.35	9
	11667A				2304977-8					Control Cbl.	2919	CMG	30	9	80	.25	6
	11664A	Not in Cat.			2330445					Video Cbl.	1354	CMX				.24	6
	11665A				2330445-3					Power Cbl.	817	SJT	300	120	90	.35	9
	11666A				2330445-2					Ground Cbl.	1028	MTW	600	0	105	.26	7

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
4 SysCab to Monitor Wallbox	11645A	C1601PG	20.5	6.25	2304977-4	C1601PH	46.8	14.25	2304977-12	Ground Cbl.	1028	MTW	600	0	105	.26	7
	11646A				2304977				2304977-9	Video Cbl.	1354	CMX	30	9	80	.24	6
	11647A				2304977-2				2304977-10	Power Cbl.	817	SJT	300	120	90	.35	9
	11648A				2304977-64				2304977-67	Video Cbl.	1354	CMX	30	9	80	.24	6
	11649A				2304977-65				2304977-68	Power Cbl.	817	SJT	300	120	90	.35	9
	11650A				2304977-66				2304977-69	Ground Cbl.	1028	MTW	600	0	105	.26	7
	11651A				2304977-3				2304977-11	9 Pin Sub-D Cbl.	2464	CM	300	24	80	.31	8
7 SysCab to IUI Wallbox	11671A	C1601PL	40.2	12.25	2304977-35	C1601PM	55.9	17.05	2304977-47	Power Cbl.	817	SJT	300	120	90	.35	9
	11672A				2304977-36				2304977-49	Ground Cbl.	1028	MTW	600	0	105	.26	7
	11674A				2304977-31				2304977-44	26 Pin HD Sub-D Cbl.	2464	CM	300	24	80	.39	10
	11655A				2304977-28				2304977-41	Video Cbl.	1354	CMX	30	24	80	.26	6
	11656A				2304977-27				2304977-40	Ground Cbl.	1028	MTW	600	0	105	.26	6
	11657A				2304977-26				2304977-39	Power Cbl.	817	SJT	300	120	90	.35	9
	11681A				2304977-29				2304977-42	Patch Cord	2919	CMG	30	7.5	80	.25	6
	11713A				2304977-37				2304977-50	9 Pin Sub-D Connector	2464	CM	300	24	80	.31	8
	11718A				2304977-71				2304977-72	Ground Cbl.	1028	MTW	600	0	105	.26	7
8 IUI Wallbox to IUI, Control Room Monitor and Modem	11676A	A8010KY (A8010KY contains these cables, along with other parts)	9.9	3.0	2304977-22	No alternate length available				Power Cbl.	817	SJT	300	120	90	.35	9
	11676A				2304977-21												
	11677A				2304977-23					Ground Cbl.	1028	MTW	600	0	105	.26	7
	11679A				2304977-18					26 Pin HD Sub-D	2464	CM	300	24	80	.39	10
	11668A[2]				2304977-15					Video Cbl.	1354	CMX	30	24	80	.26	6
	11669A				2304977-14					Ground Cbl.	1028	MTW	600	0	105	.26	7
	11670A				2304977-13					Power Cbl.	817	SJT	300	120	90	.35	9
	11683A				2304977-16					Shielded Patch Cord	2919	CMG	30	7.5	80	.25	6
	11714A				2304977-24					9 Pin Sub-D	2464	CM	300	24	80	.31	8

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
9 Pos to Sys Cab	11700A	C1601PJ	3.3	1.0	2315964-4	C1601PK	23.3	7.1	2315964-8	Power Cbl.		SJ00W	300	240	90	.9	22
	11694A				2315964				2315964-5	CAN Cbl.	2919	CM	300	24	80	.4	10
	11698A				2315964-2				2315964-6	26 Pin HD Sub-D	2464	CL2	150				
	11699A				2315964-3				2315964-7	CAN Cbl.	2919	CM	300			.34	8
10 OTS to System Cabinet	11709A	B2055WG	12.9	3.93	2322129-2	B2055WF	26.0	7.92	2322129	I/O PWB CANopen	2464	CMG	300	9VDC	90	.31	8
	11708A				2322137-2				2322137	OTS Power Cbl.	E3462	SJT		120		.35	9
	11710A				2322137-4				2322137-3	Tube Control & Stator Cbl.	2095/ 2463	CM	300/ 600	115/ 500	75/80	.24/ .56	6/ 14
	11691A				2308046-4				2308046-8	HV Cbl.	GE120	GHVC	94kV	94kV	75	.67	17
	11690A				2308046-3				2308046-7								
	11711A				2322137-6				2322137-5	Ground Cbl.	1028	MTW	600	0	105	.26	7
11 Table to System Cabinet	11687A	C1601PE	16.4	5.0	2308250-2	C1601PF	50.9	15.5	2308250-7	CAN/PWR Supply Beldin 8312	2464	GMG	300	24	80	.48	12
	11695A				2308250-3				2308250-8	Video Cbl.	2919	N/A			55	.36	9
	11685A				2308250-4				2308250-9	Tube/Stator Cbl.	2095/ 2463	CM/	300/ 500	115/ 500	75/80	.24/ .56	6/ 14
	11686A				2308250				2308250-6	Connector Cbl.	N/A	CL3	300	15	80	.32	8
	11697A				2308250-5				2308250-10	Ground Cbl.	1028	MTW	600	0	105	.264	6.7
	11689A	Not in Catalog.			2308046-2				2308046-6	HV Cbl.		GHVC	94	75	75	.68	17
	11688A				2308046				2308046-5								

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)

Run#	MIS#	Net "Usable" Cable Lengths[1]								Cable Characteristics							
		"Standard" Cables *(Shipped w/product)*				"Optional" Long Length Cables *(Purchased separately)*				Cable Desc.	UL Style	Cable Class	Volt Rate	Act Volt	Temp Rating (C)	Diameter	
		Catalog#	Feet	Meters	Cable Part #	Catalog#	Feet	Meters	Cable Part #							Inch	mm
12 Table to POS Cabinet	11693A	C1601PA	30.0	9.15	2308251-2	C1601PB	50.0	15.25	2308251-5	Power Cbl. 3 pos NML	N/A	N/A	600	120	105	.28	7
	11194A				2206480-2				2206480-9	15 Pin Sub-D Connector Cbl.		CL3	300	26	75	.4	10
	11195A				2206480-3				2206480-10	50 Pin M Series Connector Cbl.	2464	CM		120	75	.68	17
	11196A				2206480-4				2206480-11	50 Pin M Series Connector Cbl.							
	11197A				2206480-5				2206480-12	50 Pin Sub-D Connector Cbl.							
	11198A				2206480-6				2206480-13	25 Pin Sub-D Connector Cbl.	N/A	CL3		26	75	.48	12
	11192A				2308251				2308251-4	CAN Cbl.	2919	CM		24	80	.4	10
	11696A				2308251-3				2308251-6	Ground Cbl.	1028	MTW	600	0	105	.264	6.7
	11717A				2308251-7				2308251-8	15 Pin Sub-D Com. Cbl.	N/A	CL3	300	24	80	.4	10
13 Wallstand (VBS) to Pos. Cabinet	11234A	C1601RA	50.0	15.25	2327385	C1601RB	69.7	21.25	2327385-6	External Cbl.	N/CL3	3	300	24	80	.34	9
	11235A				2327385-2				2327385-7	I/O Cbl.	CL3						
	11236A				2327385-3				2327385-8	Connector Cbl.	2464	CM		24	80	.50	12
	11715A				2327385-4				2327385-9	Power Cbl.	1015	TEW		120	80	.50	12
	11716A				2327385-5				2327385-10	Ground Cbl.	1028	MTW	600	0	105	.26	7
14 SysCab to IUI	11743A	-	85.0	25.9	2383856	-	-	-	-	Shielded Patch Cord	Cat 6	CMR	300	7.5	75	.37 x .17	9.4 x 4.3

[1] Length measured from component/cabinet's entry point, to other component/cabinet's entry point.

3.2 Cable (Cbl.) Terminations

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)											
Run#	MIS#	"One" End Information					"Other" End Information				
		Designator	Used in Cabinet[1]		Maximum Dimensions		Designator	Used in Cabinet[1]		Maximum Dimensions	
			Feet	Meters	Inches	mm		Feet	Meters	Inches	mm
1	11658A	VCR	N/A	N/A	2.2	35	WBV1	N/A	N/A	22	35
	11659A				.38	9.5				.6	15
	11660A				4.1	28				1.4	35
	11684A				.5	13				.5	13
	11747A				.5	13				.5	13
	11748A				.5	13				.5	13
	11749A				.5	13				.5	13
2	11652A	WBV1	1.0	0.3	1.4	35	SKL	8.0 Note 2	2.45 Note 2	1.4	35
	11653A				.38	9.5				.53	13.4
	11654A				.35	9				1.2	30
	11682A				.5	13				.5	13
3	11661A	MON1	N/A	N/A	.38	9.5	WB1	N/A	N/A	.6	15
	11662A				.5	13				.5	13
	11663A				1.1	28				1.4	35
	11664A	MON3			.5	13				.5	13
	11665A				1.1	28				1.4	35
	11666A				.38	9.5				.6	15
	11667A				1.4	35				1.4	35
4	11645A	WB1	1.0	0.3	.38	.95	SKL	8.0 Note 2	2.45 Note 2	.53	13.4
	11646A				.5	13				.5	13
	11647A				.35	9				1.2	30
	11648A	IR			.5	13				.5	13
	11649A	WB1			.35	9				1.2	30
	11650A				.38	9.5				53	13.4
	11651A				1.4	35				1.4	35

[1] From bulkhead to access point. (n/a means not applicable or zero length; cable connection is to exterior of unit)

[2] Includes 3 feet to allow cabinet to be moved away from wall.

[3] Includes 3 feet to allow cabinet to be moved away from wall only for long length cables. For standard length cables, the SKL and RFP1 cabinets are side by side and the cables route through the cabinet side ports (so 3 feet is NOT added).

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)

Run#	MIS#	"One" End Information					"Other" End Information				
		Designator	Used in Cabinet[1]		Maximum Dimensions		Designator	Used in Cabinet[1]		Maximum Dimensions	
			Feet	Meters	Inches	mm		Feet	Meters	Inches	mm
7	11671A	SKL	8.0 Note 2	2.45 Note 2	1.2	30	WB2	1.0	0.3	.35	9
	11672A				.38	9.5				.53	13.4
	11674A				1.8	45				1.8	45
	11655A				.5	13				.5	13
	11656A				.38	9.5				.53	13.4
	11657A				1.2	30				.35	9
	11681A				.6	15				.6	15
	11713A				1.4	35				1.4	35
8	11676A	IUI WB	N/A	N/A	1.4	35	IUI	N/A	N/A	1.1	28
	11677A				1	25				.3	7
	11679A				1.8	45				1.8	45
	11668A				.5	13				.5	13
	11669A				1	25				.3	7
	11670A				1.4	35				1.1	28
	11683A				.6	15	Splitter			.6	15
	11714A				1.4	35	Remote Mouse			1.4	35
9	11700A	SKL	8.0 Note 3	2.45 Note 3	1.2	30	RFP1	8.0 Note 3	2.45 Note 3	1.2	30
	11694A				1.4	35				1.4	35
	11698A				1.8	45				1.8	45
	11699A				1.4	35				1.4	35
10	11709A	SKL	13.1 Note 2	4.0 Note 2	1.4	35	OTS1	13.1	4.0	1.4	35
	11708A				1.2	30				1.2	30
	11710A				1.6	40				N/A	N/A
	11691A				8.27	210				8.27	210
	11690A				8.27	210				8.27	210
	11711A				N/A	N/A				N/A	N/A

[1] From bulkhead to access point. (n/a means not applicable or zero length; cable connection is to exterior of unit)

[2] Includes 3 feet to allow cabinet to be moved away from wall.

[3] Includes 3 feet to allow cabinet to be moved away from wall only for long length cables. For standard length cables, the SKL and RFP1 cabinets are side by side and the cables route through the cabinet side ports (so 3 feet is NOT added).

SYSTEMS W/TABLE, 2305472 AND POSITIONER CABINET 2288798 (ORIGINAL VERSION)

Run#	MIS#	"One" End Information					"Other" End Information				
		Designator	Used in Cabinet[1]		Maximum Dimensions		Designator	Used in Cabinet[1]		Maximum Dimensions	
			Feet	Meters	Inches	mm		Feet	Meters	Inches	mm
11	11687A	SKL	13.1 Note 2	4.0 Note 2	2.2	55	RFP3	14.8	4.5	2.2	55
	11695A				2.8	70				2.8	70
	11685A				1.6	40				1.6	40
	11689A				2.9	73				2.9	73
	11688A				2.9	73					
	11686A				1.8	45				1.8	35
	11697A				.5	12.7				.5	12.7
12	11693A	RFP1	8.0 Note 2	2.45 Note 2	1.2	30	RFP3	2.0	0.6	1.2	30
	11194A				1.8	45				1.8	45
	11195A				2.8	70				2.8	70
	11196A										
	11197A										
	11198A				2.2	55				2.2	55
	11192A										
	11696A				.5	12.7				.5	12.7
	11717A				1.7	45				1.7	45
13	11234A	RFP1	8.0 Note 2	2.45 Note 2	1.6	42	SG100 VBS	1.0	0.3	1.8	47
	11235A				1.8	42					
	11236A				1.6	42				1.6	42
	11715A				1.1	28				.5	12
	11716A				.38	9.5				.26	7
14	11743A	SKL	15.0	4.6	.6	15	IUI	N/A	N/A	.6	15

[1] From bulkhead to access point. (n/a means not applicable or zero length; cable connection is to exterior of unit)

[2] Includes 3 feet to allow cabinet to be moved away from wall.

[3] Includes 3 feet to allow cabinet to be moved away from wall only for long length cables. For standard length cables, the SKL and RFP1 cabinets are side by side and the cables route through the cabinet side ports (so 3 feet is NOT added).

Chapter 9 - Seismic Calculations

Section 1.0 Overview

Seismic requirements are determined and specified by the hospital architect of record and may require approval by the specific state or country agency.

Seismic attachment hardware shown on seismic calculations may differ from hardware supplied with system. Any additional hardware that is required will be the responsibility of the institution and/or their contractor. Contact your Installation Specialist with any related questions.

Seismic calculations included in this chapter are per California Building Code.

Section 2.0 Calculations

Calculations are included for the following:

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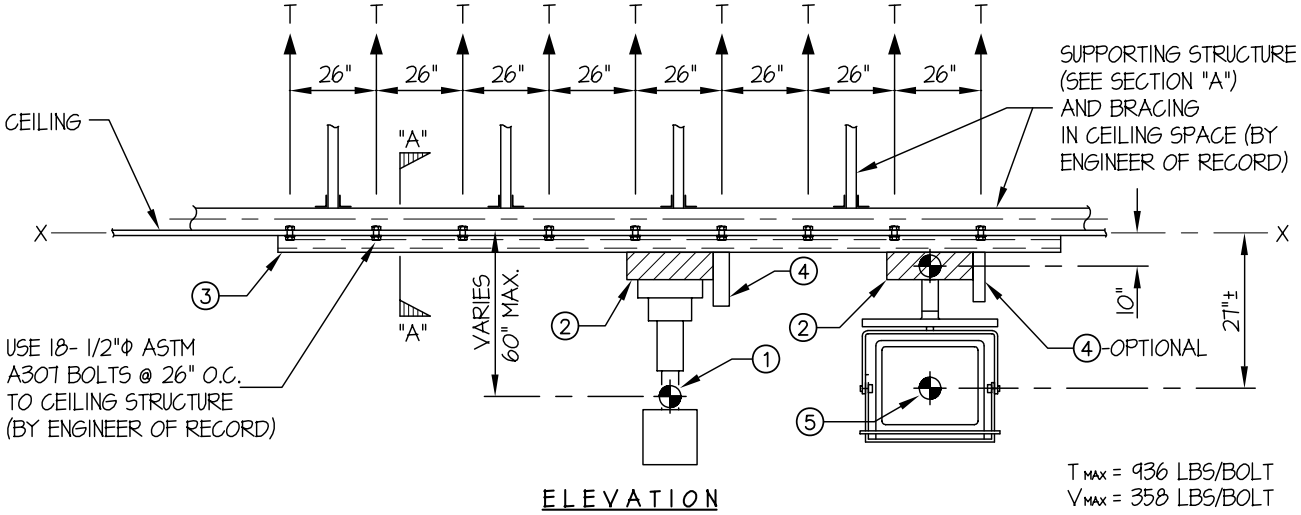
2.1 Overhead Tube Suspension (OTS1) - Sheet 1 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
Overhead Tube Suspension (OTS1)	DATE 2/15/05	OF 2 SHEETS

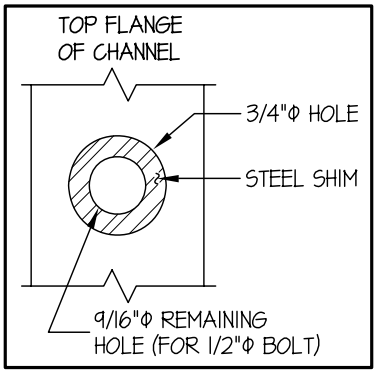
SEISMIC ANCHORAGE CALCULATION

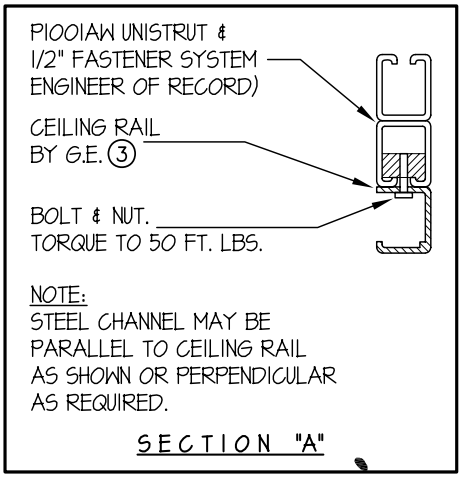


ELEVATION

T_{MAX} = 936 LBS/BOLT
V_{MAX} = 358 LBS/BOLT

DESCRIPTION	WEIGHT (LBS)
① COLUMN & TUBE SUPPORT	366
② BRIDGE CARRIAGE DOLLY	194
③ LONGITUDINAL RAILS	7.3 LBS./FT.
④ LATERAL CABLE CONCEALMENT	90
⑤ COLUMN & MONITOR SUPPORT	82





SECTION "A"

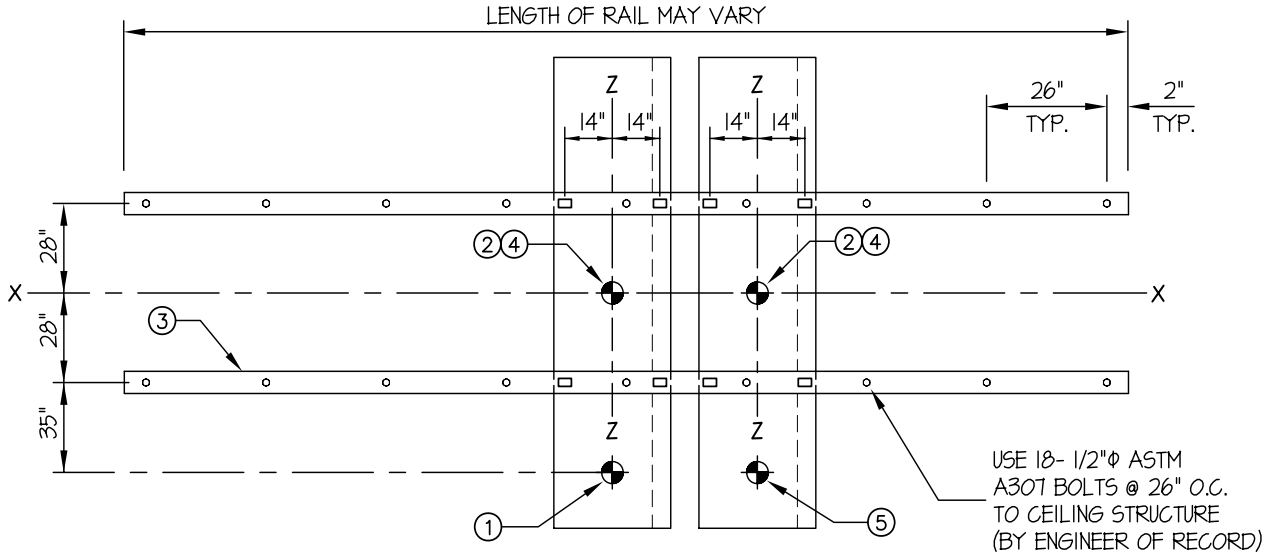
NOTES:

1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.94W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN ADDITION TO ALL OTHER LOADS.

Overhead Tube Suspension (OTS1) - Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0504	
Overhead Tube Suspension (OTS1)	DATE 2/15/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION



PLAN AT CEILING RAILS

LOADS:

① COLUMN & TUBE SUPPORT
WEIGHT = 366 LBS
HORIZ. FORCE = 344 LBS
VERT. FORCE = 115 LBS

③ LONGITUDINAL RAILS
WEIGHT = 7.3 LBS/FT
HORIZ. FORCE = 6.9 LBS/FT
VERT. FORCE = 2.3 LBS/FT

② & ④ BRIDGE CARRIAGE DOLLY & LATERAL CABLE CONCEALMENT
WEIGHT = 284 LBS
HORIZ. FORCE = 267 LBS
VERT. FORCE = 89 LBS

⑤ MONITORS & SUPPORT
WEIGHT = 82 LBS
HORIZ. FORCE = 77
VERT. FORCE = 26 LBS

BOLT FORCES:

TENSION (T)

$$T_1 = \frac{(366\# + 115\#)91"}{2\ \text{WHEELS}(56")} + \frac{344\#(60")}{2\ \text{WHEELS}(56")} = 575\ \text{LBS}$$

$$T_2\ \&\ T_4 = \frac{284\# + 89\#}{4\ \text{WHEELS}} + \frac{267\#(10")}{2\ \text{WHEELS}(56")} = 117\ \text{LBS}$$

$$T_3 = \frac{(7.3\#/\text{FT} + 2.3\#/\text{FT})(26")}{12"/\ \text{FT.}} = 21\ \text{LBS}$$

$$T_5 = \frac{(82\# + 26\#)91"}{2\ \text{WHEELS}(56")} + \frac{77\#(27")}{2\ \text{WHEELS}(56")} = 106\ \text{LBS}$$

$$T = T_1 + 2[T_2\ \&\ T_4] + T_3 + T_5 = 936\ \text{LBS/BOLT (MAX)}$$

SHEAR (V)

$$V = \frac{344\#}{2} + \frac{2(267\#)}{4} + \frac{13.8\#}{1} + \frac{77\#}{2}$$

$$= 358\ \text{LBS/BOLT (MAX)}$$

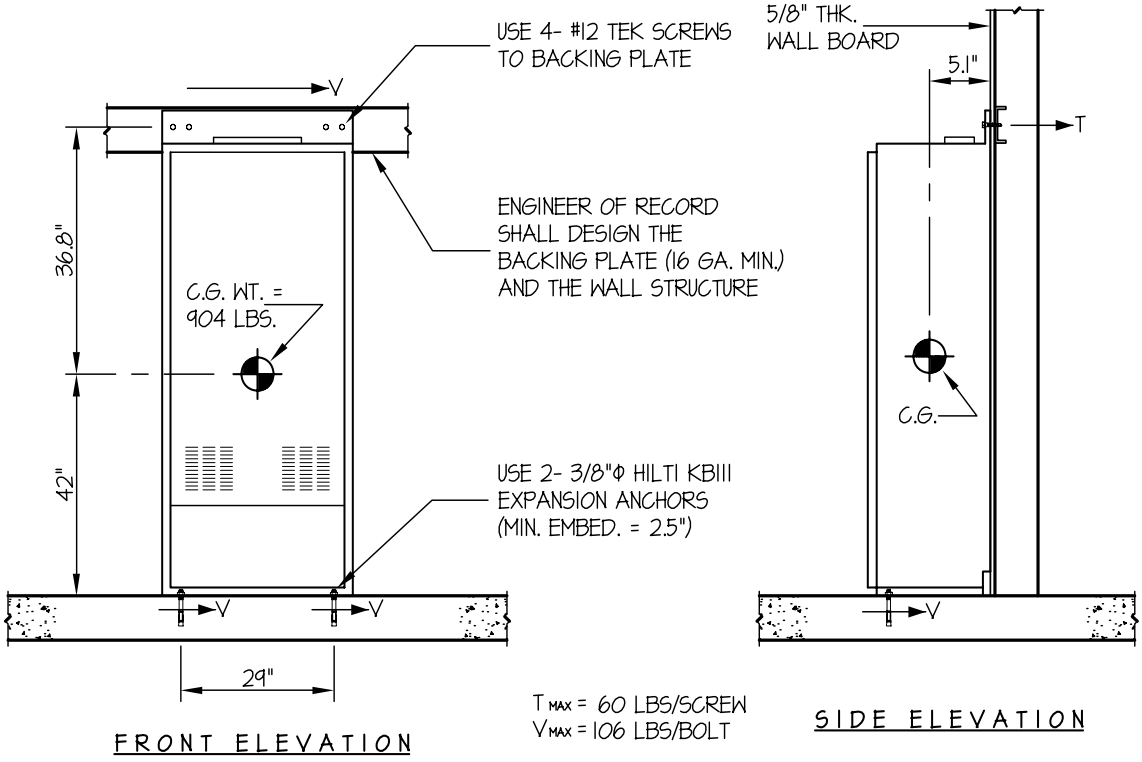
COMBINED STRESSES ARE O.K. BY INSPECTION

2.2 Positioner Cabinet (RFP1) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
Positioner Cabinet (RFP1)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



LOADS: PER 2001 CALIFORNIA BUILDING CODE SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 904 LBS

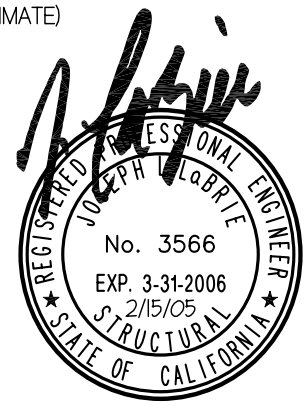
HORIZONTAL FORCE (V_H) = 0.50W = 452 LBS

VERTICAL FORCE (V_V) = 0.33(V_H) = 151 LBS

#12 TEK SCREWS
IN 16 GA., 50 KSI STEEL

$T_{ALLOW.}$ = 225 LBS

$V_{ALLOW.}$ = 570 LBS



BOLT FORCES:

TENSION (T)

$$T_{WALL} = V_{WALL} = \frac{452\#(42'')}{4 \text{ SCREWS } (78.8'')} = 60 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{FLOOR} = \frac{452\#(36.8'')}{2 \text{ BOLTS } (78.8'')} = 106 \text{ LBS/BOLT (MAX)}$$

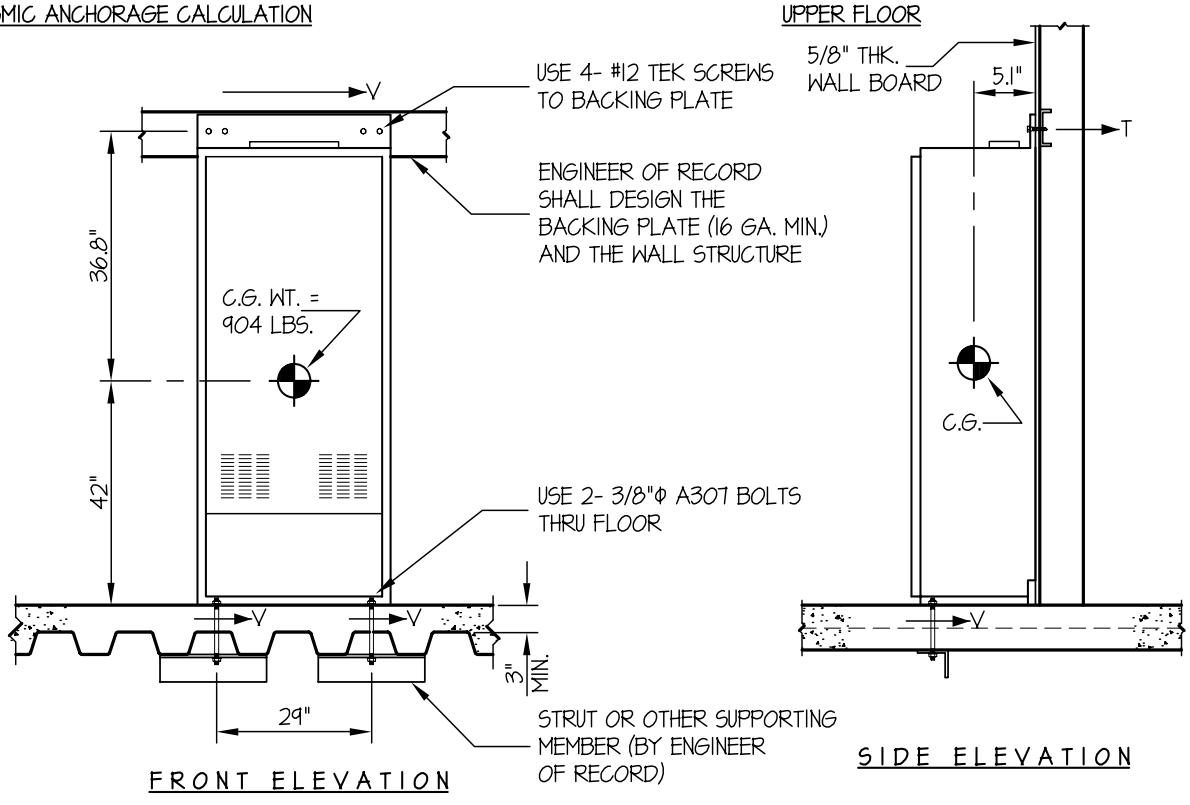
NOTE:

PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.3 Positioner Cabinet (RFP1) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
Positioner Cabinet (RFP1)	DATE 2/15/04	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION



T_{MAX} = 113 LBS/SCREW
V_{MAX} = 198 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 904 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 850 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 283 LBS

#12 TEK SCREWS
IN 16 GA., 50 KSI STEEL

$T_{ALLOW.}$ = 225 LBS
$V_{ALLOW.}$ = 570 LBS

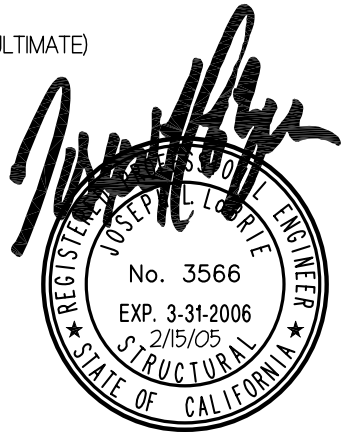
BOLT FORCES:

TENSION (T)

$$T_{WALL} = V_{WALL} = \frac{850\#(42'')}{4 \text{ SCREWS } (78.8'')} = 113 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{FLOOR} = \frac{850\#(36.8'')}{2 \text{ BOLTS } (78.8'')} = 198 \text{ LBS/BOLT (MAX)}$$



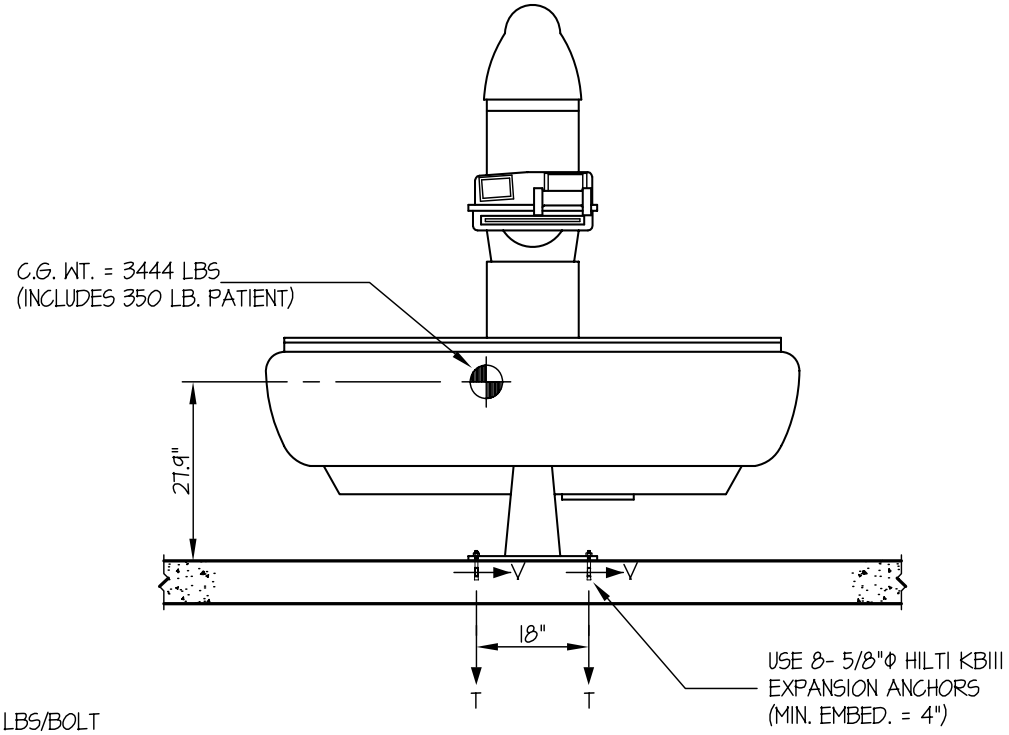
NOTE:
PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.4 R&F Table (RFP3) - Slab on Grade - Sheet 1 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
R&F Table (RFP3)	DATE 2/15/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



T_{MAX} = 1027 LBS/BOLT
V_{MAX} = 460 LBS/BOLT

FRONT ELEVATION

NOTES:

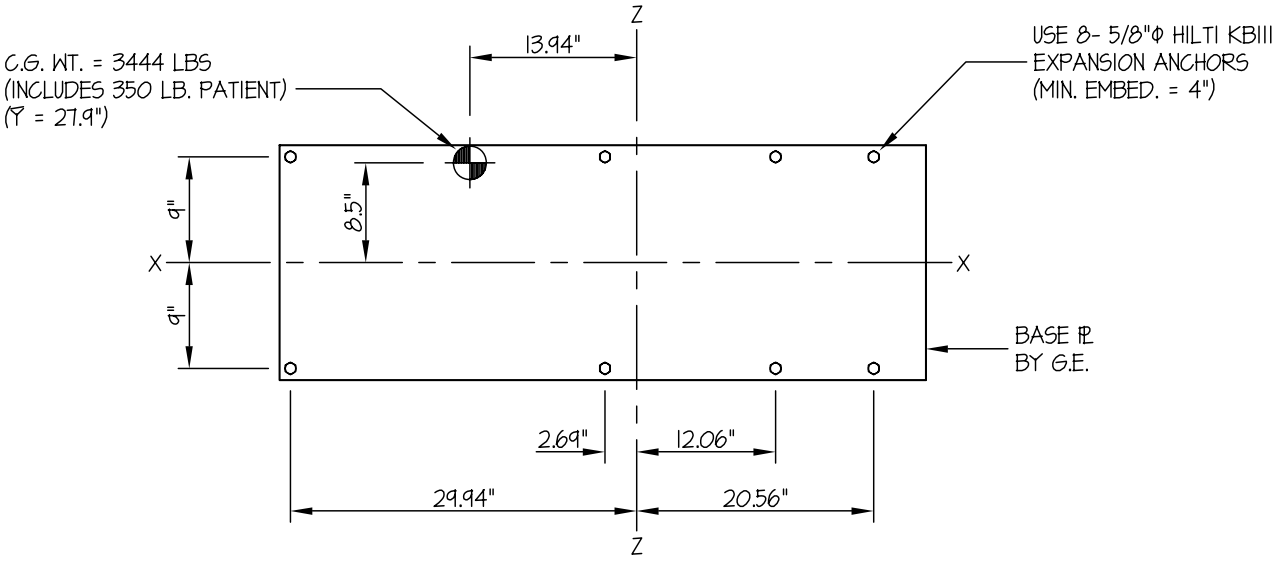
1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.50W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 1.5)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN ADDITION TO ALL OTHER LOADS.

R&F Table (RFP3) - Slab on Grade - Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0504	
R&F Table (RFP3)	DATE 2/15/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



PLAN AT BASE

LOADS:

WEIGHT = 3444 LBS
HORIZONTAL FORCE (V_H) = 1722 LBS
VERTICAL FORCE (V_V) = 574 LBS

BOLT GROUP PROPERTIES:

I_{X-X} = 648 $in.^4$
I_{Z-Z} = 2944 $in.^4$
I_{Y-Y} = 3592 $in.^4$

MOMENTS: (FROM VERTICAL LOADS)

M_{XX} = (3444# - 574#)8.5" = 24,395"#
M_{ZZ} = (3444# - 574#)13.94" = 40,008"#

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 1722#(27.9") = 48,044"#
M_{ZZ} = 1722#(27.9") = 48.444"#
M_{YY} = 1722#(16.33") = 28,120"#

BOLT FORCES:

TENSION (T)

$$T = \underbrace{\left[\frac{48044"\#(9")}{648}\right]}_{\frac{M_{XX\text{-}LAT}(C)}{I}} + \underbrace{\left[\frac{48044"\#(20.56")}{2944} \times (0.3)\right]}_{\frac{M_{ZZ\text{-}LAT}(C)}{I}} + \underbrace{\left[\frac{24395"\#(9")}{648}\right]}_{\frac{M_{XX\text{-}VERT}(C)}{I}} + \underbrace{\left[\frac{40008"\#(20.56")}{2944}\right]}_{\frac{M_{ZZ\text{-}VERT}(C)}{I}} - \underbrace{\left[\frac{3444\# - 574\#}{8 \text{ BOLTS}}\right]}_{\frac{P}{A}} = 1027 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

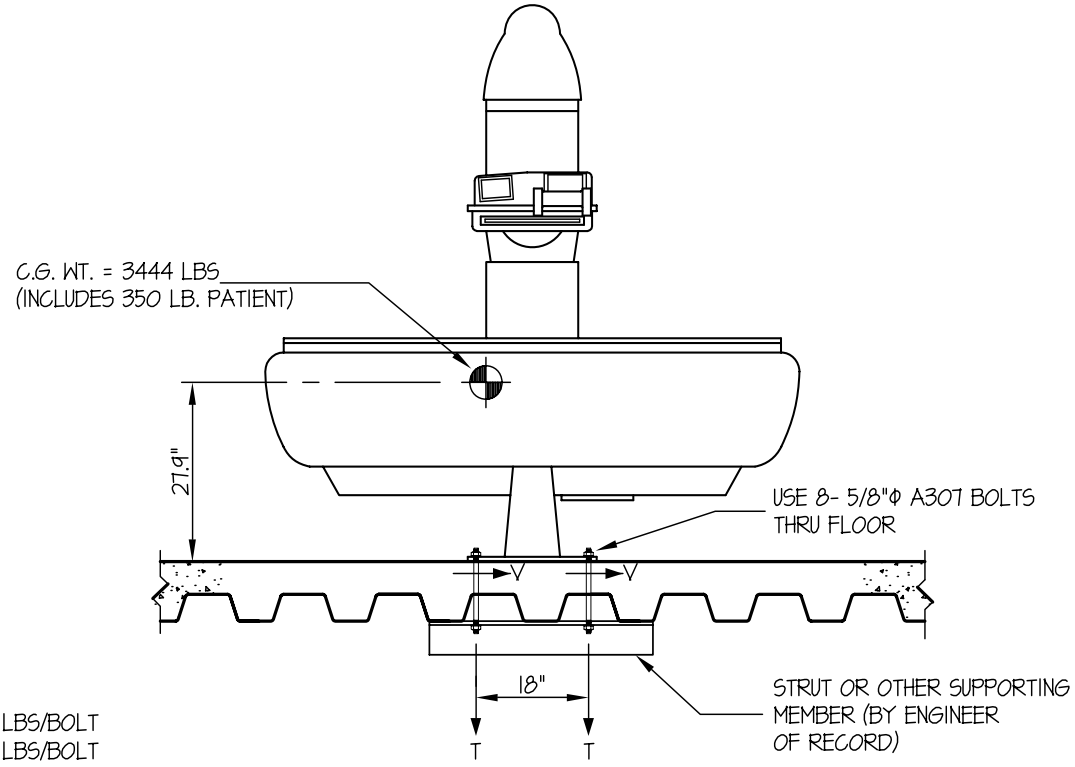
$$V = \underbrace{\frac{1722\#}{8 \text{ BOLTS}}}_{\frac{P}{A}} + \underbrace{\frac{28120"\#\sqrt{9^2 + 29.94^2}}{3592}}_{\frac{M_{YY}(C)}{I}} = 460 \text{ LBS/BOLT (MAX)}$$

2.5 R&F Table (RFP3) - Upper Floor - Sheet 1 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
R&F Table (RFP3)	DATE 2/15/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION

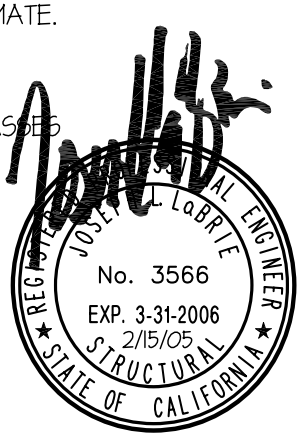
UPPER FLOOR



FRONT ELEVATION

NOTES:

1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.94W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN ADDITION TO ALL OTHER LOADS.

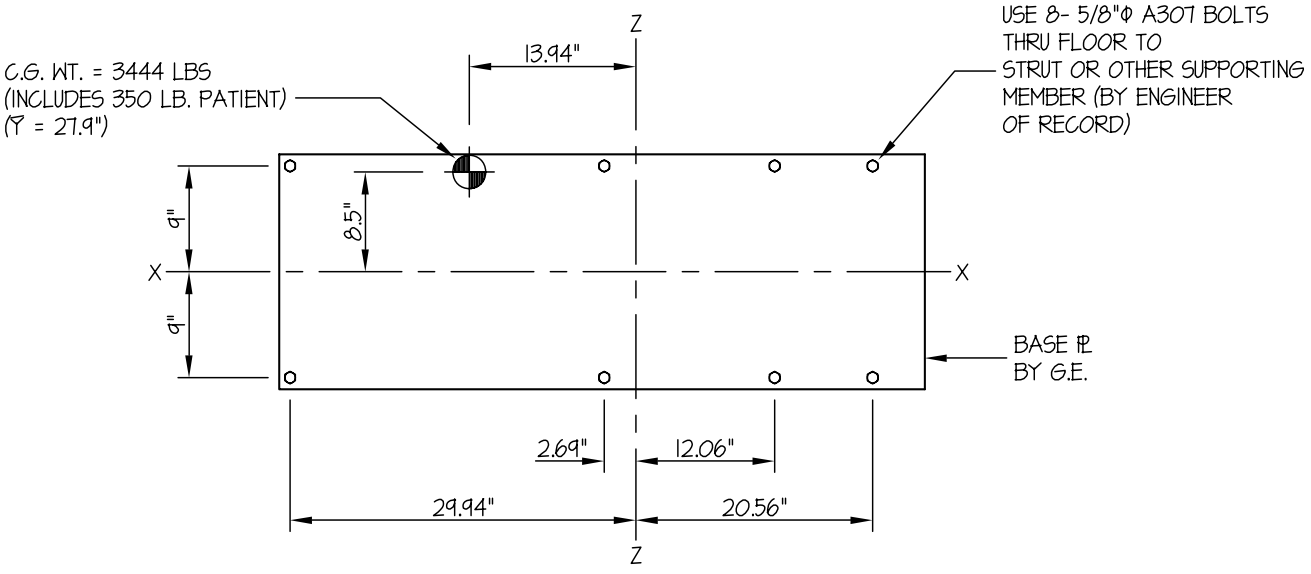


R&F Table (RFP3) - Upper Floor - Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0504	
R&F Table (RFP3)	DATE 2/15/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION

UPPER FLOOR



PLAN AT BASE

LOADS:

WEIGHT = 3444 LBS
HORIZONTAL FORCE (V_H) = 3237 LBS
VERTICAL FORCE (V_V) = 1079 LBS

BOLT GROUP PROPERTIES:

I_{X-X} = 648 in.^{4}
I_{Z-Z} = 2944 in.^{4}
I_{Y-Y} = 3592 in.^{4}

MOMENTS: (FROM VERTICAL LOADS)

M_{XX} = (3444# - 1079#)8.5" = 20,103"#
M_{ZZ} = (3444# - 1079#)13.94" = 32,968"#

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 3237#(27.9") = 90,312"#
M_{ZZ} = 3237#(27.9") = 90,312"#
M_{YY} = 3237#(16.33") = 52,860"#

BOLT FORCES:

TENSION (T)

$$T = \underbrace{\left[\frac{90312"\#(9")}{648}\right]}_{\frac{M_{XX\text{-}LAT}(C)}{I}} + \underbrace{\left[\frac{90312"\#(20.56")}{2944} \times (0.3)\right]}_{\frac{M_{ZZ\text{-}LAT}(C)}{I}} + \underbrace{\left[\frac{20103"\#(9")}{648}\right]}_{\frac{M_{XX\text{-}VERT}(C)}{I}} + \underbrace{\left[\frac{32968"\#(20.56")}{2944}\right]}_{\frac{M_{ZZ\text{-}VERT}(C)}{I}} - \underbrace{\left[\frac{3444\# - 1079\#}{8 \text{ BOLTS}}\right]}_{\frac{P}{A}} = 1657 \text{ LBS/BOLT (MAX)}$$

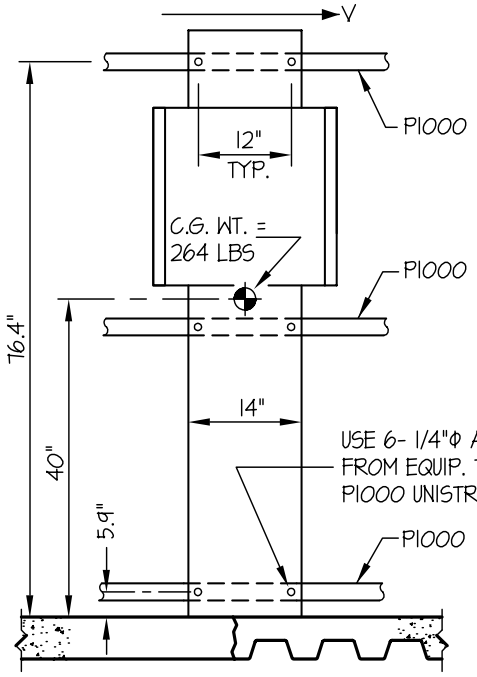
SHEAR (V)

$$V = \underbrace{\frac{3237\#}{8 \text{ BOLTS}}}_{\frac{P}{A}} + \underbrace{\frac{52860"\#\sqrt{9^2 + 29.94^2}}{3592}}_{\frac{M_{YY}(C)}{I}} = 865 \text{ LBS/BOLT (MAX)}$$

2.6 SG-60 Vertical Bucky Stand (VBS)

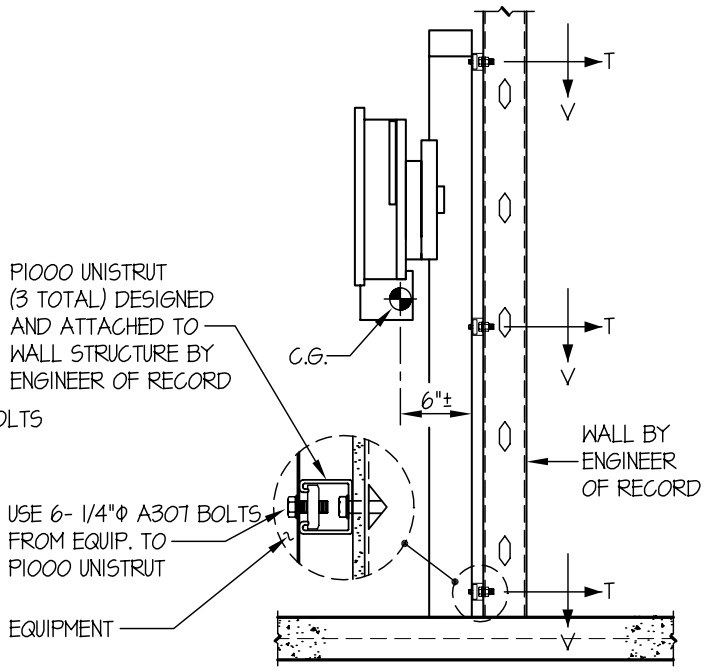
EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
SG-60 Vertical Bucky Stand (VBS)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION



FRONT ELEVATION

SLAB ON GRADE / UPPER FLOOR



SIDE ELEVATION

T_{MAX} = 94 LBS/SCREW
V_{MAX} = 65 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 264 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 248 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 83 LBS

BOLT FORCES:

TENSION (T)

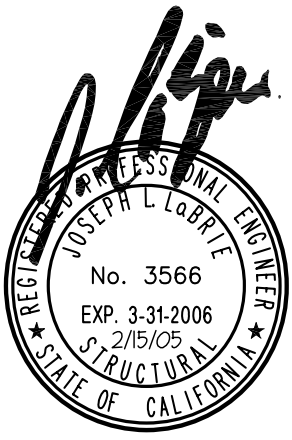
$$T_{PERP.} = \frac{248\#(40") + (264\# + 83\#)6.0"}{2_{BOLTS}(76.4")} = 79 \text{ LBS/BOLT (MAX)}$$

$$T_{PARA.} = \frac{248\#(40")(6.0")}{76.4"(12")} - \frac{(264\# + 83\#)6.0"}{2_{BOLTS}(76.4")} = 51 \text{ LBS/BOLT (MAX)}$$

$$T = 79\# + 51\#\,(0.3) = 94 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

$$V = \frac{248\#(40.0")}{2_{BOLTS}(76.4")} = 65 \text{ LBS/BOLT (MAX)}$$



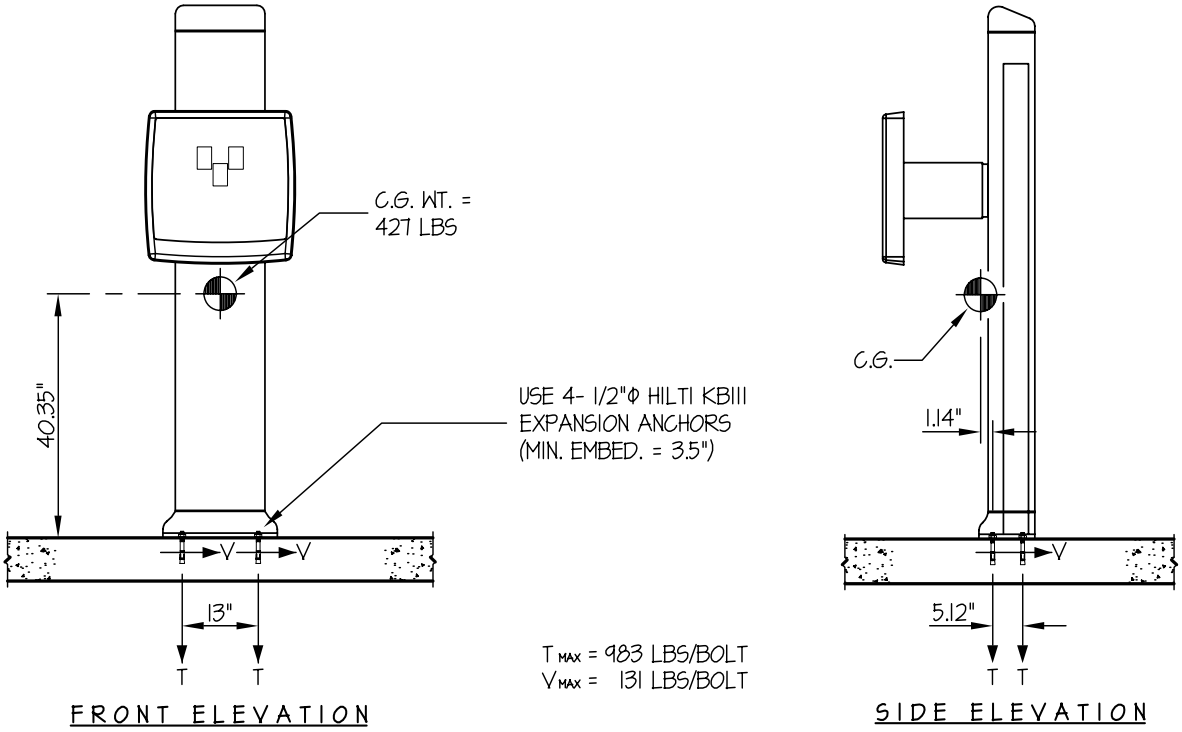
NOTE: COMBINED STRESSES ARE O.K. BY INSPECTION
PROVIDE WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.7 SG-80 Vertical Bucky Stand (VBS) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
SG-80 Vertical Bucky Stand (VBS)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



FRONT ELEVATION

SIDE ELEVATION

T_{MAX} = 983 LBS/BOLT
V_{MAX} = 131 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 427 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 214 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 71 LBS

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\frac{214\#(40.35'')}{2\ \text{BOLTS}\ (13'')} \times (0.3)\right] + \frac{214\#(40.35'') + (427\# - 71\#)1.14''}{2\ \text{BOLTS}\ (5.12'')} = 983\ \text{LBS/BOLT (MAX)}$$

(HORIZ - SIDE TO SIDE) (HORIZ - FRONT TO BACK)(WEIGHT - V_V)

SHEAR (V)

$$V = \frac{214\#(6.26'')}{2\ \text{BOLTS}\ (5.12'')} = 131\ \text{LBS/BOLT (MAX)}$$

REGISTERED PROFESSIONAL ENGINEER
JOSEPH E. LaBRIE
No. 3566
EXP. 3-31-2006
2/15/05
STRUCTURAL
STATE OF CALIFORNIA

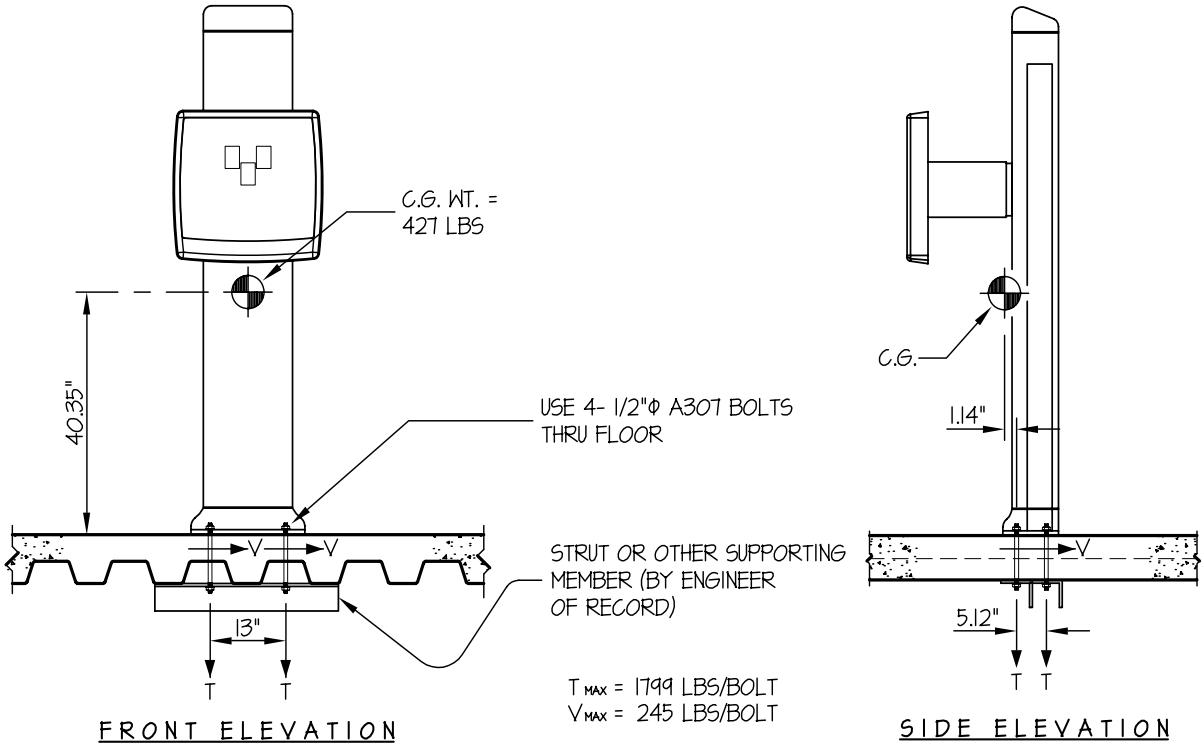
NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

2.8 SG-80 Vertical Bucky Stand (VBS) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
SG-80 Vertical Bucky Stand (VBS)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

UPPER FLOOR



FRONT ELEVATION

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 427 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 401 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 134 LBS

BOLT FORCES:

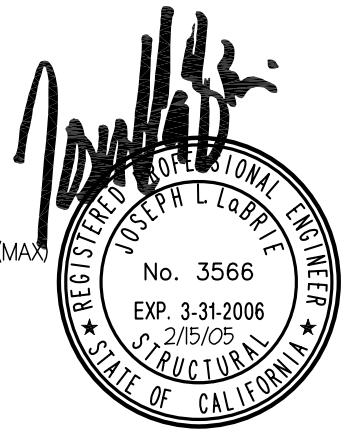
TENSION (T)

$$T_{MAXIMUM} = \left[\frac{401\#(40.35'')}{2\ \text{BOLTS}\ (13'')} \times (0.3)\right] + \frac{401\#(40.35'') + (427\# - 134\#)1.14''}{2\ \text{BOLTS}\ (5.12'')} = 1799\ \text{LBS/BOLT (MAX)}$$

(HORIZ. - SIDE TO SIDE) (HORIZ. - FRONT TO BACK)(WEIGHT - V_V)

SHEAR (V)

$$V = \frac{401\#(6.26'')}{2\ \text{BOLTS}\ (5.12'')} = 245\ \text{LBS/BOLT (MAX)}$$



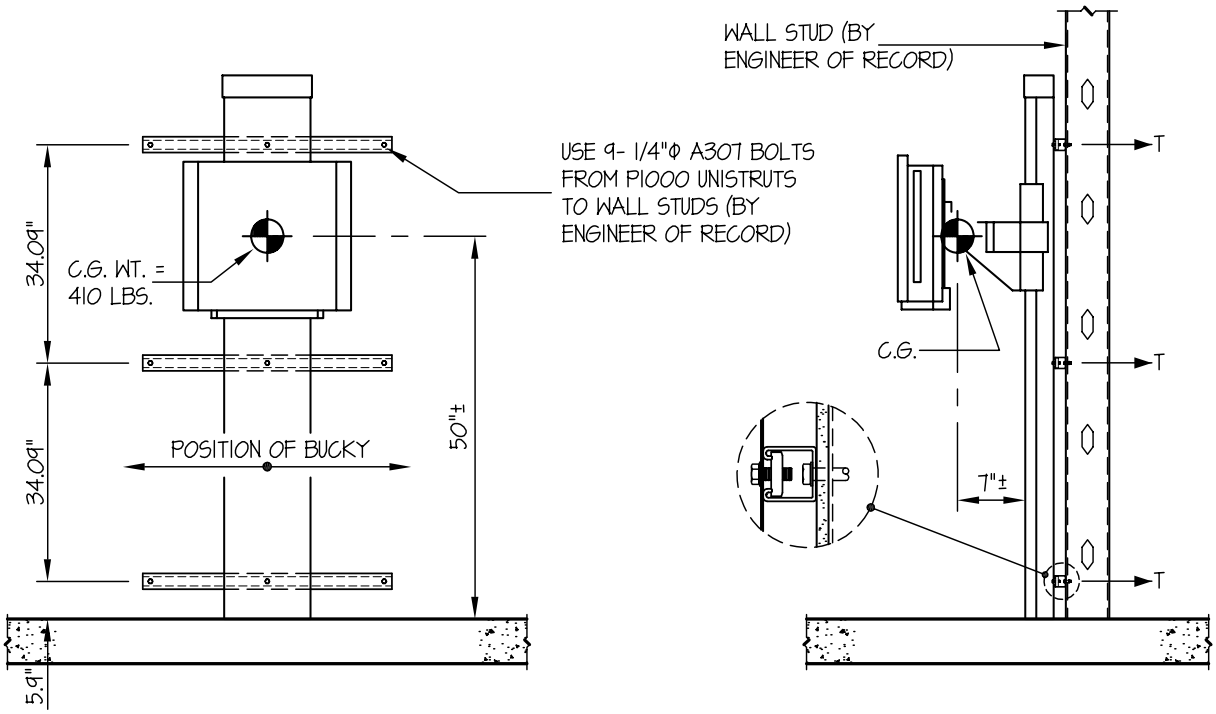
NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

2.9 SG-100 Vertical Bucky Stand (VBS) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
SG-100 Vertical Bucky Stand (VBS)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



FRONT ELEVATION

T_{MAX} = 143 LBS/BOLT
V_{MAX} = 130 LBS/BOLT

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 410 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 385 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 128 LBS

BOLT FORCES:

TENSION (T)

$$T_{WALL} = \frac{385\#(50") + (410\# + 128\#)7"}{2 \text{ BOLTS } (74.08")} = 143 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

$$V_{WALL} = \frac{385\#(50")}{2 \text{ BOLTS } (74.08")} = 130 \text{ LBS/BOLT (MAX)}$$

REGISTERED PROFESSIONAL ENGINEER
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EXP. 3-31-2006
2/15/05
STRUCTURAL
STATE OF CALIFORNIA

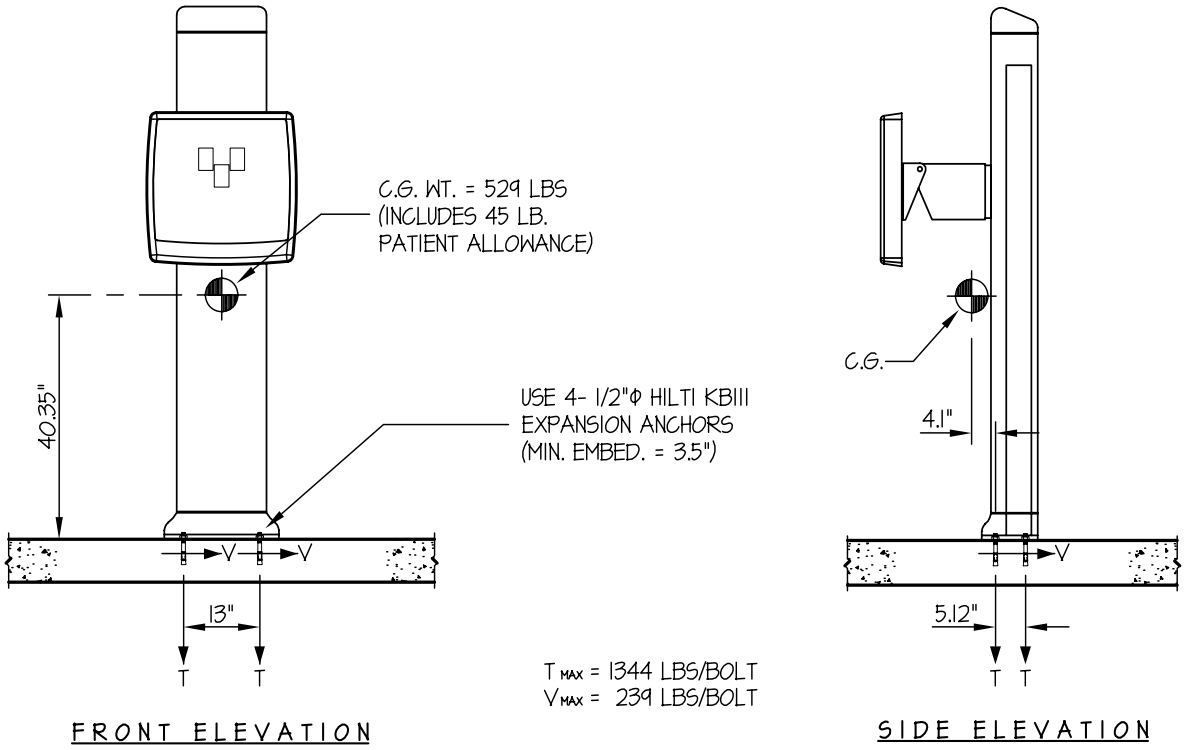
NOTE:
PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.10 SG-120 Vertical Bucky Stand (VBS) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
SG-120 Vertical Bucky Stand (VBS)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



T_{MAX} = 1344 LBS/BOLT
V_{MAX} = 239 LBS/BOLT

FRONT ELEVATION

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 529 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 265 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 88 LBS

BOLT FORCES:

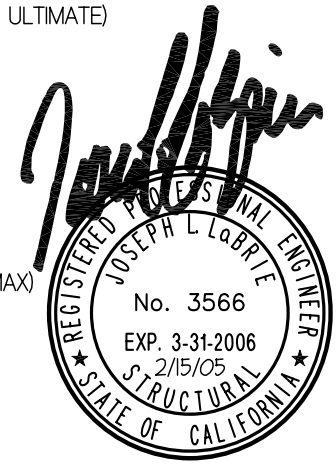
TENSION (T)

$$T_{MAXIMUM} = \left[\frac{265\#(40.35'')}{2\ BOLTS\ (13'')} \times (0.3)\right] + \frac{265\#(40.35'') + (529\# - 88\#)4.1''}{2\ BOLTS\ (5.12'')} = 1344\ LBS/BOLT\ (MAX)$$

(HORIZ. - SIDE TO SIDE) (HORIZ. - FRONT TO BACK)(WEIGHT - V_V)

SHEAR (V)

$$V = \frac{265\#(9.22'')}{2\ BOLTS\ (5.12'')} = 239\ LBS/BOLT\ (MAX)$$



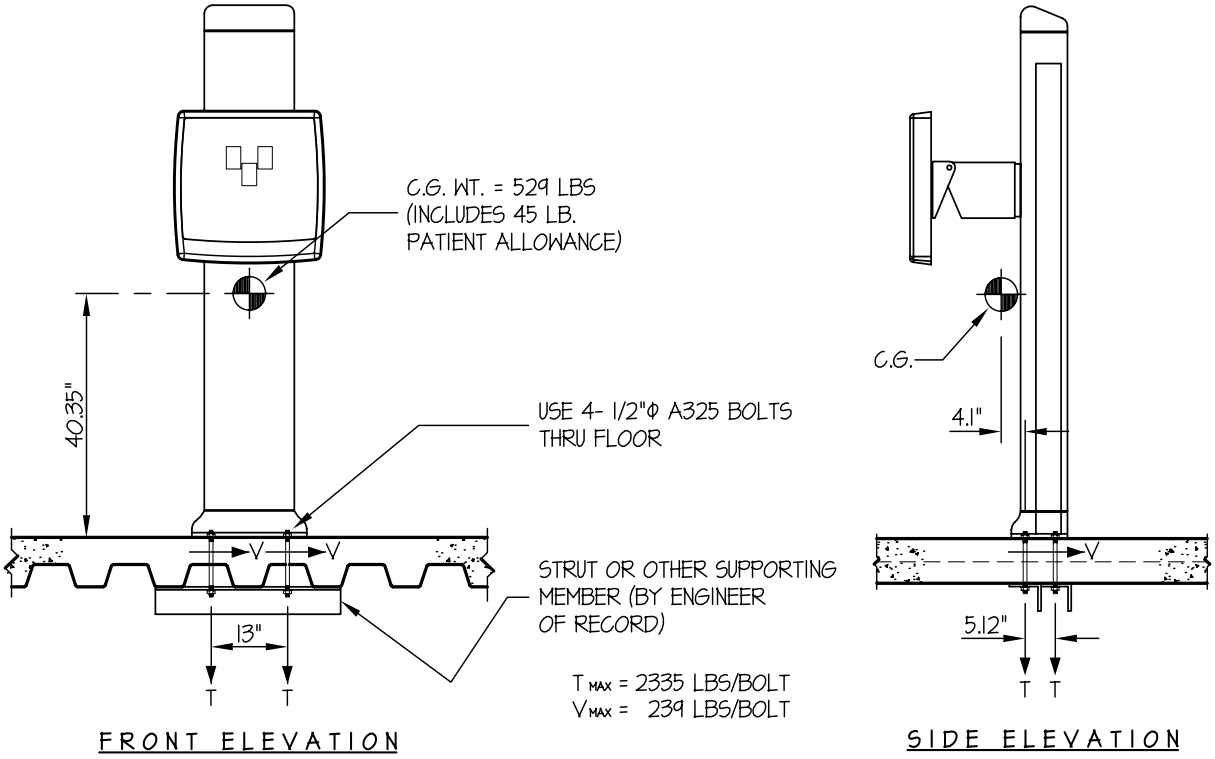
NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

2.11 SG-120 Vertical Bucky Stand (VBS) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
SG-120 Vertical Bucky Stand (VBS)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

UPPER FLOOR



FRONT ELEVATION

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 529 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 497 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 166 LBS

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\frac{497\#(40.35'')}{2\ \text{BOLTS}\ (13'')} \times (0.3)\right] + \frac{497\#(40.35'') + (529\# - 166\#)4.1''}{2\ \text{BOLTS}\ (5.12'')} = 2335\ \text{LBS/BOLT (MAX)}$$

(HORIZ. - SIDE TO SIDE) (HORIZ. - FRONT TO BACK)(WEIGHT - V_V)

SHEAR (V)

$$V = \frac{497\#(9.22'')}{2\ \text{BOLTS}\ (5.12'')} = 239\ \text{LBS/BOLT (MAX)}$$

REGISTERED PROFESSIONAL ENGINEER
JOSEPH L LaBRIE
No. 3566
EXP. 3-31-2006
2/15/05
STRUCTURAL
STATE OF CALIFORNIA

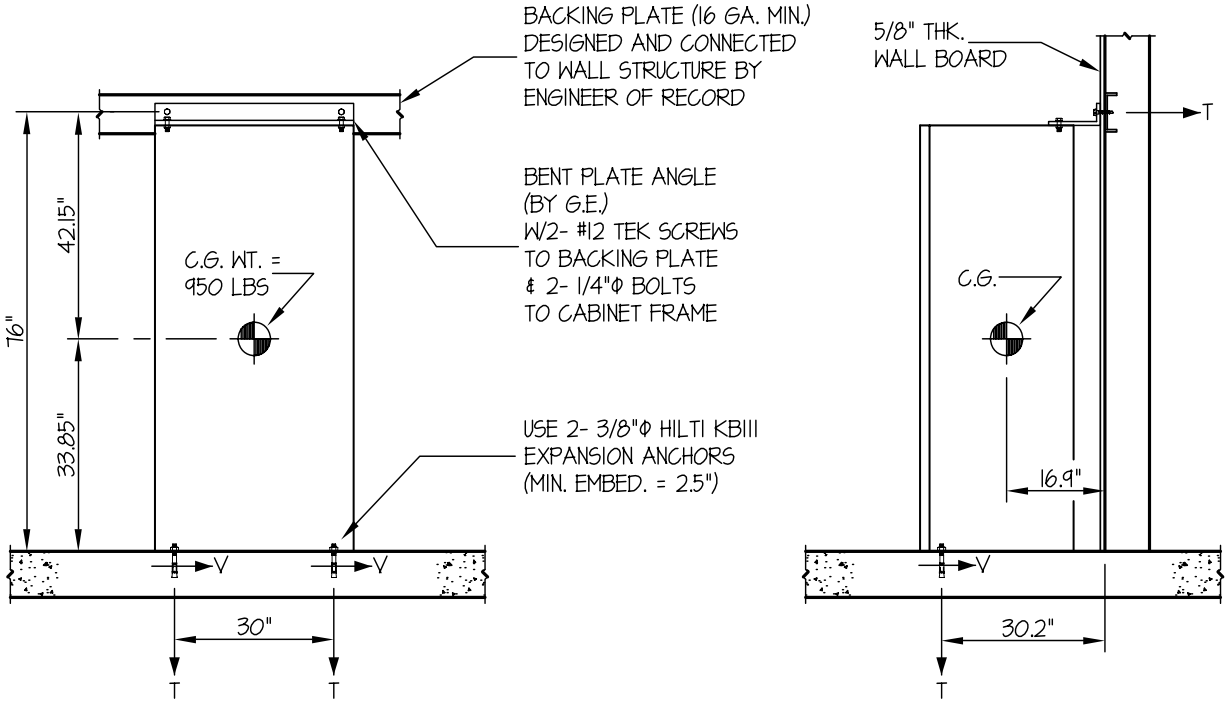
NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

2.12 System Cabinet (SKL1) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
System Cabinet (SKL1)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



FRONT ELEVATION

T_{MAX} = 106 LBS/SCREW
V_{MAX} = 132 LBS/BOLT

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 950 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 475 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 158 LBS

#12 TEK SCREWS
IN 16 GA., 50 KSI STEEL

$T_{ALLOW.}$ = 225 LBS
$V_{ALLOW.}$ = 570 LBS

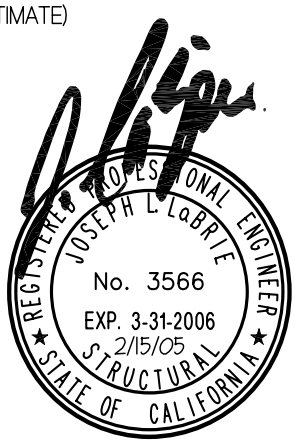
BOLT FORCES:

TENSION (T)

$$T_{WALL} = V_{WALL} = \frac{475\#(33.85'')}{2 \text{ SCREWS } (76'')} = 106 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{FLOOR} = \frac{475\#(42.15'')}{2 \text{ BOLTS } (76'')} = 132 \text{ LBS/BOLT (MAX)}$$

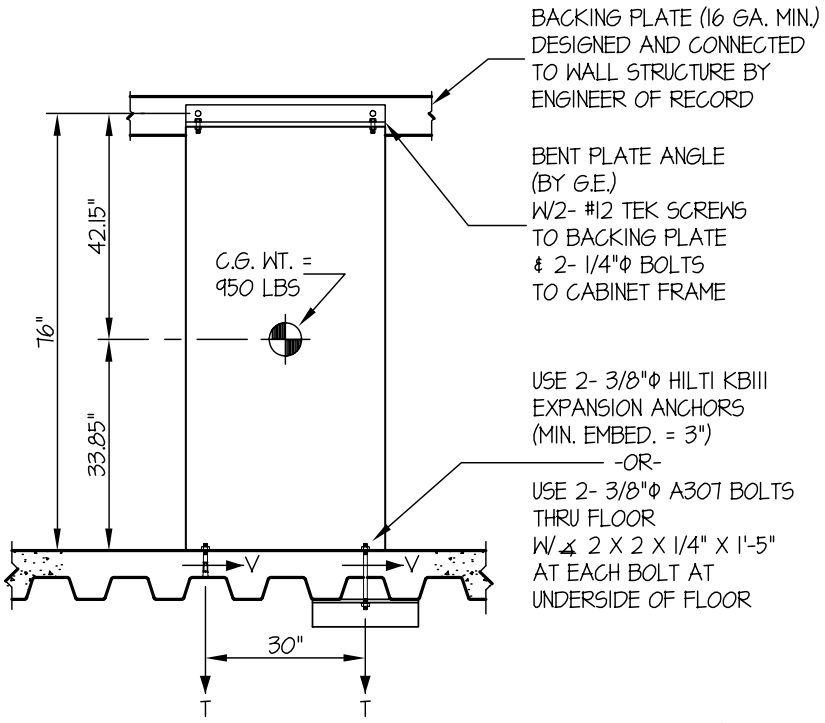


NOTE:
PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.13 System Cabinet (SKL1) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
System Cabinet (SKL1)	DATE 2/15/05	OF 1 SHEET

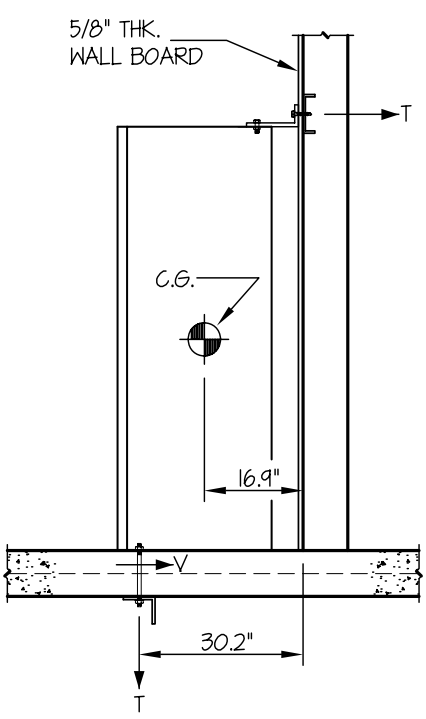
SEISMIC ANCHORAGE CALCULATION



FRONT ELEVATION

T_{MAX} = 199 LBS/SCREW
V_{MAX} = 248 LBS/BOLT

UPPER FLOOR



SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 950 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 893 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 298 LBS

#12 TEK SCREWS IN 16 GA., 50 KSI STEEL

$T_{ALLOW.}$ = 225 LBS
$V_{ALLOW.}$ = 570 LBS

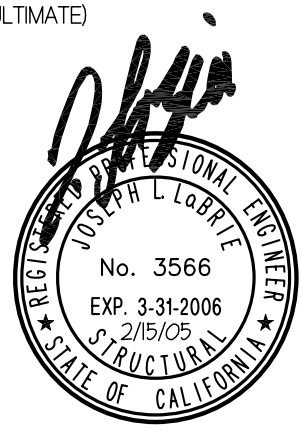
BOLT FORCES:

TENSION (T)

$$T_{WALL} = V_{WALL} = \frac{893\#(33.85'')}{2 \text{ SCREWS } (76'')} = 199 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{FLOOR} = \frac{893\#(42.15'')}{2 \text{ BOLTS } (76'')} = 248 \text{ LBS/BOLT (MAX)}$$



NOTE:
PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

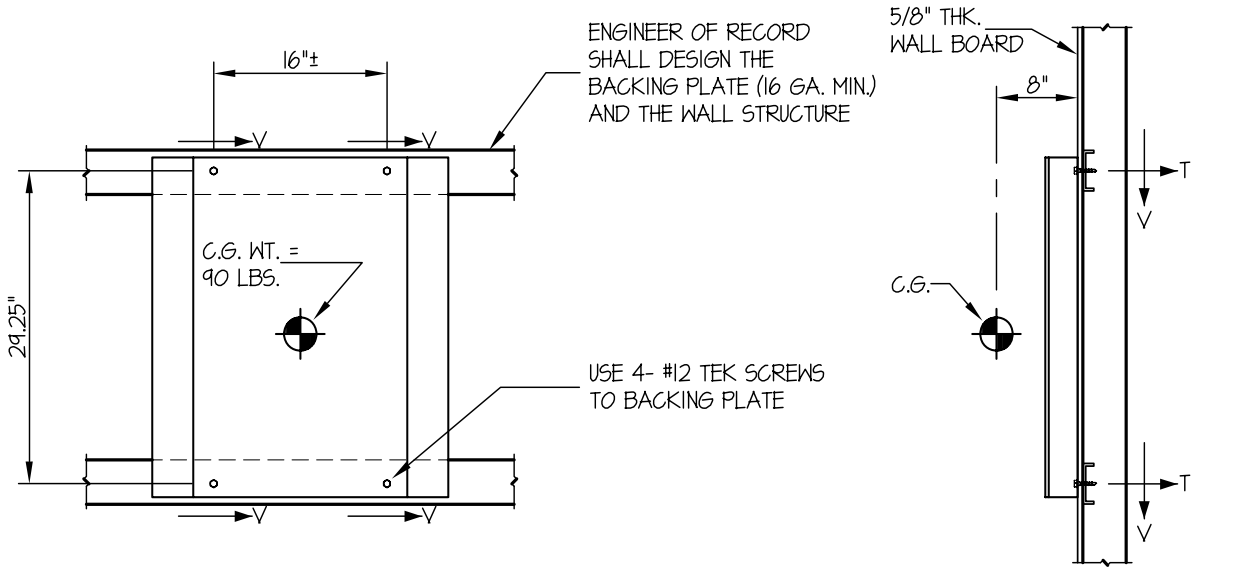
2.14 Table Accessory Rack (TAR) - Wall Mounted

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
Table Accessory Rack (TAR)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

WALL MOUNTED



FRONT ELEVATION

SIDE ELEVATION

T_{MAX} = 46 LBS/SCREW
V_{MAX} = 51 LBS/SCREW

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 90 LBS

HORIZONTAL FORCE (V_H) = 0.94W = 85 LBS

VERTICAL FORCE (V_V) = 0.33(V_H) = 28 LBS

#12 SM SCREWS TO 16 GAGE, 50 KSI

$T_{ALLOW.}$ = 225 LBS

$V_{ALLOW.}$ = 570 LBS

TENSION (T)

$$T_{VERTICAL} = \frac{(90\# + 28\#)8''}{2 \text{ BOLTS } (29.25'')} = 16 \text{ LBS}$$

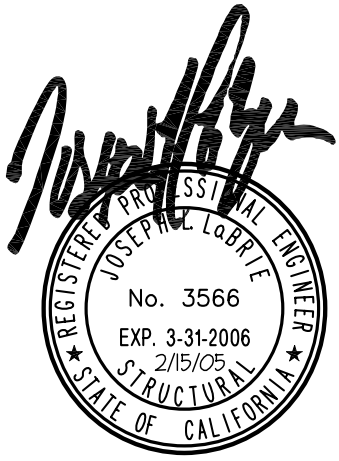
$$T_{PARALLEL} = \frac{85\#(8'')}{2 \text{ BOLTS } (16'')} = 21 \text{ LBS}$$

$$T_{PERP.} = \frac{85\#}{4 \text{ BOLTS}} = 21 \text{ LBS}$$

$$T_{MAX} = 16\# + \sqrt{21^2 + 21^2} = 46 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

$$V_{MAX} = \frac{90\# + 28\# + 85\#}{4 \text{ BOLTS}} = 51 \text{ LBS/BOLT (MAX)}$$



NOTE:

ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

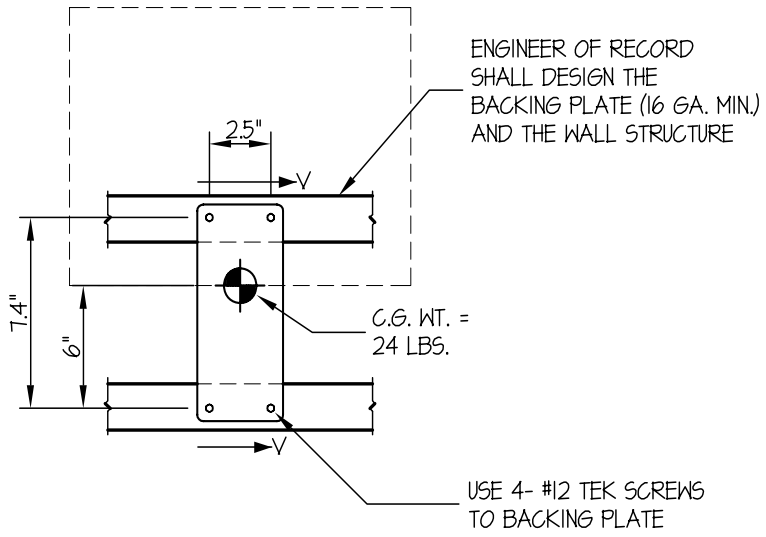
2.15 Wall Mounted Flat Panel Monitor (MON2)

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

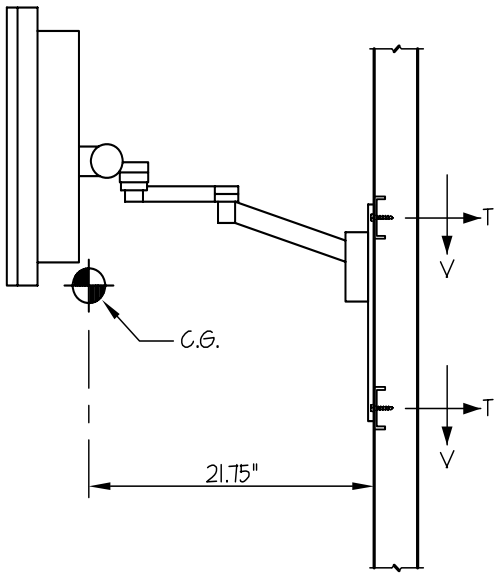
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
Wall Mtd FP Monitor (MON2)	DATE 2/15/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

WALL MOUNTED



FRONT ELEVATION



T_{MAX} = 128 LBS/SCREW
V_{MAX} = 17 LBS/SCREW

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 24 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 23 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 8 LBS

BOLT FORCES:

TENSION (T)

$$T = \frac{(24\# + 8\#)21.75"}{2 \text{ SCREWS } (7.4")} + \frac{23\#(21.75")(6")}{2 \text{ SCREWS } (2.5")(7.4")} = 128 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V = \frac{24\# + 8\#}{4 \text{ SCREWS}} + \frac{23\#(6")}{2 \text{ SCREWS } (7.4")} = 17 \text{ LBS/SCREW (MAX)}$$

REGISTERED PROFESSIONAL ENGINEER
JOSEPH L. LaBRIE
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EXP. 3-31-2006
2/15/05
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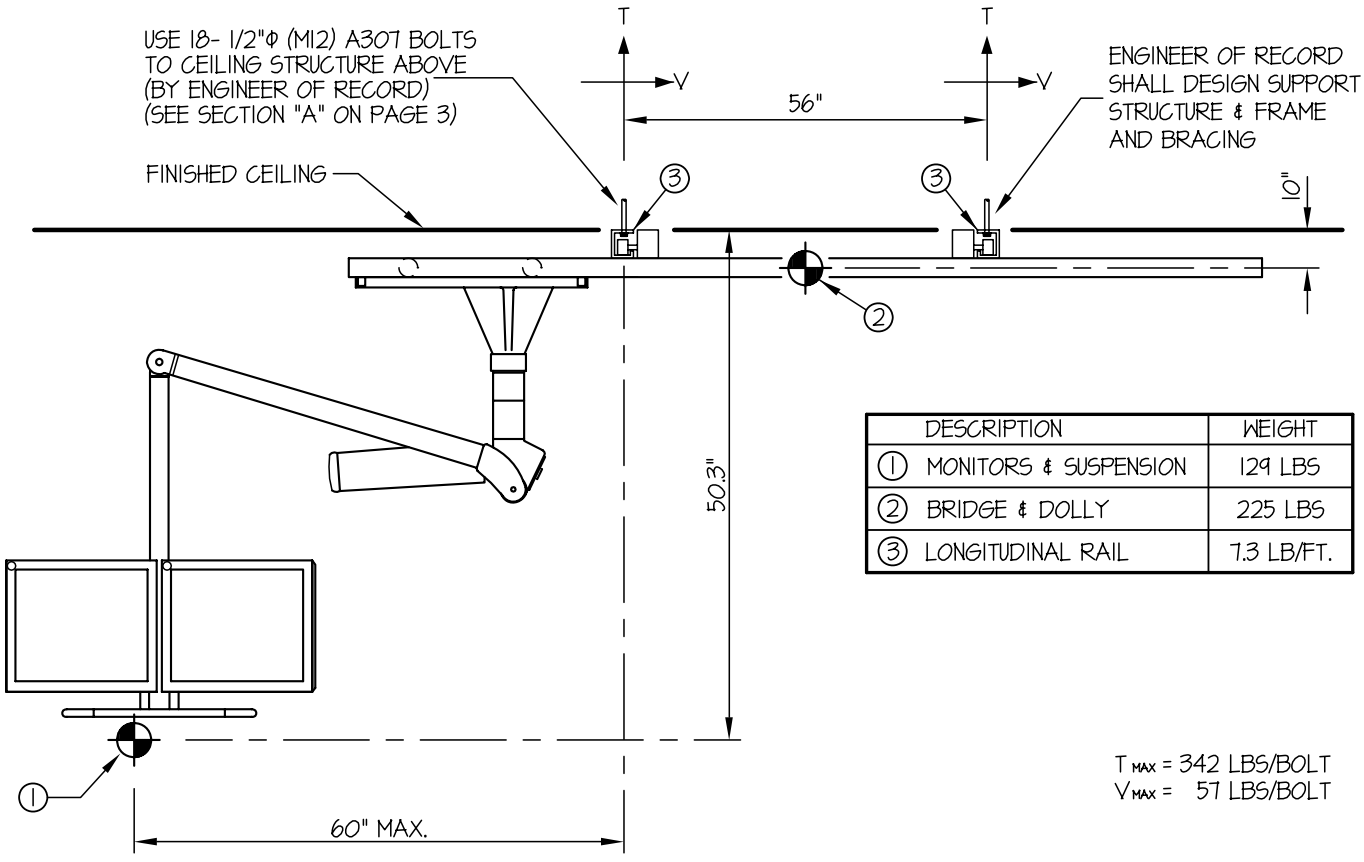
NOTE:
PROVIDE WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.16 XT with 2 Flat Panel Suspension (MON1/3) - Sheet 1 of 3

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0504	
XT with 2 Flat Panel Suspension (MON1/3)	DATE 2/15/05	OF 3 SHEETS

SEISMIC ANCHORAGE CALCULATION

CEILING MOUNTED



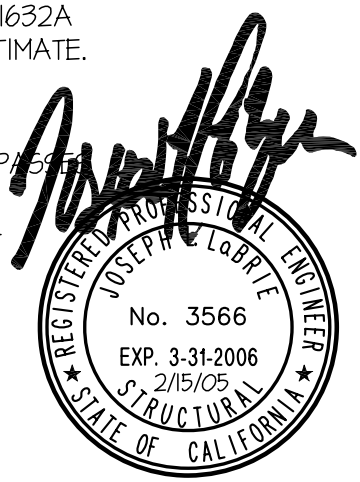
	DESCRIPTION	WEIGHT
1	MONITORS & SUSPENSION	129 LBS
2	BRIDGE & DOLLY	225 LBS
3	LONGITUDINAL RAIL	7.3 LB/FT.

T_{MAX} = 342 LBS/BOLT
V_{MAX} = 57 LBS/BOLT

ELEVATION

NOTES:

1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.94W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN ADDITION TO ALL OTHER LOADS.

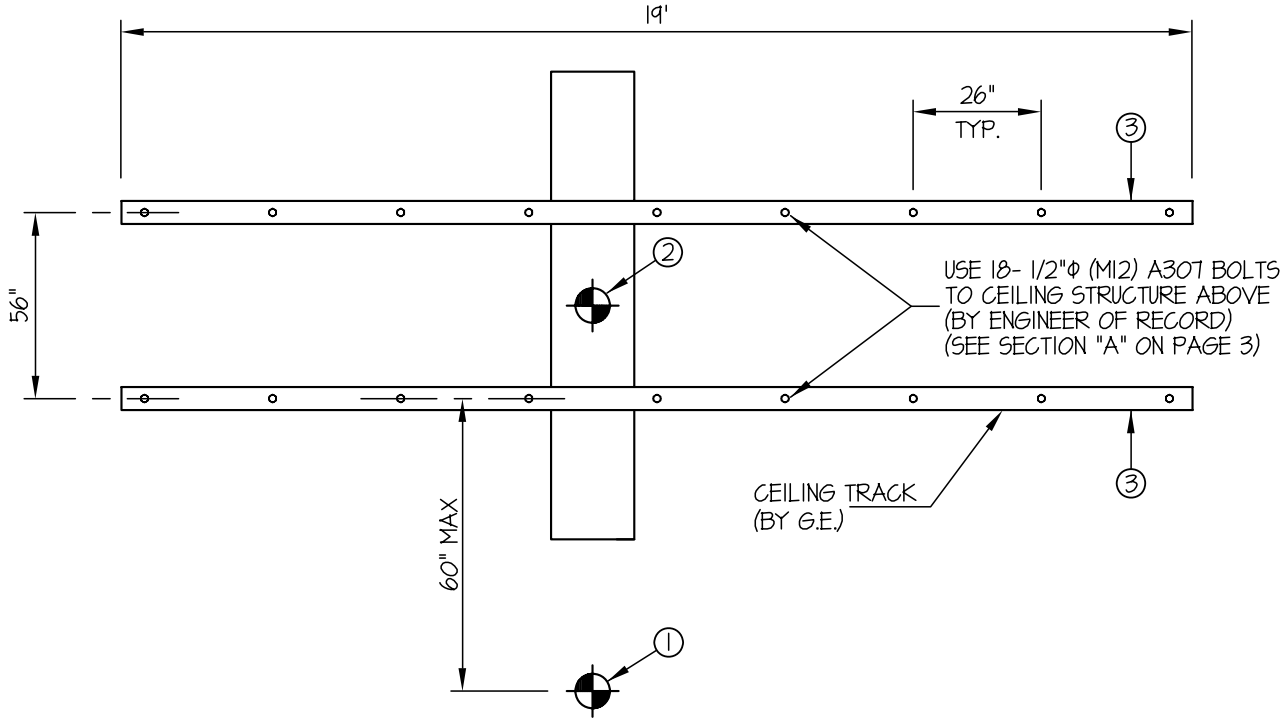


XT with 2 Flat Panel Suspension (MON1/3) - Sheet 2 of 3

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0504	
XT with 2 Flat Panel Suspension (MON1/3)	DATE 2/15/05	OF 3 SHEETS

SEISMIC ANCHORAGE CALCULATION

CEILING MOUNTED



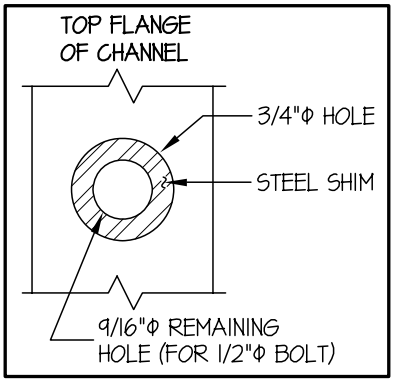
PLAN AT CEILING

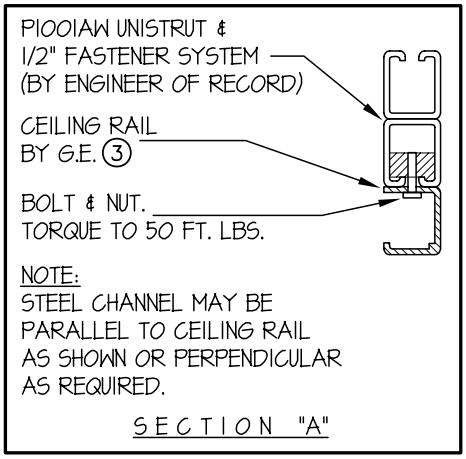
XT with 2 Flat Panel Suspension (MON1/3) - Sheet 3 of 3

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 2297165	DES. R. LA BRIE	SHEET 3
	JOB NO. 12-0504	
XT with 2 Flat Panel Suspension (MON1/3)	DATE 2/15/05	OF 3 SHEETS

SEISMIC ANCHORAGE CALCULATION

CEILING MOUNTED





LOADS:

① MONITORS & SUSPENSION
WEIGHT = 129 LBS
HORIZ. FORCE (V_H) = 121 LBS
VERT. FORCE (V_V) = 40 LBS

② BRIDGE & DOLLY
WEIGHT = 225 LBS
HORIZ. FORCE (V_H) = 212 LBS
VERT. FORCE (V_V) = 71 LBS

③ RAILS
WEIGHT = 7.3 LB/FT.
HORIZ. FORCE (V_H) = 6.9 LB/FT.
VERT. FORCE (V_V) = 2.3 LB/FT.

BOLT FORCES:

TENSION (T)

$$T_1 = \frac{[(129\# + 40\#)116"] + 121\#(50.3")}{2 \text{ BOLTS } (56")} = 229 \text{ LBS/BOLT}$$

$$T_2 = \frac{[(225\# + 71\#)28"] + 212\#(10")}{2 \text{ BOLTS } (56")} = 93 \text{ LBS/BOLT}$$

$$T_3 = \frac{(7.3\#/FT. + 2.3\#/FT.)19'}{9 \text{ BOLTS}} = 20 \text{ LBS/BOLT}$$

$$T = 229\# + 93\# + 20\# = 342 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

$$V = \frac{129\# + 40\#}{4 \text{ BOLTS}} + \frac{6.9\#/FT.(19')}{9 \text{ BOLTS}} = 57 \text{ LBS/BOLT (MAX)}$$

UNITY CHECK:

$$\frac{T_{ACTUAL}}{T_{ALLOW.}} + \frac{V_{ACTUAL}}{V_{ALLOW.}} = \frac{342}{3920} + \frac{57}{1960} = .116 < 1.0 \therefore \text{O.K.}$$

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