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**DX-D 400****X-Ray-System****► Purpose of this document**

This document contains the manufacturers' service documentation for the DX-D 400. The service documentation is only applicable for X-Ray-System.

**► Changes compared to previous revision**

Edition. Revision	Release Date	Changes compared to previous Version 1.3
1.4	07-2018	<p>The following documents have been updated</p> <ul style="list-style-type: none"><li>• DX-D 400 Service manual - Analog (SM-1097R6)</li></ul>

## DOCUMENT CONTROL NOTE:

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## **LIST OF DOCUMENTS**

This Service Manual comprises the following documents:

<b>CODE / REVISION</b>	<b>DOCUMENT</b>	<b>Date</b>
SM-1097R6	DX-D 400 Service Manual	JUL 06, 2018
AP-0058R1	Appendix - DX-D 400 with Short Columns and Transport Locks	SEP 25, 2013

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# **DX-D 400**

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## **Service Manual**



## REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	March 02, 2010	First Edition
1	Jul 22, 2011	Table Brakes
2	Jun 06, 2012	Varian 4343R Detector Added
3	Oct 17, 2013	Spare Parts moved to RP1114
4	Sep 05, 2015	New inverter at elevating Table
5	Oct 23, 2017	Focal spot label in x-ray tube, schematic A3507-01 update to rev. E, Adjustments section improved and others.
6	Jul 06, 2018	New inverter at elevating Table and improved troubleshooting Section.

This Document is the English original version, edited and supplied by the manufacturer.

The Revision state of this Document is indicated in the code number shown at the bottom of this page.

## ADVISORY SYMBOLS

The following advisory symbols will be used throughout this manual. Their application and meaning are described below.



**DANGERS ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEeded OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.**



**ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEeded OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY, OR CATASTROPHIC DAMAGE OF EQUIPMENT OR DATA.**



*Advise of conditions or situations that if not heeded or avoided could cause personal injury or damage to equipment or data.*

Note

*Alert readers to pertinent facts and conditions. Notes represent information that is important to know but which do not necessarily relate to possible injury or damage to equipment.*

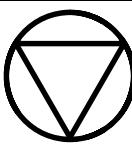
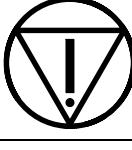
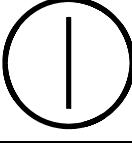
## SAFETY SYMBOLS

The following safety symbols may appear in the equipment.

Their meaning are described below.

	<b>Caution. Consult accompanying documents.</b>
	<b>Safety Symbol. Follow instructions for use, especially those instructions identified with Advisory Symbols to avoid any risk for the Patient or Operator.</b> <i>(Only applies to IEC 60601-1 Standard - Third edition)</i>
	<b>General Mandatory action.</b>
	<b>Type B applied part.</b>
<b>IPX0</b>	<b>Protection against harmful ingress of water or particulate matter.</b> IP Classification: Ordinary.
	<b>Ionizing radiation.</b>
	<b>Non-ionizing electromagnetic radiation.</b>
	<b>Radiation of Laser apparatus.</b> Do not stare into beam. <i>(Only applicable to equipment with Laser Pointer)</i>

	Dangerous voltage.
	General warning, caution, risk of danger.
	Warning: Ionizing radiation.
	Warning: Non-ionizing radiation.
	Warning: Laser beam.
	Warning: Dangerous voltage.
	Warning: Do not place fingers between mobile and fixed parts of the equipment, it may cause serious injuries to patient or operator. As well, make sure the patient extremities are correctly positioned into limit areas during operation, movement of parts may cause serious damages to patient.
	Electrostatic sensitive devices.
	No pushing.

	No sitting.
	No stepping on surface.
	Stop (of action).
	Emergency stop.
	“ON” power.
	“OFF” power.
	“ON” / “OFF” (push-push). Each position, “ON” or “OFF”, is a stable position.
~	Alternating current.
3~	Three-phase alternating current.
3N~	Three-phase alternating current with neutral conductor.

<b>N</b>	Connection point for the neutral conductor on Permanently Installed equipment.
— — —	Direct current.
~	Both direct and alternating current.
	Protective Earth (Ground).
	Earth (Ground).
	This symbol according to the European Directive indicates that the Waste of Electrical and Electronic Equipment (WEEE) must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.
 Li/Pb/Cd/Hg	This separate collection symbol is affixed to a battery or its packing, to advise that the battery must be recycled or disposed of in accordance with local or country laws. The letters below the symbol indicate whether certain elements (Li=Lithium, PB=Lead, CD=Cadmium, Hg=Mercury) are contained in the battery. All batteries removed from the equipment must be properly recycled or disposed. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.
	<b>Pollution Control.</b> (Only applicable to People's Republic of China (PRC)). This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese Standards. It must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.

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## SECTION 1 INTRODUCTION

### 1.1 OBJECTIVE AND SCOPE OF THIS MANUAL

This Service Manual is intended to describe the installation, adjustments, configuration, calibration, troubleshooting and periodic maintenance of the Radiographic Room.



OPERATOR AND SERVICE MANUALS SHOULD BE CAREFULLY READ AND UNDERSTOOD BY SERVICE PERSONNEL BEFORE USING AND SERVICING THE EQUIPMENT, ESPECIALLY THE INSTRUCTIONS CONCERNING SAFETY, REGULATORY, DOSAGE AND RADIATION PROTECTION. KEEP THE MANUALS WITH THE EQUIPMENT AT ALL TIMES AND PERIODICALLY REVIEW THE OPERATING AND SAFETY INSTRUCTIONS.



SERVICE PERSONNEL MUST HAVE SUFFICIENT KNOWLEDGE TO COMPETENTLY PERFORM THE SERVICE TASKS RELATED TO X-RAY DEVICES AND PARTICULARLY TO THE EQUIPMENT DESCRIBED IN THIS MANUAL. THIS KNOWLEDGE IS ACQUIRED THROUGH A VARIETY OF EDUCATIONAL METHODS FOR TECHNICIANS IN ACCORDANCE WITH LOCAL LAWS OR REGULATIONS, INCLUDING SPECIFIC TRAINING ON THIS EQUIPMENT.

### 1.2 TOOLS AND TEST EQUIPMENT

The following tools and test equipment are required for the installation:

- Standard service engineers tool kit.
- Standard and extended levels (1 meter for Column Base).
- Electric drill motor and assorted bits.

The following special Tools are commonly used for adjustment of the Rad Room (these tools are **not included** with the System. Use the suggested tools or equivalent):

- Collimator Test Tool (Model RMI 161B9).
- Beam Alignment Test Tool (Model RMI 162A).
- SID Test Stand Tool (Inside Case: RMI Model 175).
- Light Meter (Standard).

### 1.3 TORQUE VALUES FOR SCREWS

Generally, when any screw is installed during the installation procedure described in this document, it is recommended to apply the torque listed in *Table 1-1*, unless the torque value to be applied is specified in the corresponding procedure.



***Apply only the tightening torques listed in Table 1-1 for mounting the mechanical parts of the unit (metallic parts to metallic parts), never for mounting electrical or electronic parts (e.g. electronic boards).***

**Note**

*It is also recommended to apply a drop of Loctite 243 to the end of the metallic screws before tightening them definitely.*

**Table 1-1**  
**Screws Torque Specifications**

SCREW SIZE (Metric ISO Screw Thread)	APPLIED TORQUE
M3	0.11 Nm
M4	2.9 Nm
M5	5.7 Nm
M6	10 Nm
M8	24.1 Nm
M10	47.7 Nm
M12	82 Nm

**Note.** - Conversion Factor: 1 Nm = 0.10197 kgf\*m ; 1 Kgf\*m = 9.80665 Nm.

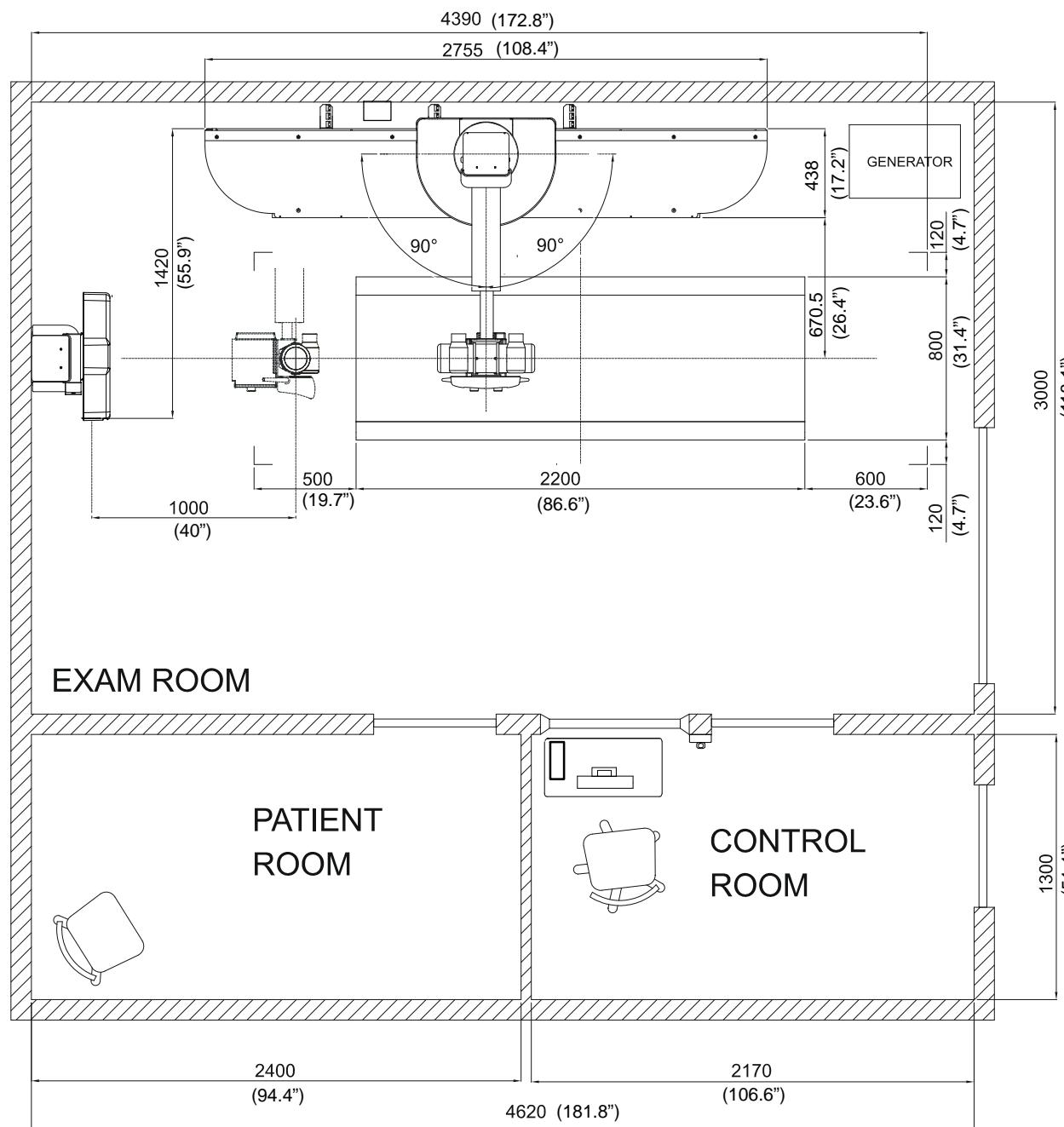
## 1.4 PRE-INSTALLATION CHECKS

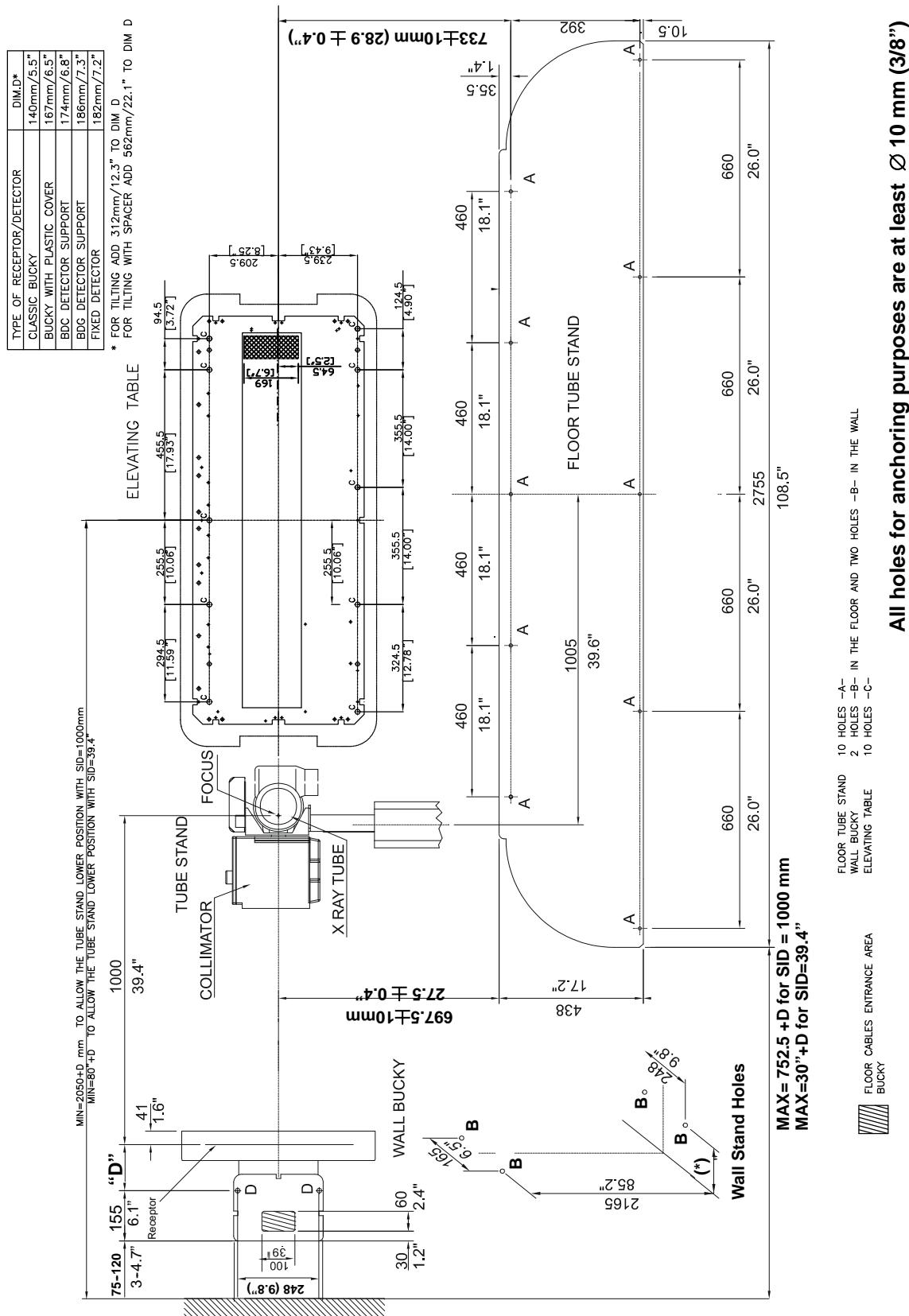
This section provides product information and illustrations showing physical dimensions, weight, mounting holes and access areas for cabling.

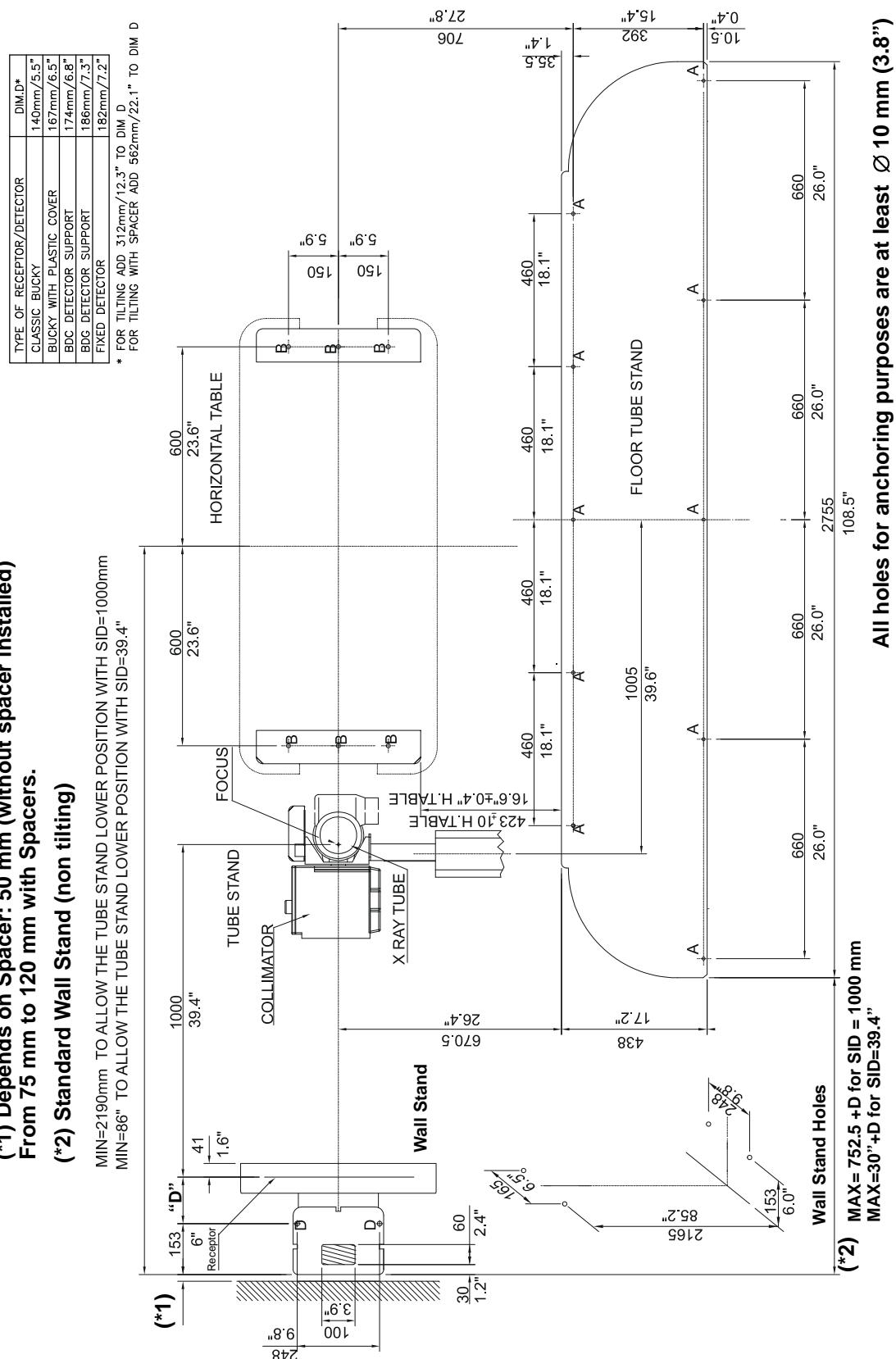
- Floor, wall and raceways for equipment installation.
- It is recommended to install a wood block 600 mm x 25 mm approx. inside all non brick walls for a safe Wall Stand installation.
- A plan distribution is strongly recommended prior equipment installation. Take into account dimensions, travels, operation and passing through areas. Minimum room space required to allow installation and travels of the equipments:
  - Surface: 4 x 2 meters (13 x 6.5 ft).
  - Height: 2.6 meters (8.5 ft).
- Operator / Patient audio and Video Controls must be considered in the room layout.

The following illustrations show a typical Room Layout, dimensions of the equipments and anchoring holes in the Rad Room.

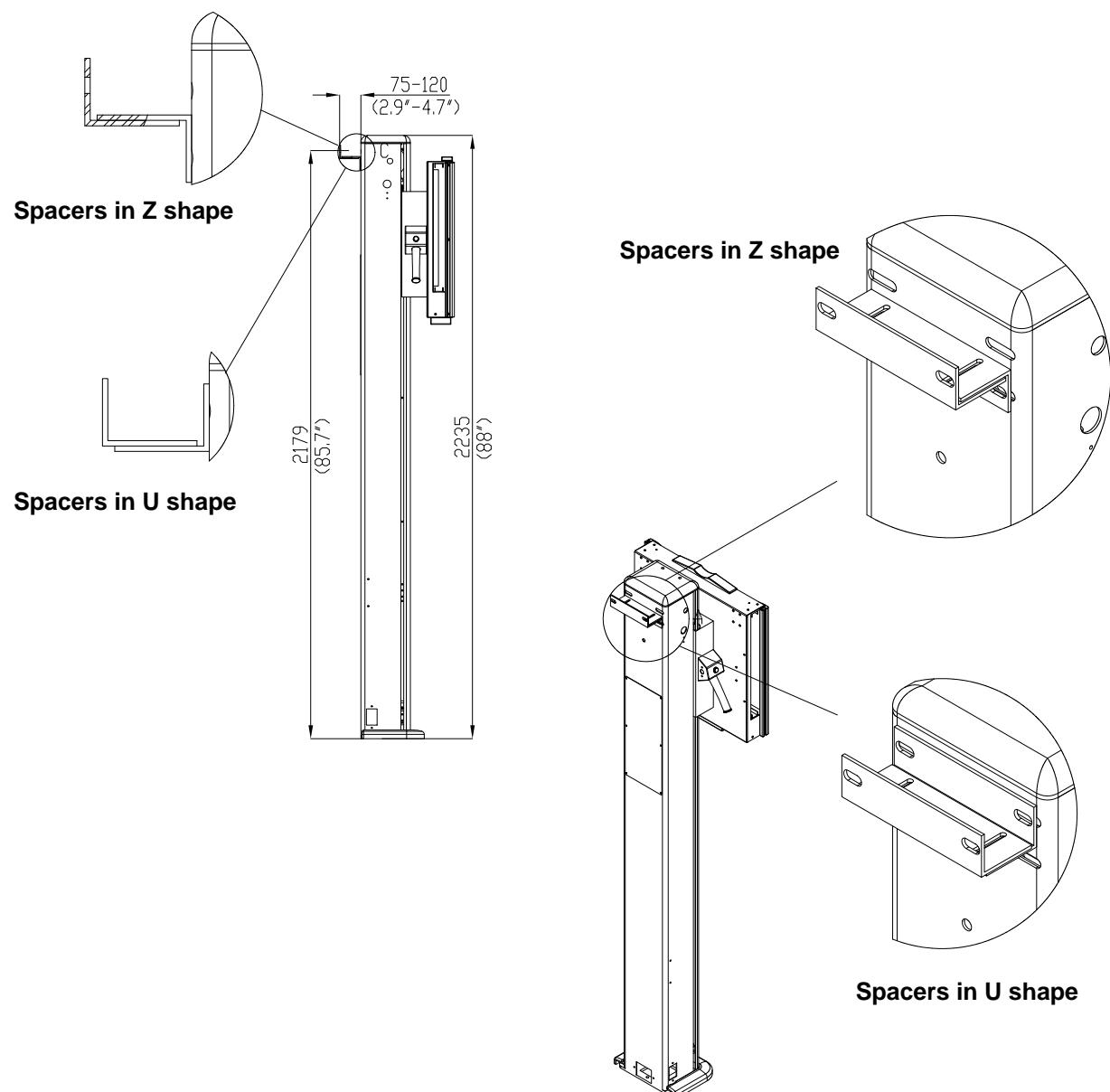
**Illustration 1-1**  
**Typical Room Layout**



**Illustration 1-2****Anchoring Holes and cable entrances in the Radiographic Room (Elevating Table)**

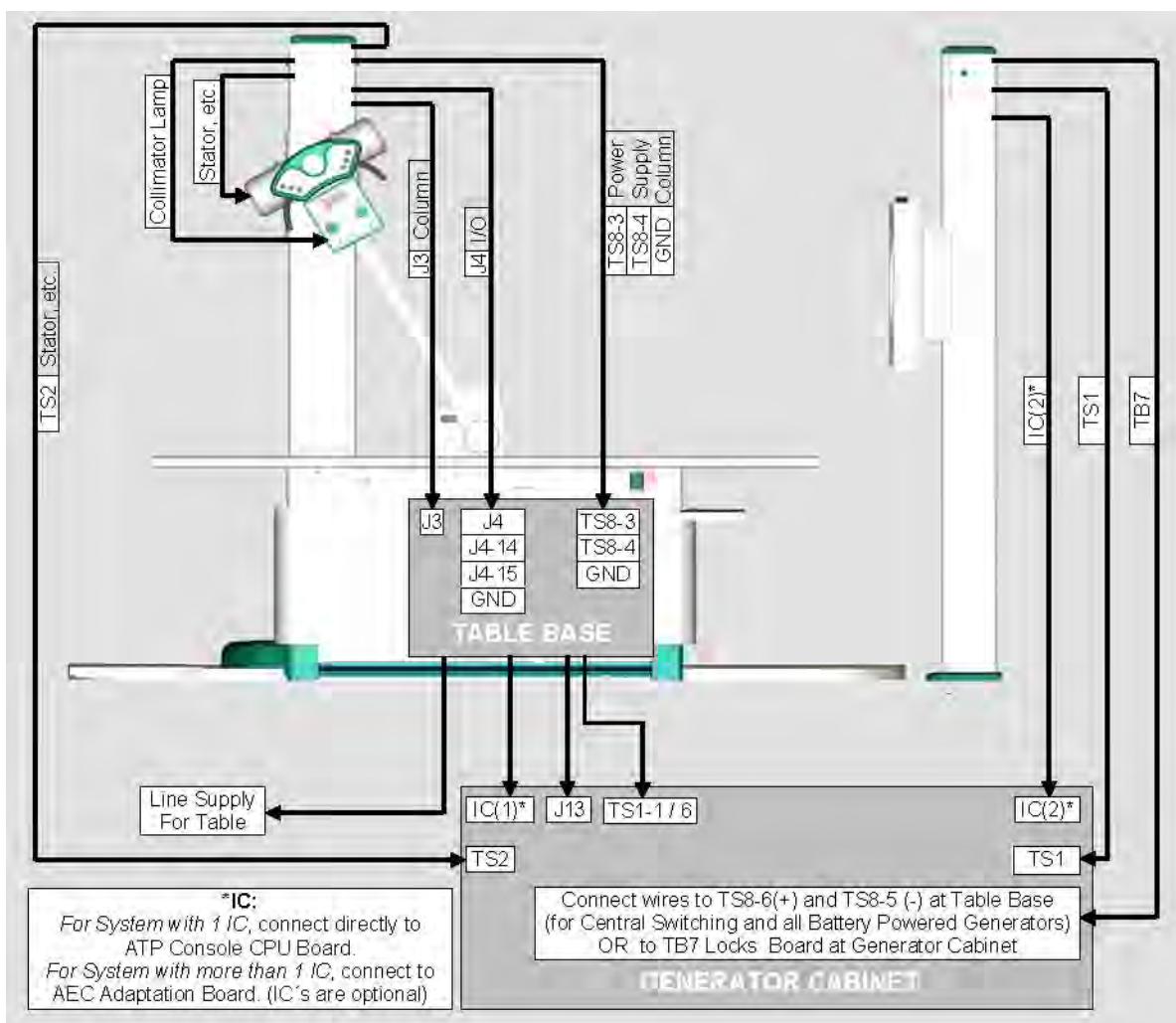
**Illustration 1-3****Anchoring Holes and cable entrances in the Radiographic Room (Fixed Height Table)**

**Illustration 1-4**  
**Wall Stand - Spacers**

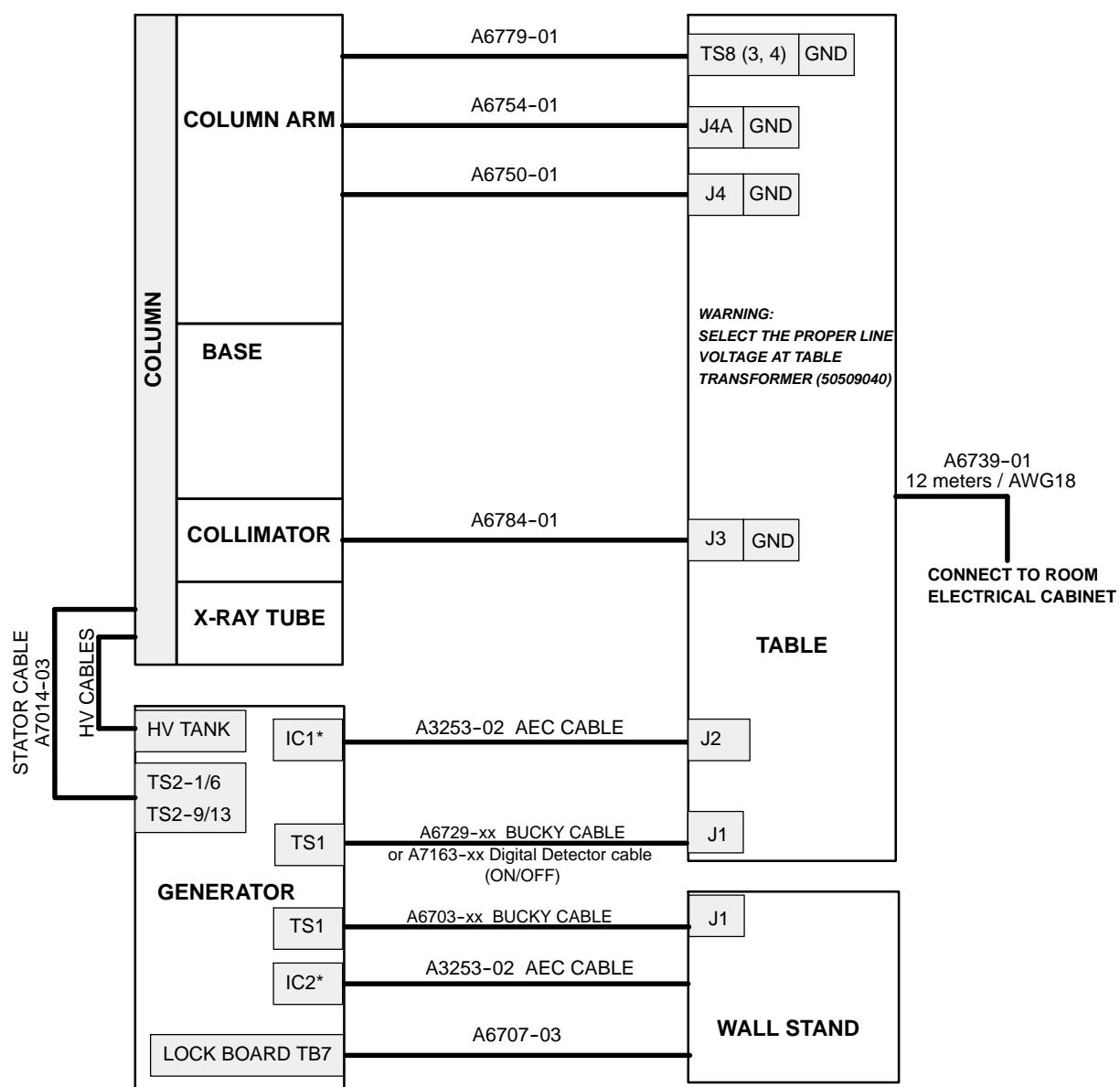


The following illustrations show the room cabling connections to be performed during installation in the Column, Table, Wall Bucky and Generator. Also refer to Section 5.5. Optional Digital Detector Cables are not included, refer to Schematics Section in this Service Manual or to the Digital Detector documentation.

### Illustration 1-5 Room Cabling

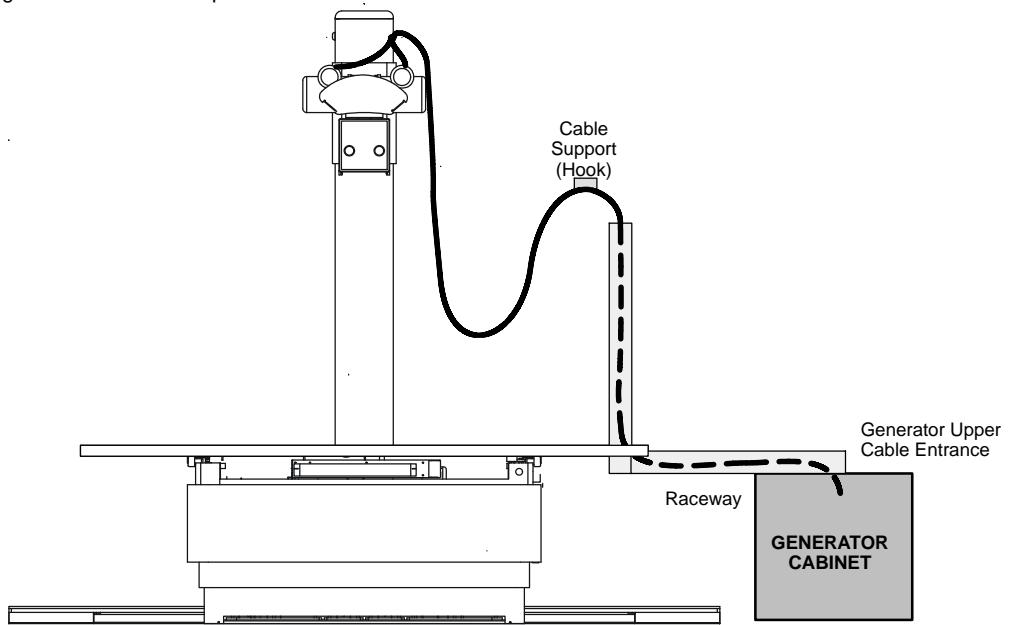


**Illustration 1-6**  
**Room Cabling (cont.)**

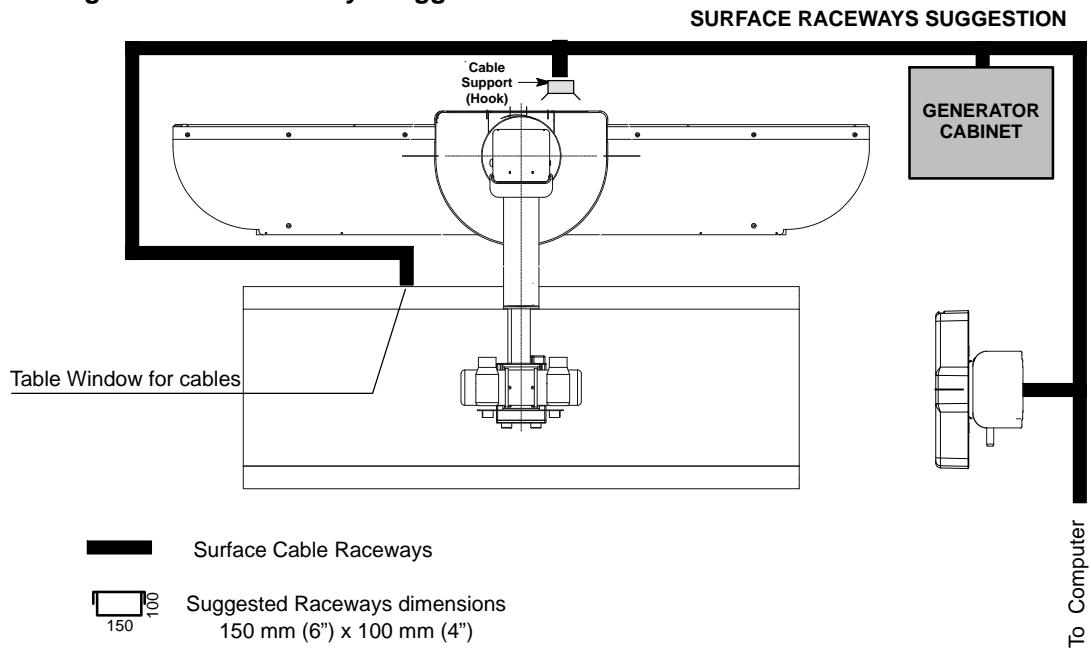


**Illustration 1-6****Cabling and Room Raceways suggestions**

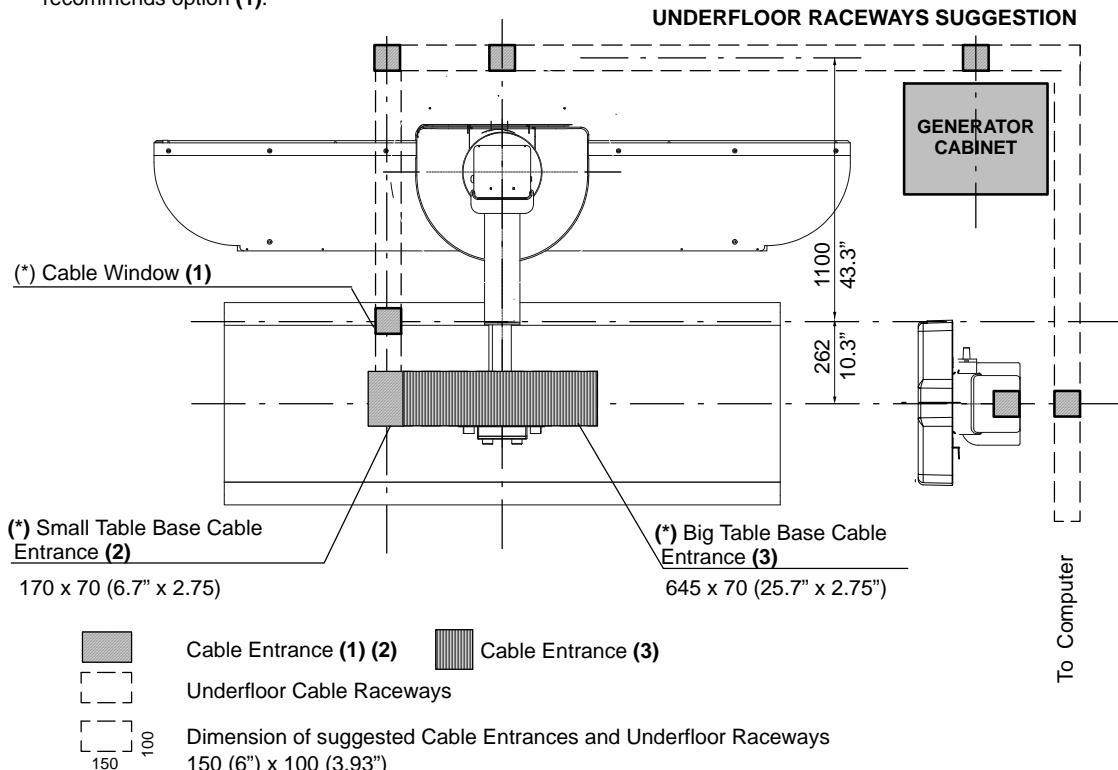
For 9 m High Voltage Cables, install a cable hook of the wall and position the generator as close as possible to the Column base



**Illustration 1-6 (cont.)**  
**Cabling and Room Raceways suggestions**

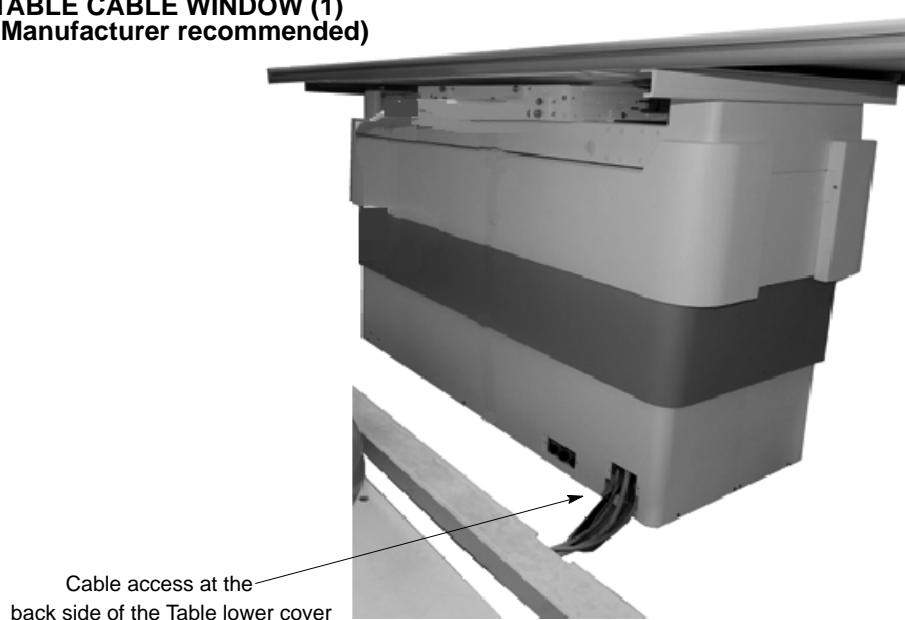


(\*) Cables in the Table are factory guided through the Cable window (1) located at the back of the Table lower cover. Some installations may require to use the Small Table Base Cable entrance (2). As a third option, the Big Table Base Cable entrance (3) **may be used**, in this case, the cables should be carefully routed in a flat harness such a way that they are not smashed when the Elevating Table is moved to the lowest position. The manufacturer recommends option (1).

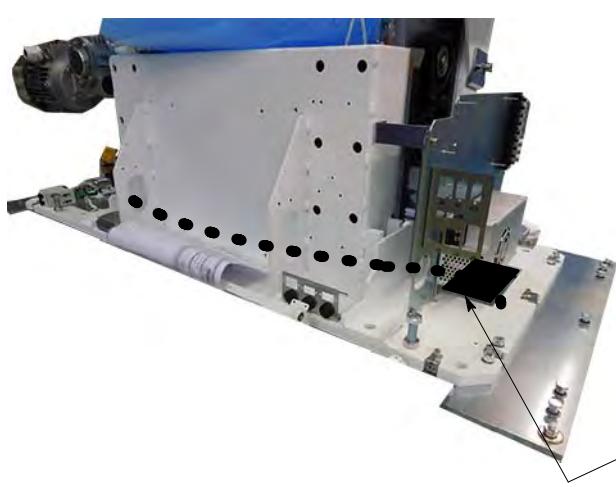


### 1.4.1 CABLE ACCESS

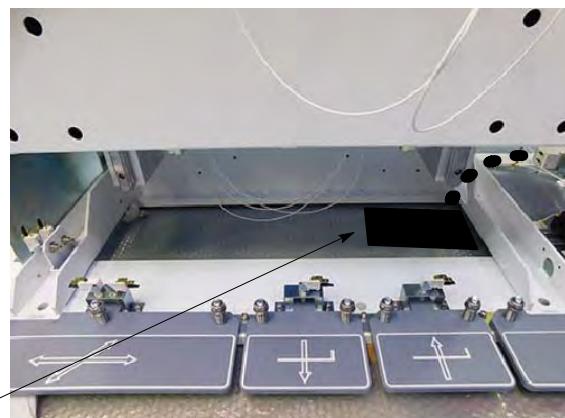
**TABLE CABLE WINDOW (1)**  
(Manufacturer recommended)



**Cable access (2)**



**Cable access (3)**



Please remember that this option (3) requires the cables guided in a flat harness to avoid cables smashed by the table down movement.

**WALL STAND**

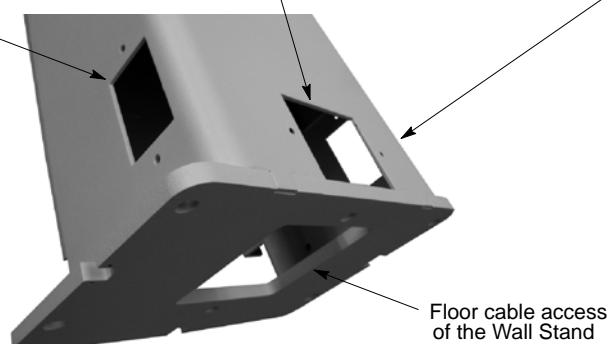
Cable access at the right side of the Wall Stand



Cable access at the rear side of the Wall Stand



Cable access at the left side of the Wall Stand



Floor cable access of the Wall Stand

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## SECTION 2 TECHNICAL SPECIFICATIONS

### 2.1 ENVIRONMENTAL REQUIREMENTS

ATMOSPHERIC PRESSURE (hPa)		RELATIVE HUMIDITY (%)		AMBIENT TEMPERATURE	
MIN	MAX	MIN	MAX	MIN	MAX
WORKING					
700 hPa	1060 hPa	30%	75%	10 °C (50 °F)	35 °C (95 °F)
TRANSPORT & STORAGE					
500 hPa	1060 hPa	10%	90%	-20 °C (-4 °F)	70 °C (158 °F)

Note 

*These environmental conditions do not include the Digital Detector. Refer to the Digital Detector Documentation.*

### 2.2 POWER LINE REQUIREMENTS

EQUIPMENT	VOLTAGE	FREQUENCY	MINIMUM INPUT POWER REQUIRED	POWER OUTPUT	BRAKE POWER SUPPLY
RAD TABLE - ELEVATING TABLE	110 - 230 VAC, Single Phase	50/60 Hz	0.6 kVA	0.18 kW	-
RAD TABLE - FIXED HEIGHT TABLE	110 - 230 VAC, Single Phase	50/60 Hz	0.4 kVA	0.18 kW	-
RAD WALL STAND	* See Note		0.5 kVA	0.10 kW (4A)	24 VDC, 2A
* NOTE: Power Line for the RAD Wall Stand is supplied by the X-ray Generator (110 - 230 VAC, Single Phase, 50 / 60 Hz)					



**ACCORDING TO MDD93/42/CEE, THIS UNIT IS EQUIPPED WITH EMC FILTERS. THE LACK OF THE PROPER GROUNDING MAY PRODUCE ELECTRICAL SHOCK TO THE USER.**

## 2.3 PHYSICAL CHARACTERISTICS

### FLOOR MOUNTED TUBE STAND

#### Dimensions

Height .....	2370 mm
Width .....	2755 mm
Length .....	1267 mm
Weight .....	345 kg
Maximum Height of X-ray Tube focus (vertical position) .....	2020 mm
SID from horizontal axis of X-Ray Tube facing the RAD Table - Fixed Height (maximum) .	1270 mm
SID from horizontal axis of X-Ray Tube facing the RAD Table - Elevating Table (maximum)	1620 mm
Distances from vertical axis of X-Ray tube facing the RAD Wall Stand	
Minimum height .....	400 mm
Maximum height .....	1900 mm
SID from Horizontal axis of X-Ray Tube facing the RAD Wall Stand	
Minimum SID .....	874 mm
Maximum SID .....	2884 mm
Column longitudinal travel .....	2010 mm
(optional longitudinal travel with 3755 mm base)	(3010 mm)
Rotation of Column with respect to its vertical axis ( <i>Rotation may be limited by cables</i> ) .....	$\pm 180^\circ$
Rotation of Tube-Collimator Assembly with respect to its transverse axis ( <i>Rotation may be limited by cables</i> )	$+135^\circ / -180^\circ$
High Voltage Cables .....	12 m

**RAD TABLE - FIXED HEIGHT**

Dimensions	
Height .....	750 mm
Width .....	2200 mm
Length .....	800 mm
Weight .....	190 kg
Dimensions of Floating Table-Top .....	2200 x 800 mm
Maximum Patient Weight supported .....	350 kg
Table-Top / Receptor distance .....	85 mm
Table-Top Attenuation .....	<1.0 mm Al eq.
Longitudinal motion of Table-Top .....	1100 mm
Transverse motion of Table-Top .....	250 mm
Longitudinal motion of Receptor .....	510 mm
Ion Chamber .....	Claymount SSMC-617
Cassettes sizes .....	from 18 to 43 cm

**RAD TABLE - ELEVATING TABLE**

Dimensions	
Maximum Height .....	900 mm
Minimum Height .....	500 mm
Width .....	2200 mm
Length .....	800 mm
Weight .....	280 kg
Dimensions of Floating Table-Top .....	2200 x 800 mm
Maximum Patient Weight supported .....	350 kg
Table-Top / Receptor distance .....	85 mm
Table-Top Attenuation .....	<1.0 mm Al eq.
Longitudinal travel of Table-Top .....	1100 mm
Transverse travel of Table-Top .....	250 mm
Ion Chamber .....	Claymount SSMC-617
Cassettes sizes .....	from 18 to 43 cm

**RAD WALL STAND**

## Dimensions

Height .....	2235 mm
Width .....	657 mm
Length .....	381 mm
Weight .....	145 kg
Dimensions of Receptor Assembly .....	657 x 570 mm
Table-Top Dimensions .....	559 x 485 mm
Table-Top / Receptor distance .....	46.5 mm ( $\pm$ 2)
Table-Top Attenuation .....	<0.8 mm Al eq.
Height from horizontal axis of receptor	
Minimum height .....	360 mm
Maximum height .....	1860 mm
Receptor vertical motion .....	1500 mm
Ion Chamber .....	Claymount SSMC-617
Cassettes sizes .....	from 18 to 43 cm

**RAD WALL STAND - MANUAL TILTING**

Height .....	2235 mm
Width .....	657 mm
Length .....	890 mm
Weight .....	175,5 kg
Dimensions of Receptor Assembly .....	657 x 570 mm
Table-Top Dimensions .....	559 x 485 mm
Table-Top / Receptor distance .....	46.5 mm ( $\pm$ 2)
Table-Top Attenuation .....	<0.8 mm Al eq.
Height from horizontal axis of receptor	
Minimum height .....	360 mm
Maximum height .....	1860 mm
Receptor Vertical and Horizontal Travel .....	1500 mm
Tilting Angle .....	+90° , -20°
Ion Chamber .....	Claymount SSMC-617
Cassette sizes .....	from 18 to 43 cm

**WALL STAND FOR FILM / CR**

Height .....	2235 mm (88")
Width .....	657 mm (25.8")
Length .....	381 mm (15")
Weight .....	145 kg (319 lb)
Table-Top Dimensions .....	559 x 485 mm (22" x 19")
Table-Top / Detector distance .....	46.5 mm ( $\pm$ 2) (1.83" ( $\pm$ 0.07"))
Table-Top Attenuation .....	<0.85 mm Al eq.
Height from horizontal axis of receptor	
Minimum height .....	400 mm (14.17")
Maximum height .....	1900 mm (73.2")
Table-Top Vertical Travel .....	1500 mm (59")
Detector sizes .....	max. 43 x 43 cm (17 x 17")

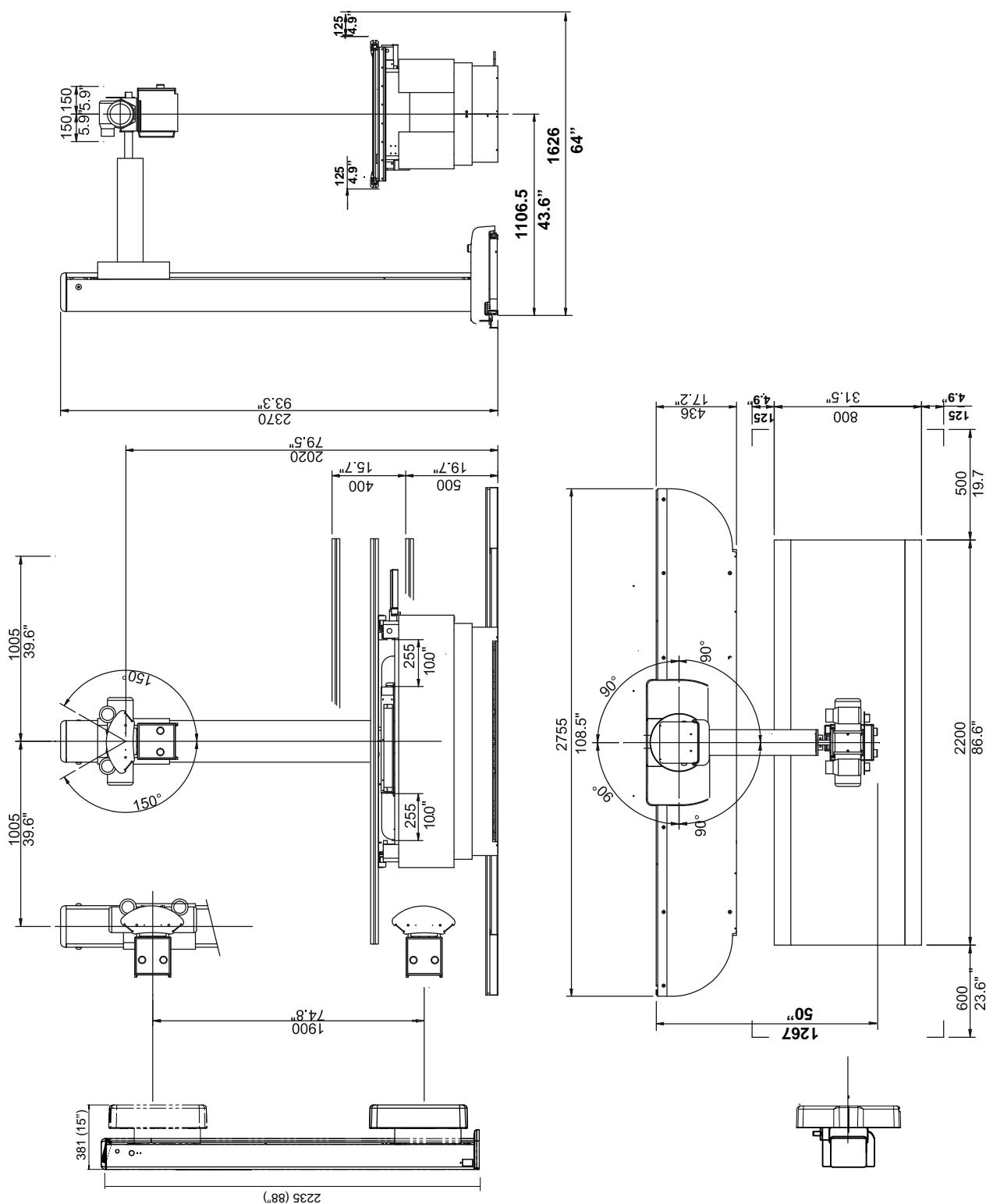
**GRIDS**

- Configurations with non-removable moving grid:
 

Grids for Table .....	1 m -- 215 lines/inch -- 12:1 (Carbon Fibre)
Grids for Wall Stand ...	1 m -- 215 lines/inch -- 12:1 (Carbon Fibre)
	1.3 m -- 215 lines/inch -- 8:1 (Carbon Fibre)
	1.8 m - 215 lines/inch -- 12:1 (Carbon Fibre)
- Configurations with removable static grid:
 

Grids for Table .....	1 m -- 132 lines/inch -- 10:1 (Carbon Fibre)
Grids for Wall Stand	
	1 m -- 132 lines/inch -- 10:1 (Carbon Fibre)
	1.5 m -- 132 lines/inch -- 10:1 (Carbon Fibre)
	1.8 m - 132 lines/inch -- 10:1 (Carbon Fibre)

### **Illustration 2-1** **Dimensions of the Equipments in the X-ray System (Elevating Table).**



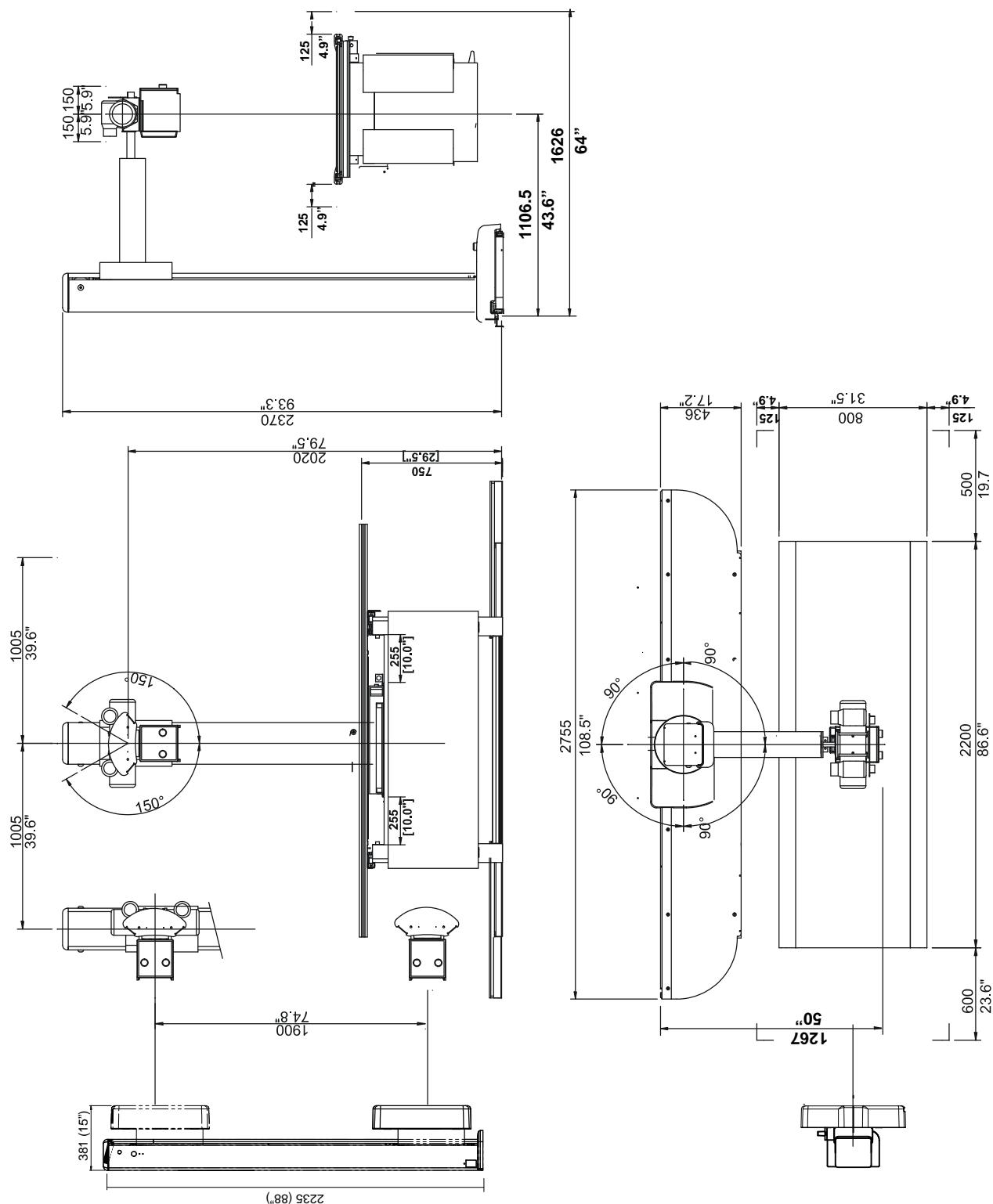
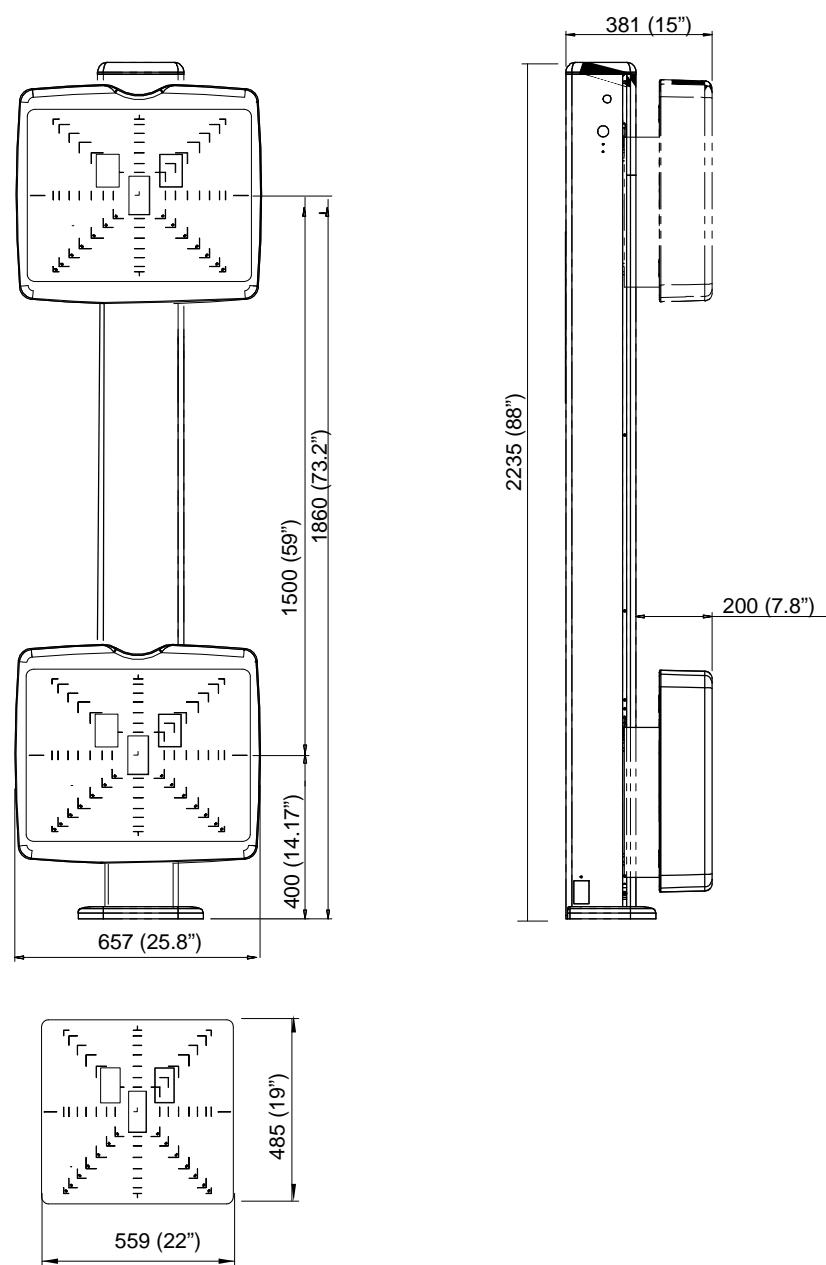
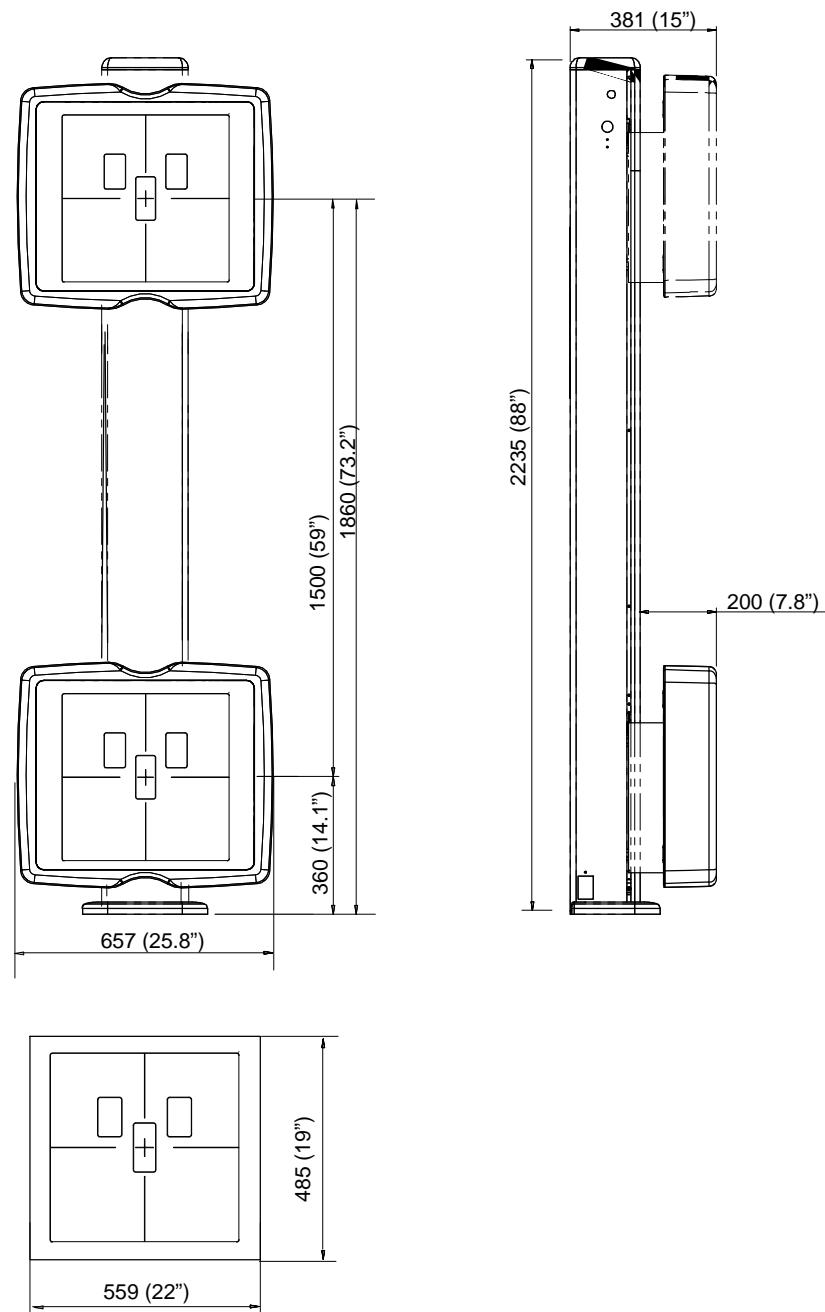
**Illustration 2-2****Dimensions of the Equipments in the X-ray System (RAD Table - Fixed Height Table).**

Illustration 2-3

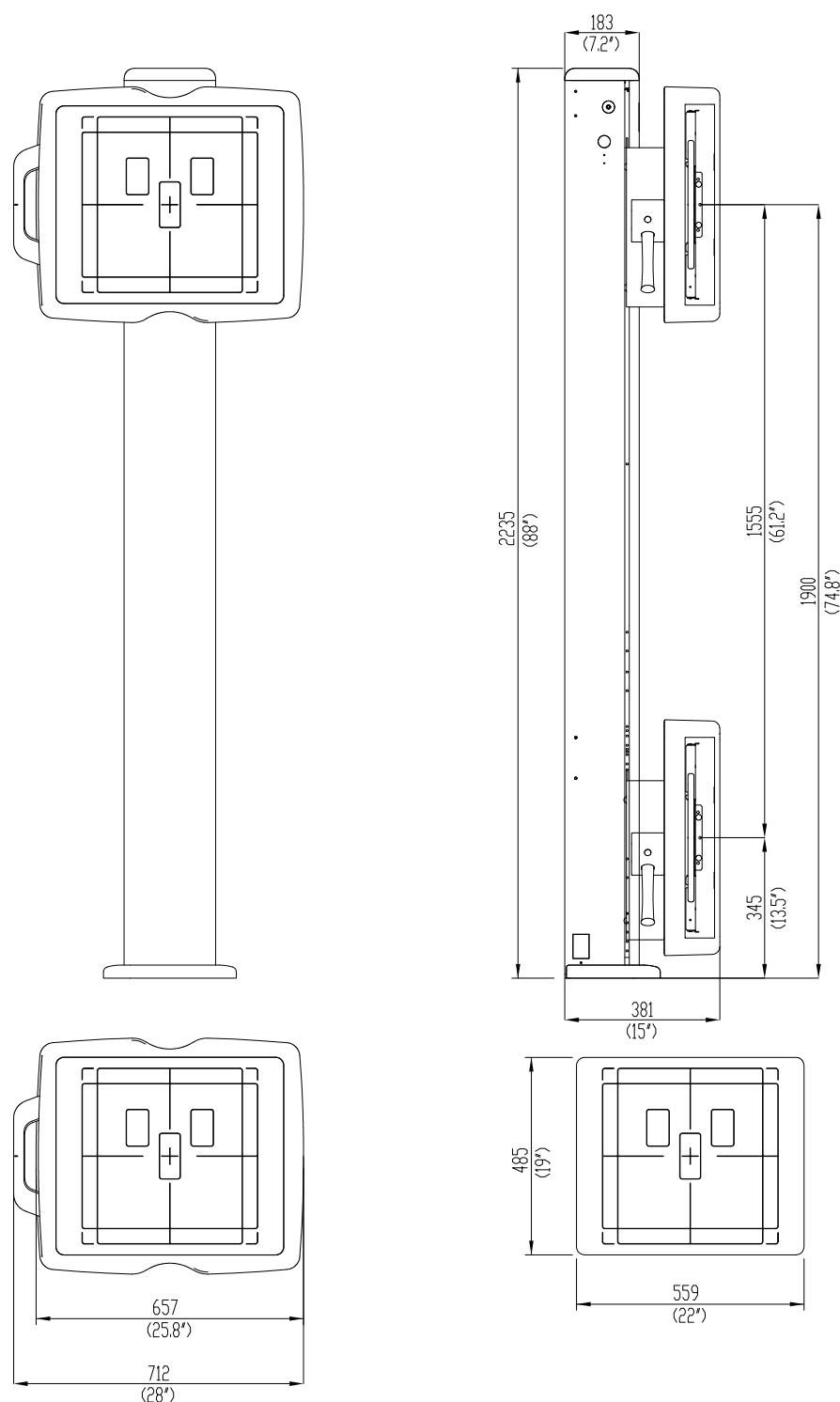
Dimensions of the Wall Stand for Film / CR



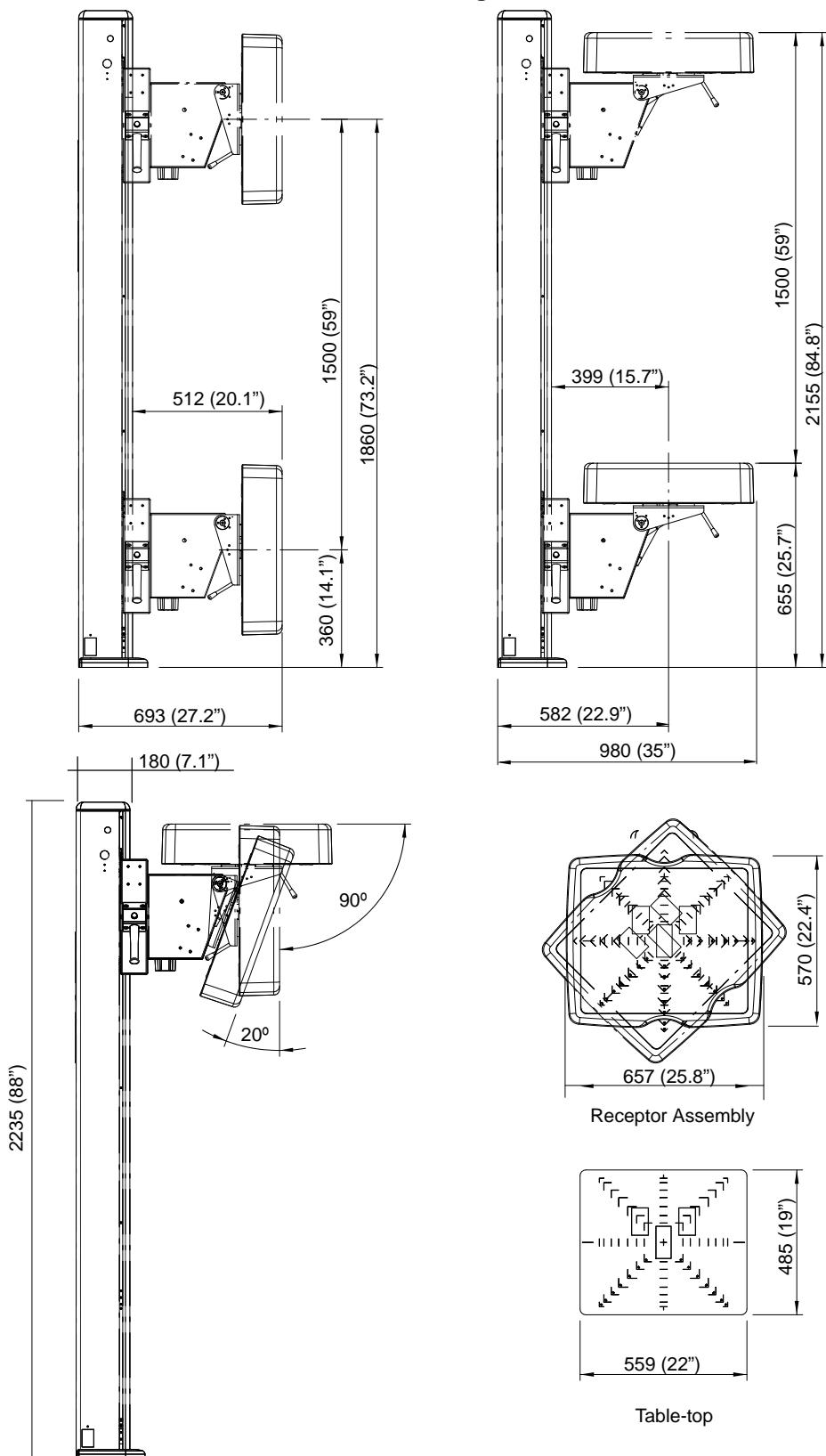
**Illustration 2-4**  
**Dimensions of the Wall Stand for Fixed Digital Detector**



**Illustration 2-5**  
**Dimensions of the Wall Stand for Portable Digital Detector**



**Illustration 2-6**  
**Dimensions of the RAD Wall Stand - Manual Tilting**



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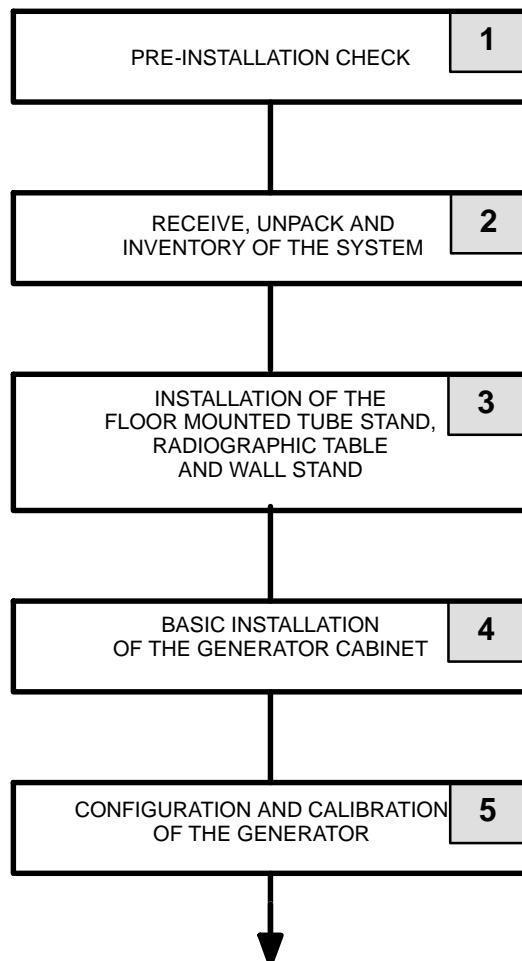
## SECTION 3

## SYSTEM INSTALLATION GUIDE

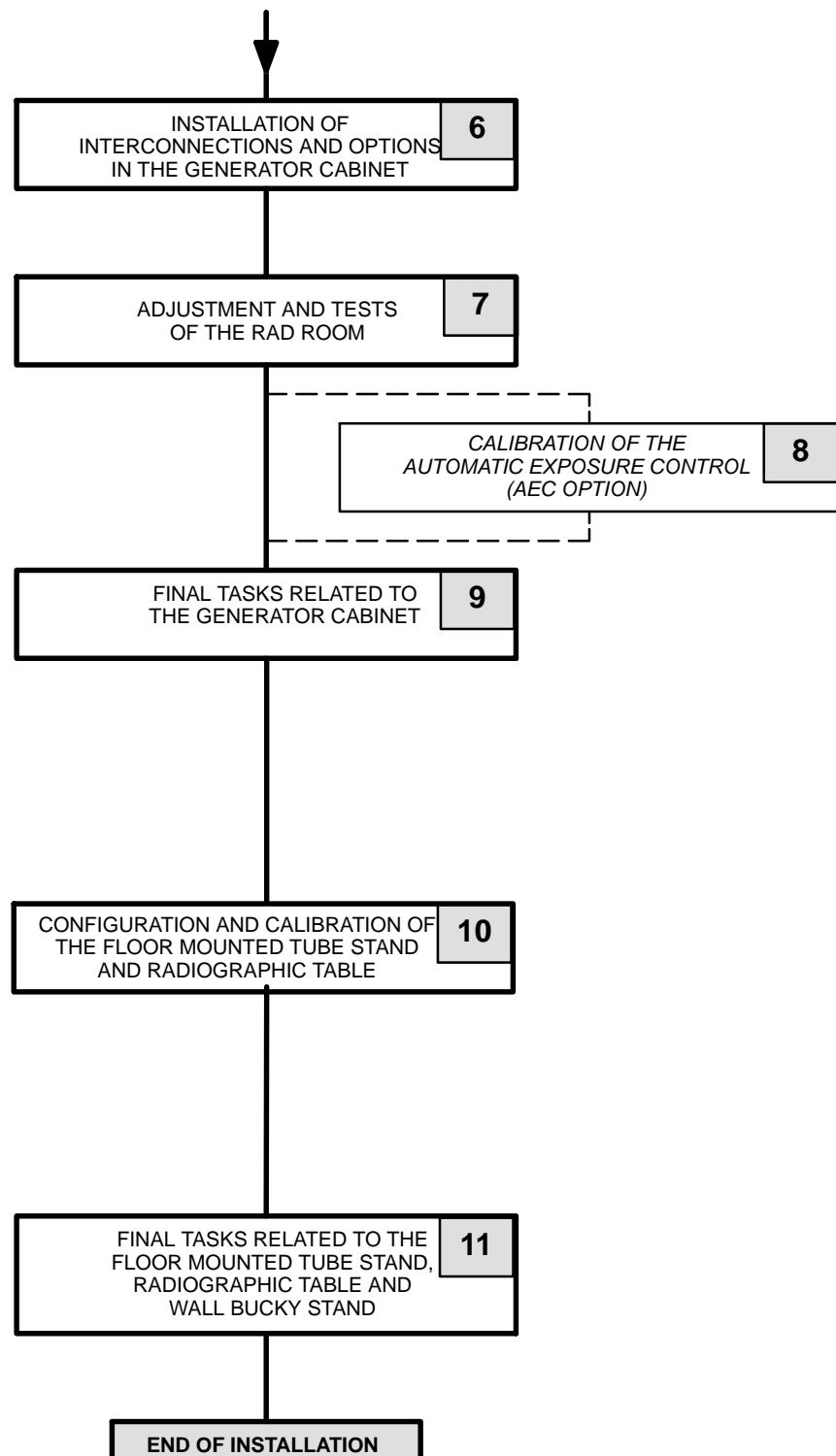
This System Installation Guide applies to the RAD Room. The tasks must be performed in the order listed in this document. Perform only the procedures required to install, configure and calibrate the present RAD Room taking into account the different options (AEC, etc.).

*Note* 

*The System Installation can be performed by two field engineers in two days.*



*Follow in next page*



<b>1 PRE-INSTALLATION CHECK</b>		<b>DONE</b>
1.1	Does X-ray Room meet the Pre-Installation requirements?  Check the following points:	
	Complete room floor, ceiling and wall finish. <i>(It is recommended to install a wood block 600 mm x 25 mm approx. inside all non brick walls for a safe Wall Bucky Stand installation)</i>	<input type="checkbox"/>
	Installation of conduits, ducts, raceways and junction boxes with covers. <i>(For 9 m High Voltage Cables, install a cable hook on the wall and position the Generator as close as possible to the Column Base)</i>	<input type="checkbox"/>
	Environmental requirements.	<input type="checkbox"/>
	Electrical requirements. Installation of line power with proper voltage output and adequate kVA rating. Installation of all safety devices according to Pre-Installation document and Local Codes.	<input type="checkbox"/>

<b>2 RECEIVE, UNPACK AND INVENTORY OF THE SYSTEM</b>		<b>DONE</b>
<i>(Also refer to the - RAD Generator Service Manual)</i>		
2.1	Upon receipt of the equipments, inspect all shipping crates for signs of damage. If damage is found, notify carrier or his agent immediately.	<input type="checkbox"/>
2.2	Place crates close to its final location at room and unpack the equipment.  <b>WARNING: AT LEAST TWO/THREE PEOPLE ARE REQUIRED TO REMOVE ALL HEAVY COMPONENTS FROM THE SHIPPING PALLET.</b>	<input type="checkbox"/>
2.3	Check the packing list, part numbers and serial numbers of each component. Verify that all items on the customer order are present.	<input type="checkbox"/>

<b>3 INSTALLATION OF THE FLOOR MOUNTED TUBE STAND, RADIOGRAPHIC TABLE AND WALL BUCKY STAND</b>		<b>DONE</b>
3.1	<b>Installation of the Floor Mounted Tube Stand:</b>	
	- Position the Column Base, level and anchor it to the floor.	<input type="checkbox"/>
	- Insert the Column in the Base.	<input type="checkbox"/>
	<b>WARNING: AT LEAST TWO/THREE PEOPLE ARE REQUIRED TO INSERT THE COLUMN IN THE BASE.</b>	
	- Install the Microswitch Contact Plates, Drilled Guide and Magnet Plate on the Column Base.	<input type="checkbox"/>
	- Move the Column Arm to the central position (vertically) and level the Column.	<input type="checkbox"/>
	- Install the Tube-Collimator Support.	<input type="checkbox"/>
	- Mount the Control Panel.	<input type="checkbox"/>
	- Mount the X-ray Tube and Collimator. Connect the Stator and Collimator cables.	<input type="checkbox"/>
	- Connect the High Voltage cables to the X-ray Tube.	<input type="checkbox"/>
	- Route the above mentioned cables to the Generator position. These cables will be later connected to the Generator.	<input type="checkbox"/>
	- Remove the Shipping Safety screws of the Column.	<input type="checkbox"/>
	- Check leveling and check/readjust the foot bearings of the Column.	<input type="checkbox"/>
3.2	<b>Installation of the Elevating Table:</b>	
	- Remove the Table from the pallet and place it on its final position.	<input type="checkbox"/>
	<b>WARNING: AT LEAST TWO PEOPLE ARE REQUIRED REMOVE THE TABLE FROM THE PALLET.</b>	
	- Connect the Power Supply cable of the Table and step on the "UP" pedal to raise the Table-top.	<input type="checkbox"/>
	- Remove Telescopic Covers.	<input type="checkbox"/>
	- Remove Jumper J4 and Jumper at relay of the Table Base.	<input type="checkbox"/>
	- Switch ON the Collimator Lamp and align the Table respect to Floor Mounted Tube Stand.	<input type="checkbox"/>
	- Anchor and level the Table in its final position.	<input type="checkbox"/>
	- Perform and check the cable connections at the rear side of the Table Base. Route these cables.	<input type="checkbox"/>
	- Install the Table-Top.	<input type="checkbox"/>

<b>3 INSTALLATION OF THE FLOOR MOUNTED TUBE STAND, RADIOGRAPHIC TABLE AND WALL BUCKY STAND</b>		<b>DONE</b>
3.3	<b>Installation of the Wall Bucky Stand:</b>	
	- Place the Wall Bucky Stand in vertical position and remove the Shipping Safety screws.	<input type="checkbox"/>
	- Switch ON the Collimator Lamp and align the Wall Bucky Stand respect to the X-ray Tube.	<input type="checkbox"/>
	- Anchor and level the Wall Bucky Stand in its final position. Install the covers.	<input type="checkbox"/>
3.4	<b>Final Installation and Checks:</b>	
	- Check that J4 and bridge at Relay have been removed at Elevating Table.	<input type="checkbox"/>
	- Check all Room cable connections and connectors.	<input type="checkbox"/>

<b>4 BASIC INSTALLATION OF THE GENERATOR CABINET</b>		<b>DONE</b>	
4.1	<b>If the Generator is a Line Powered Generator follow the next steps:</b>		
	- Place the Generator in its final position and anchor it to the floor / wall if it is required.	<input type="checkbox"/>	
	- Route and install the Power Line cables between the Room Electrical Cabinet and the Generator.	<input type="checkbox"/>	
4.2	If applicable, place the <b>Console</b> in its final position and anchor it to the Pedestal / floor / wall,	<input type="checkbox"/>	
4.3	Previous to cable connections inside the Generator Cabinet, check that all the cables are first connected to the each Device (Table, Bucky, etc.) and routed through the raceways.	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Connect the following cables: Line Power, High Voltage, Stator, Console Cables. Install the High Voltage white Sleeves and cable Hook on the wall / roof, if applicable.  <i>Note: The following cables will be connected after performing Configuration and Calibration procedures of the Generator: Warning Light, Collimator Lamp, System Locks, Bucky, Ion Chambers, Radiation Measuring System.</i>	<input type="checkbox"/>	<input type="checkbox"/>

<b>5 CONFIGURATION AND CALIBRATION OF THE GENERATOR CABINET AND CONTROL CONSOLE</b>		DONE
<b><u>IMPORTANT NOTE:</u></b>		
<b><i>THE GENERATOR HAS BEEN CONFIGURED, CALIBRATED AND TESTED BY THE MANUFACTURER, EXCEPT FOR AEC PROCEDURES.</i></b>		
<b><i>IF APPLICABLE, CONFIGURE AND CALIBRATE THE AEC AS INDICATED IN THE GENERATOR SERVICE MANUAL</i></b>		
5.1	<b>Configuration of:</b>	
	<ul style="list-style-type: none"> <li>- Switches and jumpers on the boards. <input type="checkbox"/></li> </ul>	
	<ul style="list-style-type: none"> <li>- Touch Screen Settings, if the Console is a Touch Screen Console. <input type="checkbox"/></li> </ul>	
	<ul style="list-style-type: none"> <li>- Workstations. <input type="checkbox"/></li> </ul>	
	<ul style="list-style-type: none"> <li>- Enter the data in the respective Extended Memory Location for the Limit of Maximum RAD kV, Limit of Maximum kW, X-ray Tube Power Limit. <input type="checkbox"/></li> </ul>	
5.2	<b>Calibration of:</b>	
	<ul style="list-style-type: none"> <li>- Exposure Time adjustment. <input type="checkbox"/></li> </ul>	
	<ul style="list-style-type: none"> <li>- kV Loop. <input type="checkbox"/></li> </ul>	
	<ul style="list-style-type: none"> <li>- Digital mA Loop Closed <input type="checkbox"/></li> </ul>	
	<ul style="list-style-type: none"> <li>- Digital mA Loop Open (X-ray Tube calibration) <input type="checkbox"/></li> </ul>	

<b>6 INSTALLATION OF INTERCONNECTIONS AND OPTIONS IN THE GENERATOR CABINET</b>		DONE
6.1	Connect the following cables: Warning Light, Collimator Lamp, System Locks, Bucky, Ion Chambers, Radiation Measuring System.	<input type="checkbox"/>

<b>7 ADJUSTMENTS AND TESTS OF THE RAD ROOM</b>		<b>DONE</b>
7.1	<b>Alignment of the X-ray Beam with the Radiographic Table:</b>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	- Align the X-ray Beam with the Radiographic Table.	
	- Align the Collimator Light Field with the X-ray Field.	
	- Adjust the Perpendicularity of the X-ray Beam with the Image Receptor	
	- Center the X-ray Field and the Image Receptor	
7.2	Alignment of the X-ray Beam with the Wall Bucky Stand.	<input type="checkbox"/>
7.3	SID Indicator Test.	<input type="checkbox"/>
7.4	Field Size Indicator Test.	<input type="checkbox"/>
7.5	<b>Collimator Lamp Brightness Test:</b>	<input type="checkbox"/> <input type="checkbox"/>
	- Test of the Collimator Light Field Intensity.	
	- Test of the Collimator Light Field Contrast Ratio.	

<b>8 CALIBRATION OF THE AUTOMATIC EXPOSURE CONTROL</b>		<b>DONE</b>
8.1	Calibration of AEC (Optical Density, kV Compensation, Density Scale)	<input type="checkbox"/>

<b>9 FINAL TASKS RELATED TO THE GENERATOR CABINET AND CONTROL CONSOLE</b>		<b>DONE</b>
9.1	Check all routing and cable connections.	<input type="checkbox"/>
9.2	Install the Generator covers	<input type="checkbox"/>
9.3	Final Configuration and Calibration checks. Write down values in the Data Book.	<input type="checkbox"/>

<b>10 CONFIGURATION AND CALIBRATION OF THE FLOOR MOUNTED TUBE STAND AND RADIOGRAPHIC TABLE</b>		<b>DONE</b>
10.1	Set / check on the Column Control Panel the Configuration parameters related to the Floor Mounted Tube Stand and Radiographic Table.	<input type="checkbox"/>
10.2	Set / check on the Column Control Panel the Calibration parameters related to the Floor Mounted Tube Stand and Radiographic Table.	<input type="checkbox"/>

<b>12 FINAL TASKS RELATED TO THE FLOOR MOUNTED TUBE STAND, RADIOGRAPHIC TABLE AND WALL BUCKY STAND</b>		<b>DONE</b>
13.1	Check all routing and cable connections.	<input type="checkbox"/>
13.2	Install the all the covers (Tube Stand, Table and Bucky).	<input type="checkbox"/>

## SECTION 4

## UNPACKING

The system is shipped in different crates to facilitate transport and installation. Upon receipt of the equipments, inspect all shipping crates for signs of damage. If damage is found, notify carrier or his agent immediately.

1. Place crates close to its final location at room and remove each wood package part. Do not discard any packing material (envelopes, boxes, bags) until all parts are identified and listed in the packing list.



**AT LEAST TWO/THREE PEOPLE ARE REQUIRED TO REMOVE ALL HEAVY COMPONENTS FROM THE SHIPPING PALLET.**

2. When the equipment is unpacked, check part numbers and serial numbers of each component in the identification labels. Inspect all pieces for visible damages. If any damaged part is found, repair it or order a replacement to prevent unnecessary delay in installation.
3. Verify that all items on the customer order are present.
4. Leave a free working area around equipment until installation is complete.

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## SECTION 5      INSTALLATION

*Note* 

*Follow Installation sequence process as described. At least two or three people are required for the following tasks.*

*Note* 

*For cabling connection during installation process, refer to the Schematics Section at the end of this Service Manual.*

### 5.1 TOOLS

Tools required for Installation:

- Standard service engineers tool kit.
- Standard and extended levels (1 meter for Column Base).
- Electric drill motor and assorted bits.

## 5.2 FLOOR MOUNTED TUBE STAND



**DO NOT REMOVE THE COUNTERWEIGHT SAFETY BAR INSTALLED AT THE UPPER SIDE OF THE COLUMN OR THE SAFETY SCREWS OF THE VERTICAL CARRIAGE LOCATED IN THE LATERAL RAILS OF THE COLUMN BEFORE SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.**

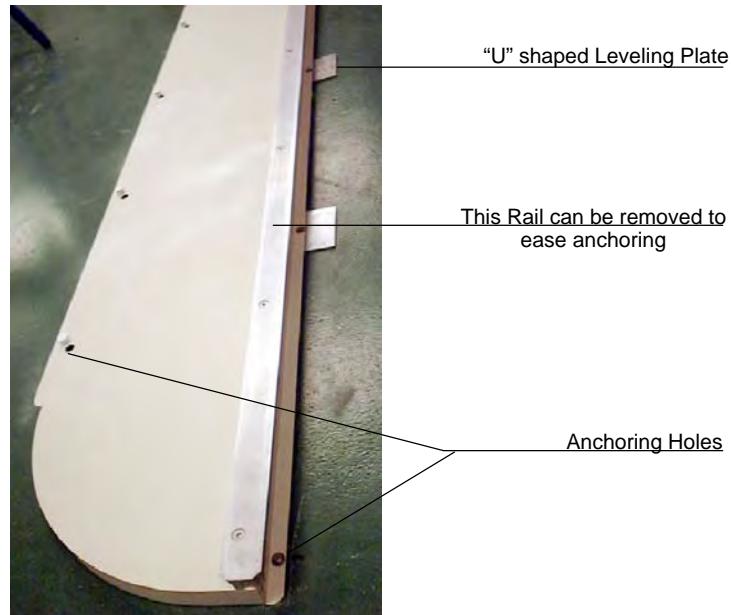
1. Place the Base of the column perpendicular to the wall where the Wall Stand will be installed. Leave a minimum 305 mm (12") from the rear of the base to the wall, this will allow servicing.
2. Place the Wall Stand as close as possible to its final position in the room in order to set the references for maximum distance from the wall where the Wall Stand is to be installed (892.5 mm - 35.14") to the Base of the Column. (Refer to Section 1).
3. Mark on the floor the position of the ten anchoring holes of the Base.
4. Remove the rail from the base before drilling.

**Note**

*In some cases, depending on the room size it may be necessary to mount the Tube Stand on the base prior to securing and leveling the Base.*

5. Move the Base, drill the anchoring holes, clean the area and insert the anchors.

6. Attach the Base to the floor but DO NOT tighten bolts yet. Use the "U" shaped leveling plates provided to raise and level the Base.



**Note**

*Use an extended level (1 meter - 4ft) or several standard levels placed in different points to level the Base.*

7. Tighten the Base bolts and put the white caps in the front holes.
8. Remove the Rail Stop from one end of the Base.

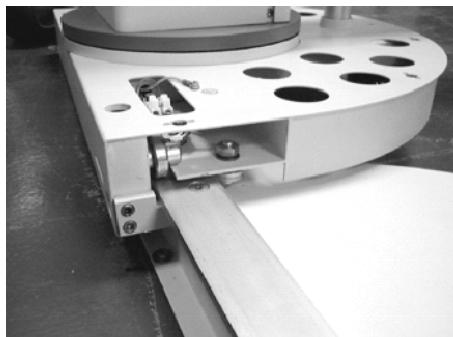


9. Lift the Column to its vertical position



**AT LEAST THREE PEOPLE ARE REQUIRED TO LIFT AND INSTALL THE COLUMN ON THE BASE.**

10. Place the Column at one side of the Base. Tilt the Column slightly to the opposite side of the Base and align the bearings to the rear rolling track and insert the Column.



11. Proceed to insert the back set of bearings.
12. Remove the retaining nut of both Brakes of the Column Foot and install them in place.



***Do not remove the Counterweight Safety Bar installed at the upper side of the Column or the Safety Screws of the vertical carriage located in the lateral rails of the Column before specifically instructed in this manual.***

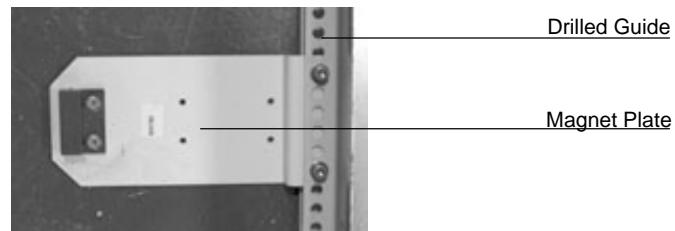
***Make sure that the iron cables are properly routed around the pulleys before standing up the Column.***

13. Re-install the Rail Stop in the lateral of the Base and the Column Foot Brakes.
14. Install and connect the microswitches contact plate at the Column back.



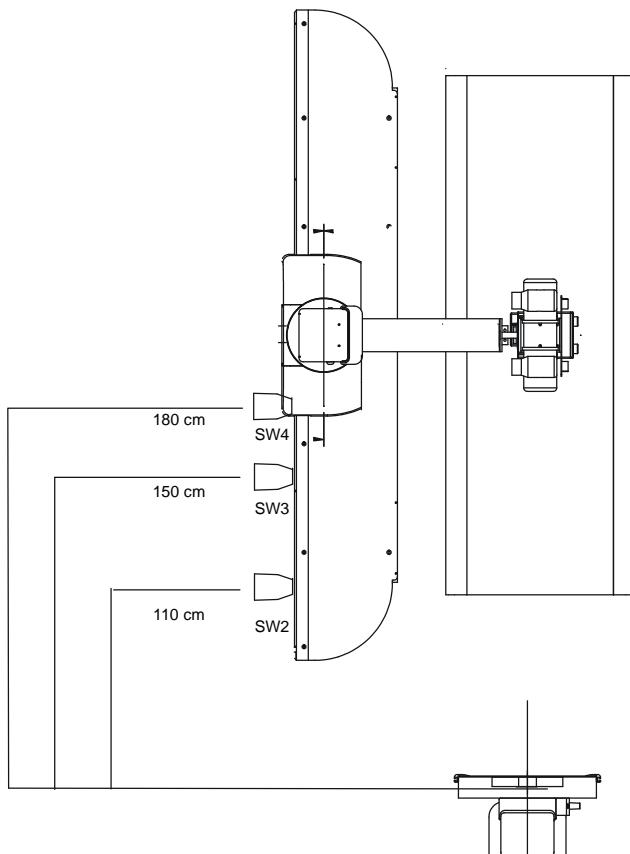
15. Install the Drilled Guide at left or right on the Column Base. This depends on the position of the Wall Stand, install the Drilled guide close to the Wall Stand side.

16. Install the provided magnet plates for SID distance with respect to the Vertical Receptor (2 for the Column with Basic Control Panel and 3 for the Column with Digital Control Panel) at the Drilled Guide. The Magnets must be located at exact SID Position from the Wall Stand (Image distance) (for Systems with Digital Control Panel, the Calibration of SID Points must coincide with the closed position of the Magnets).

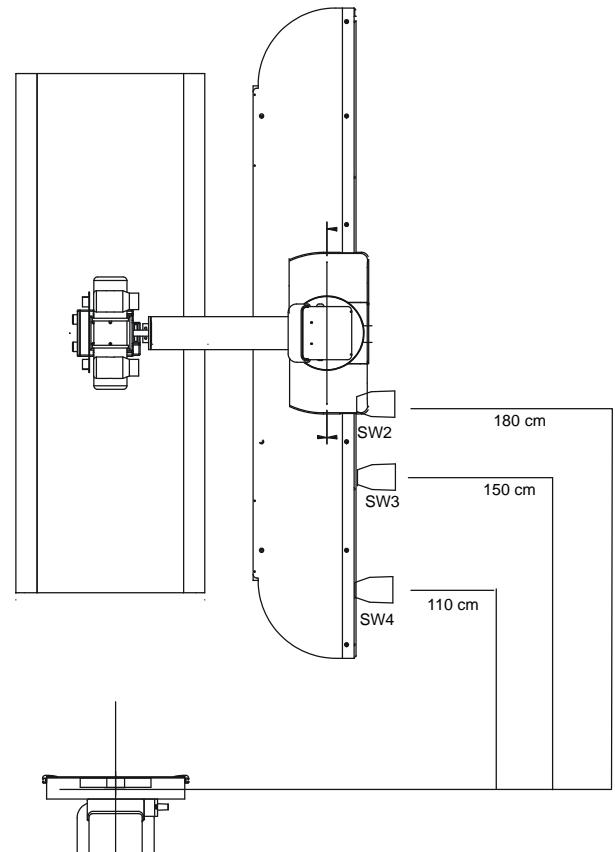


**Illustration 5-1**  
**Magnet Plates installation**

**WALL STAND AT LEFT SIDE**



**WALL STAND AT RIGHT SIDE**



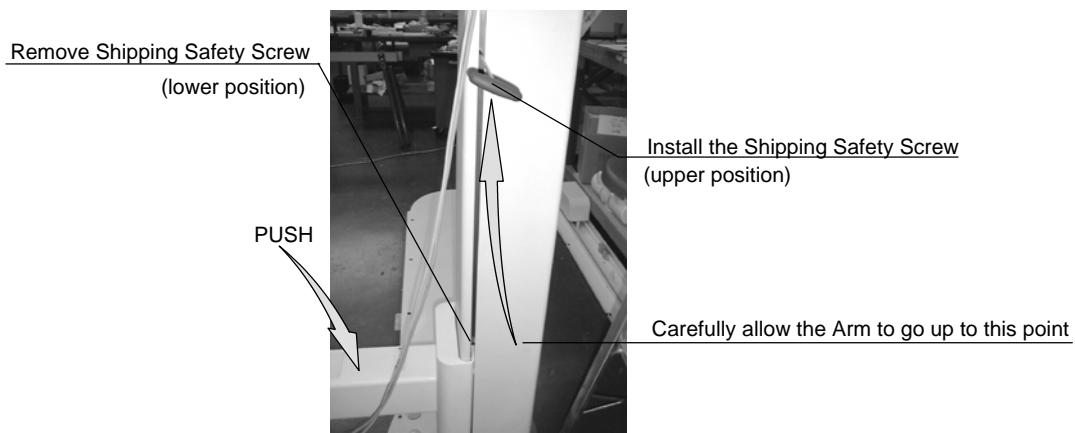


**REMOVING BOTH THE COUNTERWEIGHT SAFETY BAR AND SHIPPING SAFETY SCREWS WILL CAUSE THE CARRIAGE TO TEND TO RAISE UP RAPIDLY, IT IS ADVISABLE THAT ONE PERSON HOLDS THE CARRIAGE IN PLACE UNTIL SHIPPING SAFETY SCREWS ARE REMOVED FROM THE LOWER HOLES OF THE COLUMN AND INSTALLED IN THE CENTRAL HOLES OF THE COLUMN.**

17. Remove the Counterweight Safety Bar and the lower Carriage Rail screws of the Column in order to carefully raise the Arm to the central position at Column. For this operation it is advisable that a person pushes the Arm downwards so that the Shipping Safety Screws can be easily removed and re-installed in the upper position of the carriage guide.

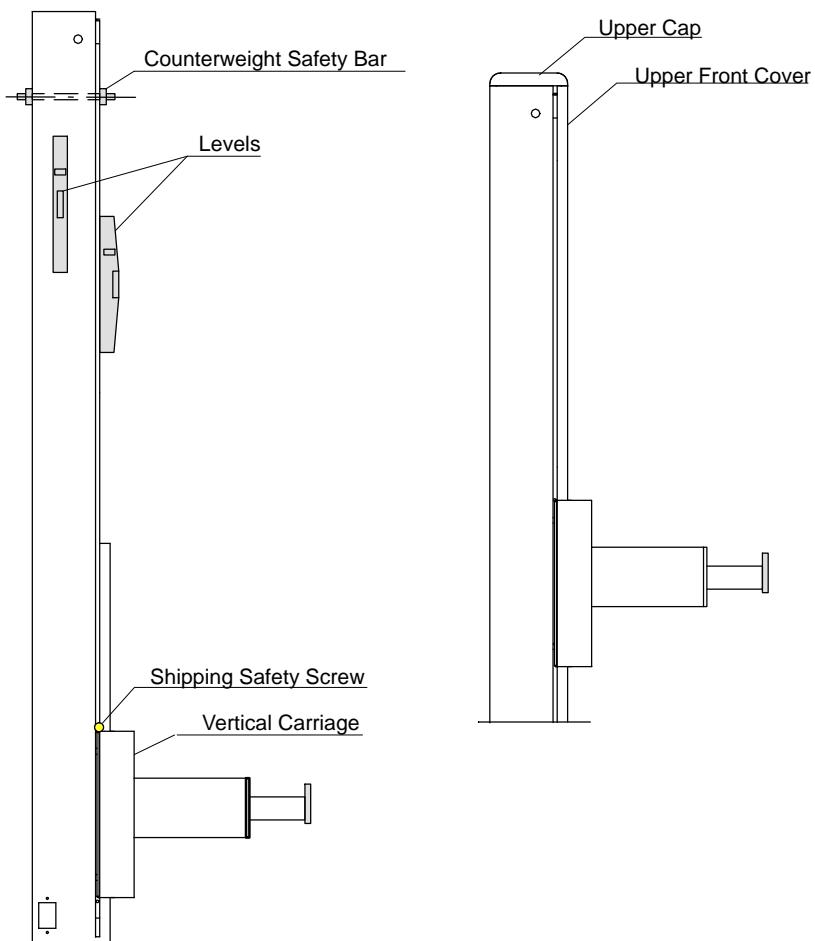


18. After the Shipping Safety Screws have been re-installed at the upper point, allow the carriage to raise to this point.

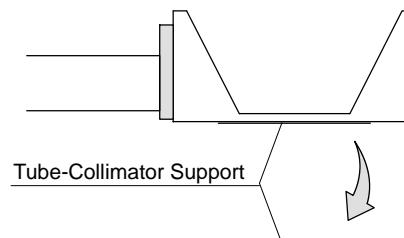
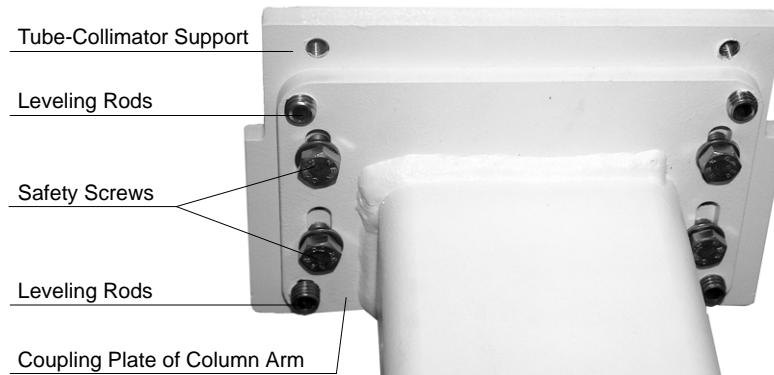


19. Level the Column vertically on both laterals and front side. Adjust it by means of the leveling plates in the Column Base. Anchor tightly the Base to the floor.

**Illustration 5-2**  
**Column Base**



20. Install the Tube-Collimator Support to the Coupling Plate of the Column Arm by using the four safety screws mounted at the rear side of the Coupling Plate (upper and lower slots). The four rods will be used to level the Support when all the components are assembled. Also, the balance of the Tube-Collimator Assembly (in any position) can be adjusted according to the position of the Tube-Collimator Support with reference to the Coupling Plate.

**Illustration 5-3****Assemble of Tube-Collimator Support to Column Arm - Rear View****Control Panel**

21. Mount the Control Panel (if not installed yet).

22. Install the Tube-Collimator Support to the Coupling Plate of the Column Arm by using the four safety screws mounted at the rear side of the Coupling Plate (upper and lower slots). The four rods will be used to level the Support when all the components are assembled. Also, the balance of the Tube-Collimator Assembly (in any position) can be adjusted according to the position of the Tube-Collimator Support with reference to the Coupling Plate.
23. Unbox the Collimator.
24. Remove the rear cover of the Collimator.
25. Remove both red label screws that retain the Collimator windows.

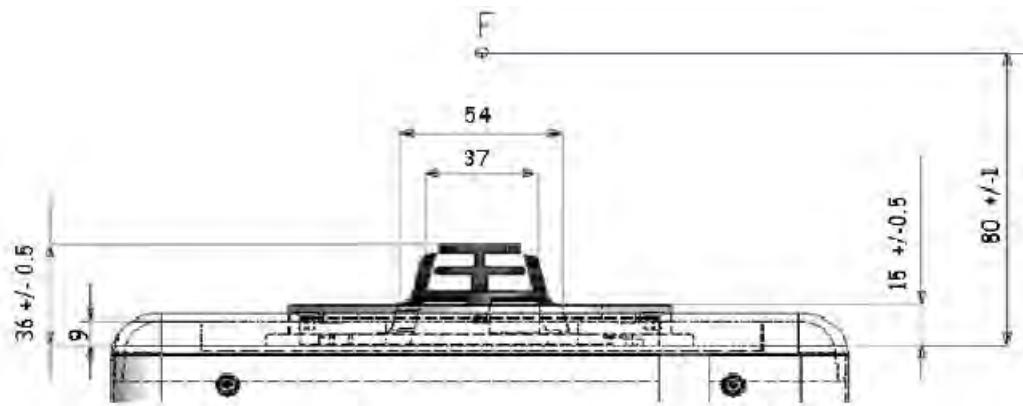
**Note** 

*The Collimator windows should be locked whenever the Collimator is transported to other facilities.*

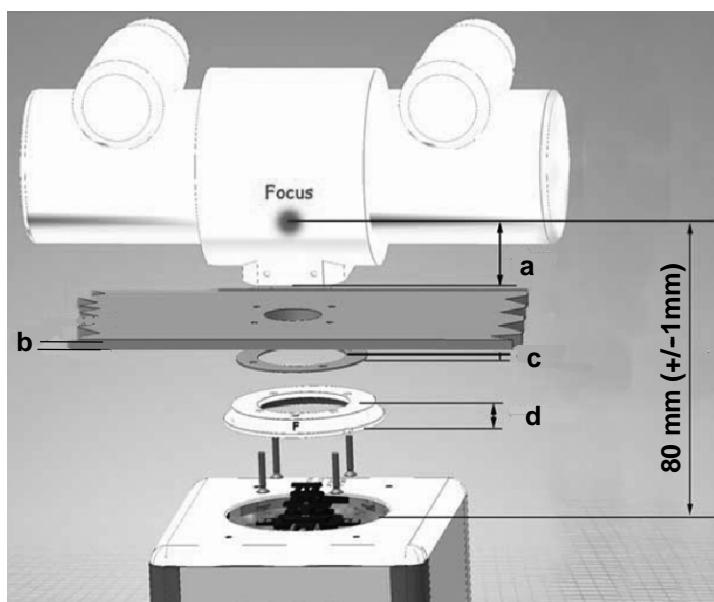
Depending on the Collimator installed, follow the corresponding process: Step 27. for Ralco Automatic Collimator or step 26. for Ralco Manual Collimator.

**26. RALCO MANUAL COLLIMATOR R225/R225 DHHS**

- a. Before installing the collimator, unscrew the four mounting and centering adjustment Allen screws until the four tabs are withdrawn from the Collimator top opening.
- b. The distance between the X-Ray tube focus and the Adaptation Ring mounting plane (collimator upper plate) must be: 80 mm (3.14"), tolerance  $\pm 1\text{mm}$  (0.04").



Use the X-Ray tube housing literature to determine the distance from the focal spot to the tube port face. Subtract the resulting distance from 80 mm (3.14") and determine the number of 1.5mm (0,06") spacers that, combined with the thickness of the Adaptation Ring (15 mm) and the thickness of the Tube-Collimator Support (6.5 mm), will make up the difference. Allowable tolerance is 1 mm. (0.04").



**a = Tube Focal Distance**, depends on the Tube specifications.

For example:

a = 53 mm in X-Ray Tubes E7884X or E7252X.

a = 56mm in X-Ray Tubes E7254X or E7869XX.

Focal Spot position

**b = Tube Support (arm)**, always 6.5 mm.

**c = Spacer 1.5 mm**, the number of spacers installed depends on the tube model.

**d = Collimator Adaptation Ring (Mounting Flange)**, always 15 mm.

**a + b + c + d = 80 ± 1 mm. for Ralco 225 Collimator**

Number of spacers to be installed:

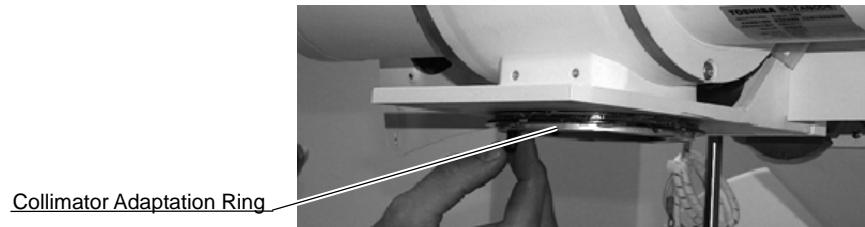
X-Ray Tubes with a = 53 mm, for example the E7884X or the E7252X, require 4 spacers of 1.5 mm to get a total distance of 80.5 mm.

X-Ray Tubes with a = 56 mm, for example the E7254X or the E7869XX, require 2 spacers of 1.5 mm to get a total distance of 80.5 mm.

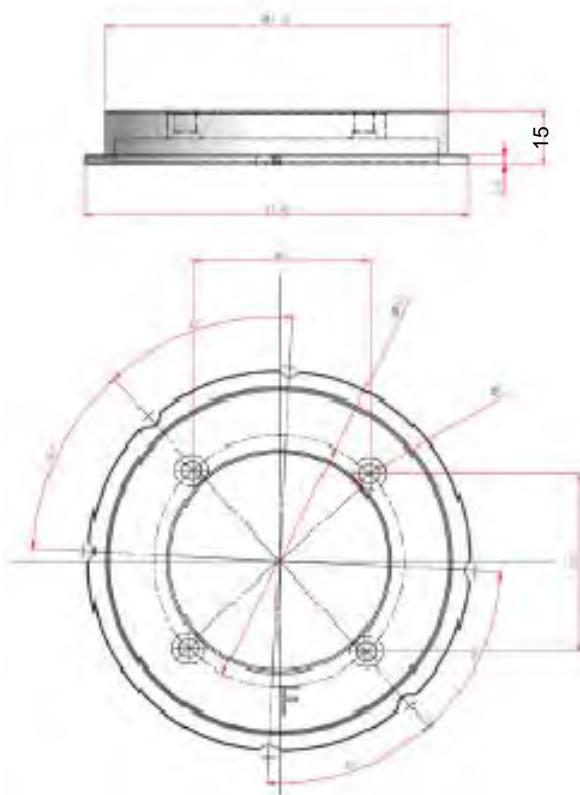
For other tubes calculate the distance as explained above.



- c. Mount the Collimator Adaptation Ring and spacers to the tube port with 4 Flathead screws M6 that must be long enough to be driven into the tube port face for at least 5 threads.



The 6 incisions in the Adaptation Ring edge indicate the collimator positioning to the X-Ray tube ( $\varnothing$  and  $\pm 45^\circ$ ). (Also, refer to *Collimator Manual*).



**Note the position of the Collimator Adaptation Ring**

- d. Manually adjust the collimator shutters to their widest setting.
- e. Carefully couple the collimator with the tube: make sure that the primary shutters have enough clearance to move in the port opening and in the Adaptation Ring.

- f. For the collimator to rotate to position "Ø", adjust and tighten the four Allen screws as follows:

screws 1 and 3 = 7 turns (fully)

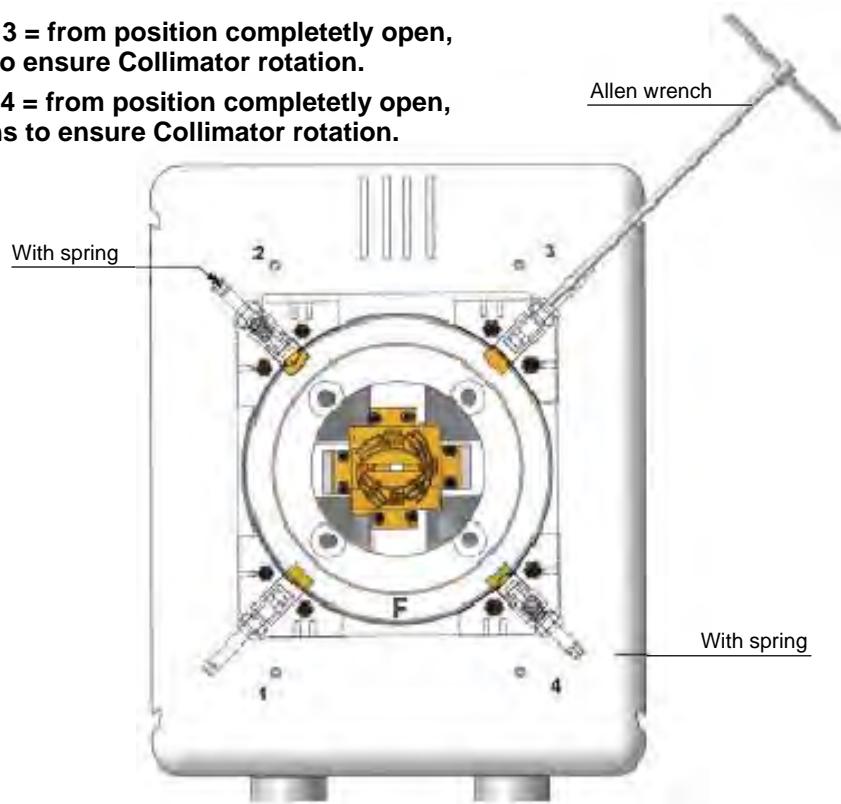
screws 2 and 4 = 5 1/2 turns;

**Illustration 5-4**

**Collimator Adaptation Ring position**

**Positions 1 and 3 = from position completely open,  
tighten 7 turns to ensure Collimator rotation.**

**Positions 2 and 4 = from position completely open,  
tighten 5 1/2 turns to ensure Collimator rotation.**



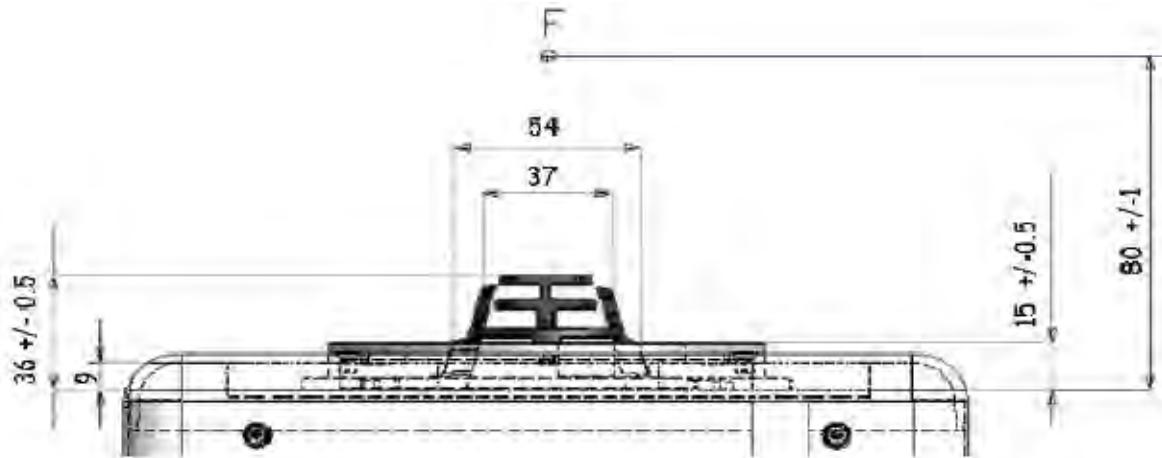
- g. Check that the distance between the collimator housing and the mounting flange is equal in all directions and, that the collimator face is parallel to the table axis. Loosen the screws and adjust if required.
- h. Route the Collimator Cables and connect as explained in the Schematics Section of this Service Manual.



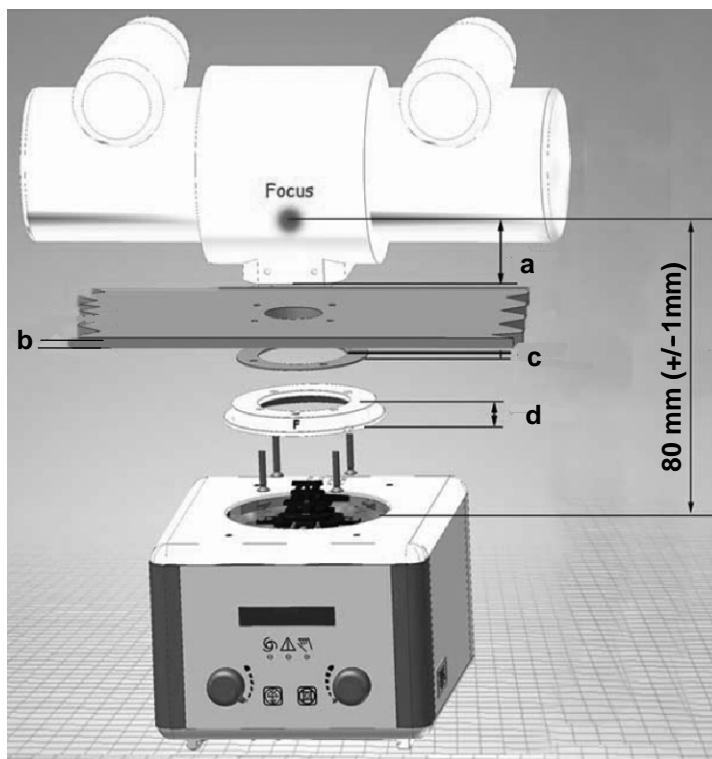
***Make sure that the Collimator is well positioned by turning it to both sides and pulling it down to ensure that it is safely and properly mounted.***

## 27. RALCO AUTOMATIC COLLIMATOR R225 ACS

- a. The distance between the X-ray tube focus and the flange mounting plane (collimator upper plate) must be: 80 mm (3.14"), tolerance  $\pm 1\text{mm}$  (0.04").



Use the X-Ray tube housing literature to determine the distance from the focal spot to the tube port face. Subtract the resulting distance from 80 mm (3.14") and determine the number of 1.5mm (0.06") spacers that, combined with the thickness of the Adaptation Ring (15 mm) and the thickness of the Tube-Collimator Support (6.5 mm), will make up the difference. Allowable tolerance is 1 mm. (0.04").



**a = Tube Focal Distance**, depends on the Tube specifications.

For example:

$a = 53\text{ mm}$  in X-Ray Tubes E7884X or E7252X.

$a = 56\text{ mm}$  in X-Ray Tubes E7254X or E7869XX.

**b = Tube Support (arm)**, always 6.5 mm.

**c = Spacer 1.5 mm**, the number of spacers installed depends on the tube model.

**d = Collimator Adaptation Ring (Mounting Flange)**, always 15 mm.

$a + b + c + d = 80 \pm 1\text{ mm}$ . for Ralco 225 Collimator

Number of spacers to be installed:

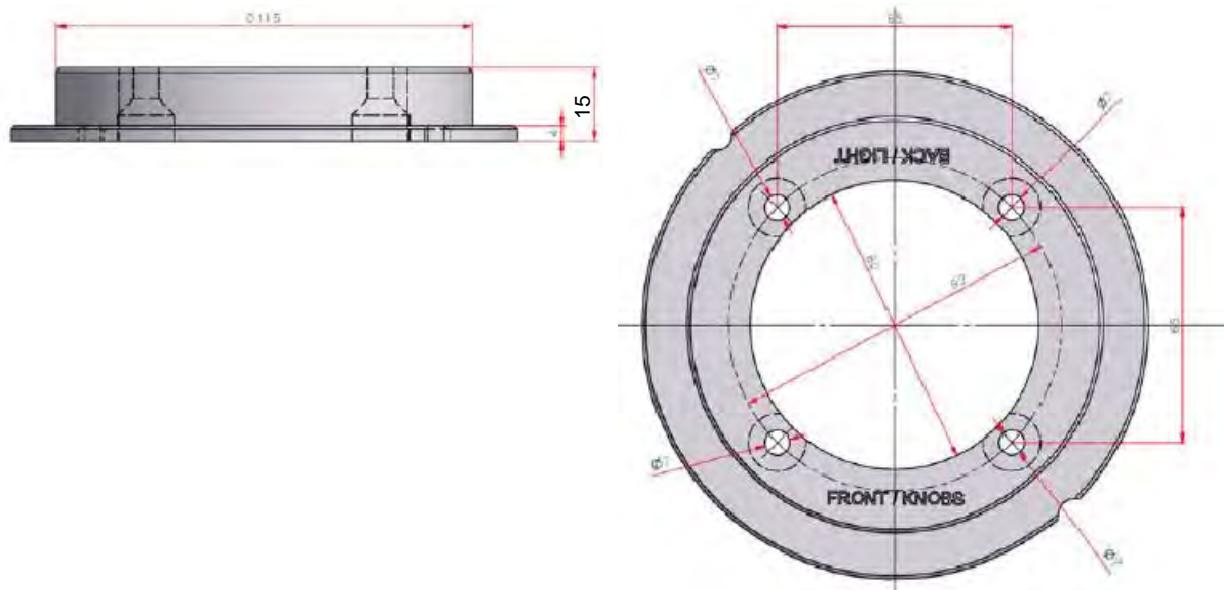
X-Ray Tubes with  $a = 53\text{ mm}$ , for example the E7884X or the E7252X, require 3 spacers of 1.5 mm to get a total distance of 80.5 mm.

X-Ray Tubes with  $a = 56\text{ mm}$ , for example the E7254X or the E7869XX, require 1 spacer of 1.5 mm to get a total distance of 80.5 mm.

For other tubes calculate the distance as explained above.



- b. The Collimator Adaptation Ring shows a label "front/knob". Place the Collimator Adaptation Ring with the label turned towards the X-ray tube front.



- c. Mount the Collimator Adaptation Ring and spacers to the tube port with 4 Flathead screws M6 that must be long enough to be driven into the tube port face for at least 5 threads. Refer to Illustration 5-5.
- d. Unscrew the four mounting and centering adjustment Allen screws until the four tabs are withdrawn from the Collimator top opening.
- e. Manually adjust the collimator shutters to their widest setting.
- f. Carefully couple the collimator with the tube: make sure that the primary shutters have enough clearance to move in the port opening and in the Adaptation Ring.
- g. To allow the collimator to rotate to position " $\emptyset$ ", two of the four tabs retract to allow collimator rotation, Tighten the four Allen screws as follows:

screws 2 and 4 = 5 1/2 turns

screws 1 and 3 = 7 turns

**Note**

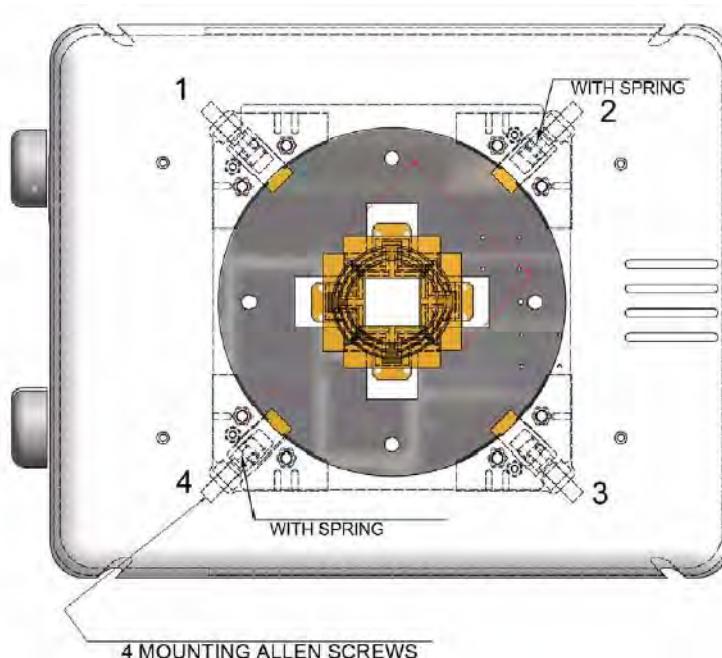
If Allen screws "2" and "4" are tightened more than 5 1/2 turns, the collimator will not rotate.

- h. Check that the distance between the collimator housing and the mounting flange is equal in all directions and, that the collimator face is parallel to the table axis. Loosen the screws and adjust if required. (Also, refer to Collimator Manual).

**Illustration 5-5****Collimator Adaptation Ring position**

**Positions 1 and 3 = from position completely open, tighten 7 turns to ensure Collimator rotation.**

**Positions 2 and 4 = from position completely open, tighten 5 1/2 turns to ensure Collimator rotation.**



- i. These Systems require the installation of a Collimator External Interface Unit ASR003, pre-installed at the Table Base. Refer to the Schematic 54303033 in the Schematic Section of this Service Manual and also refer to Collimator Manual for further Information.

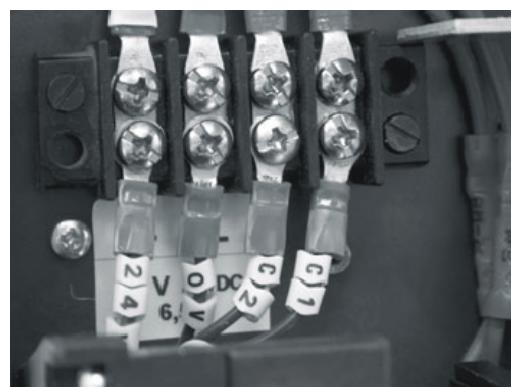


**Make sure that the Collimator is well positioned by turning it to both sides and pulling it down to ensure that it is safely and properly mounted.**

28. Remove the X-ray Tube and Collimator covers and connect the stator and Collimator cables as per identification Tags.



X-Ray Tube Cabling



Collimator cabling

**Note** 

*For Automatic Collimator Configuration, Calibration, Adjustment, Maintenance and Specifications refer to the Automatic Collimator Manual.*

29. Connect the HV cables in the X-ray tube.



**The Terminal Pins of the High Voltage cables are extremely delicate and easily damaged. They therefore must be handled carefully. Make sure that they are straight and that the splits in the pins are open (parallel to the sides).**

**Note** 

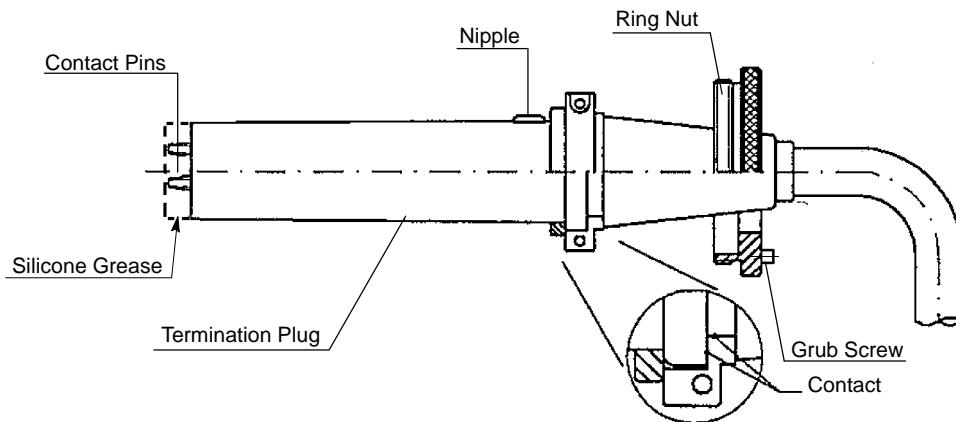
*Mark the anode and cathode ends of the HV Cable connections to ensure proper connection at the X-ray Tube and HV Transformer.*

- a. The mounting accessories of each termination plug are factory assembled. For extended information refer to the HV Cable manufacturer's instructions located inside the HV cable package.



***Do not install the Silicone washer supplied with the HV Cables.***

- b. Screw out the grub screw of the ring nut. (Refer to the illustration below.)



- c. Prepare the high voltage terminals that will be installed in the X-ray tube receptacles. Completely coat the end of the termination plug such a thick layer of silicone grease covers the end and extends up past the top of the pins. (Refer to the previous illustration)

*Note*

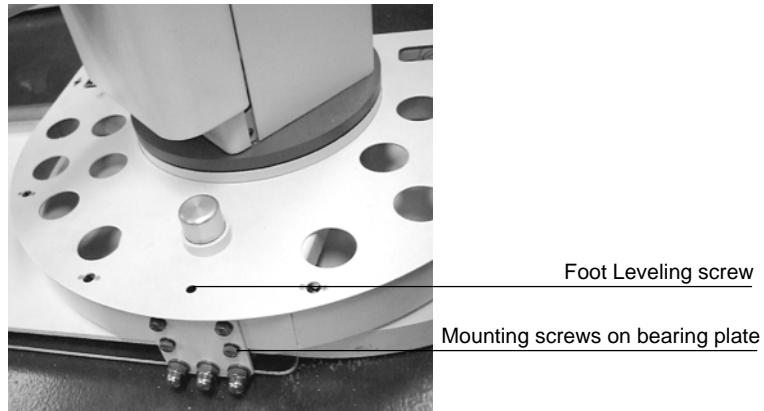
*Two silicone grease tubes are provided in the X-ray tube package.*



Silicone Grease Tubes

- d. Carefully insert the anode and cathode termination plug into the respective receptacle socket. Watch the nipple on the plug to ensure correct positioning of the contact pins.
- e. Hand tighten the ring nut. It must be secure.
- f. Tighten the grub screw.

30. Route the cables along the room to the generator for their later connection.
31. Remove the two Shipping Safety Screws from the Carriage Rail of the Column to allow vertical movement of the carriage.
32. Check the Column leveling. Place a level on both Collimator Base and on the Arm of the Column.

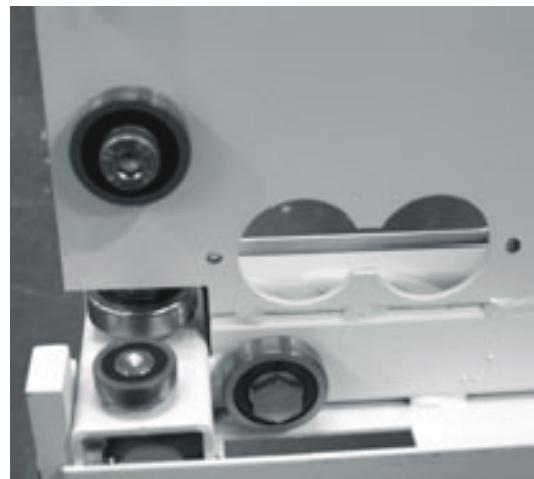
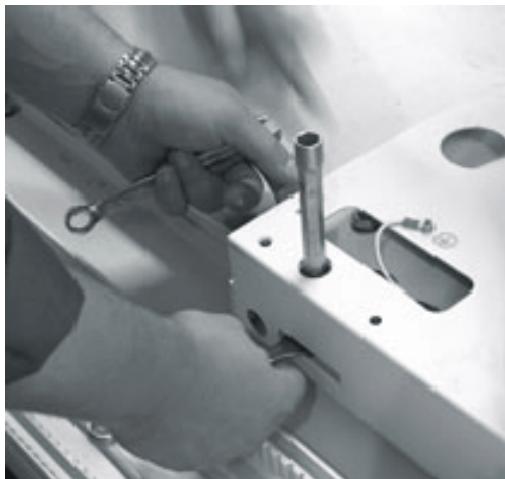


**Note** 

*The Foot leveling Screw is for leveling only and should be backed off once the leveling procedure is complete.*

33. If it is necessary a leveling adjustment of the Column, turn the Foot Leveling Screw down (clockwise) till it makes contact with the Base Plate.
34. Loosen the four mounting screws on the bearing plate and adjust the Foot Leveling Screw until proper leveling is achieved.
35. Tighten the four screws on bearing plate and turn the foot leveling (counterclockwise) until it no longer touches the base of the plate.

36. Check and readjust the foot bearings if necessary. USE THE WRENCH INCLUDED IN PACKAGE.



Note 

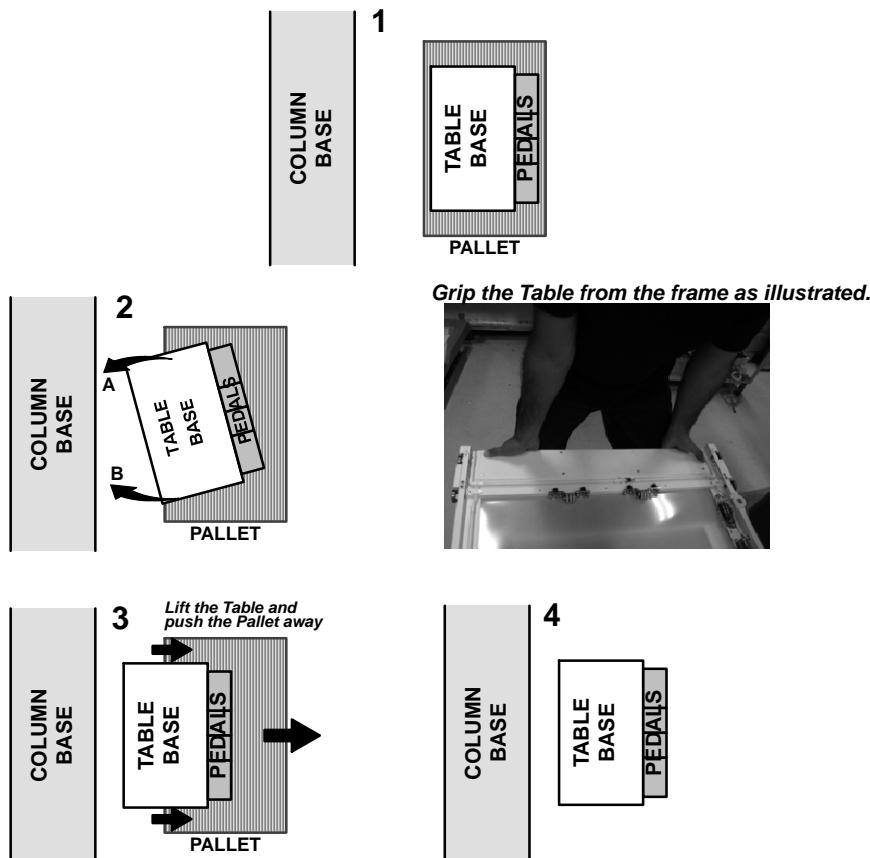
*Level the Tube Collimator with the arm extended 20 cm (7.9") from the arm extension to the back of the Tube Mounting Bracket. Place a level on bottom of Collimator.*

## 5.3 INSTALLATION OF THE RADIOGRAPHIC TABLE

Follow the installation of the Radiographic Table: Section 5.3.1 for Elevating Table or Section 5.3.3 for Four Way Floating -Top Table.

### 5.3.1 ELEVATING TABLE

1. Remove the shipping screws that secure the Table Base to the Pallet.
2. The Table can be handled in two ways, by hand or with the optional Transport Wheels. This procedure describes the installation with the optional Transport Wheels, follow point a) below if no Transport wheels are installed.
  - a. By hand (two people are needed for this task): Place the Table on the pallet as close as possible to its final position in the room, lift and push the table from one side to the edge of the pallet, then lift and push the Table from the other side until it is parallel again, then lift the table, push the pallet away and let it rest on the floor.



3. Assemble the transport accessories (optional transport wheels) to both laterals of the Table Base using the plates and screws provided.

Transport Wheels



4. Raise the Table using the wheels threaded rod. Move carefully the Table to its final position in the room.



***Do not remove transport accessories before indicated in this document. Transport accessories are useful to move the Table after marking anchoring holes on the floor.***

5. Check that the Table Circuit Breaker located at the back of the Table is OFF, connect the Power Supply cable from the Table (factory connected to TS1) to the Room Electrical Cabinet.

**Note**

*The Table Transformer is factory configured according to the Mains voltage specified in the customer order. Refer to Schematic 54301061.*

6. Turn ON the Circuit Breaker located at the backside of the Table and turn ON the Red Emergency Switch located at the front of the Table.
7. Raise the Table to the top stepping on the "Up" Pedal.

8. Remove all the Telescopic Covers from the Table Base as indicated below:

- a. **Upper Front Cover:** Remove two screws located at right and left sides of the lower side of the cover.



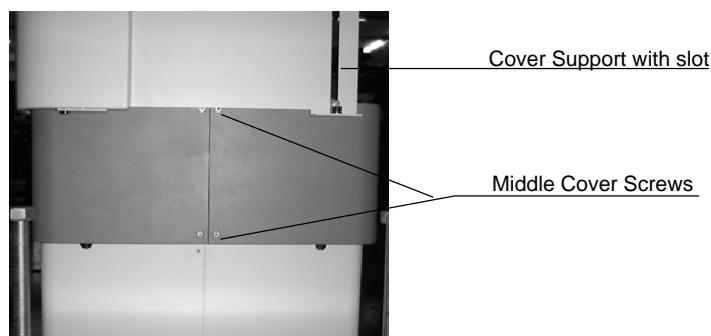
- b. Then raise the Upper Front Cover with both hands and remove it from the Table. Disconnect ground cable (GND) if applicable.



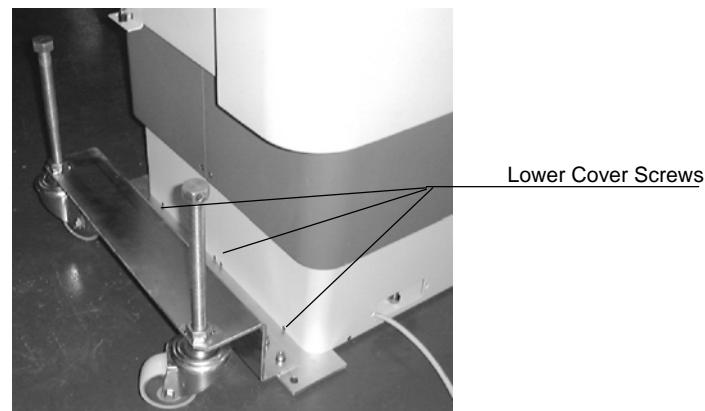
- c. **Upper Rear Cover:** Disassembly both nuts and washers located at upper side of the cover attached to the table chassis (inside the table).



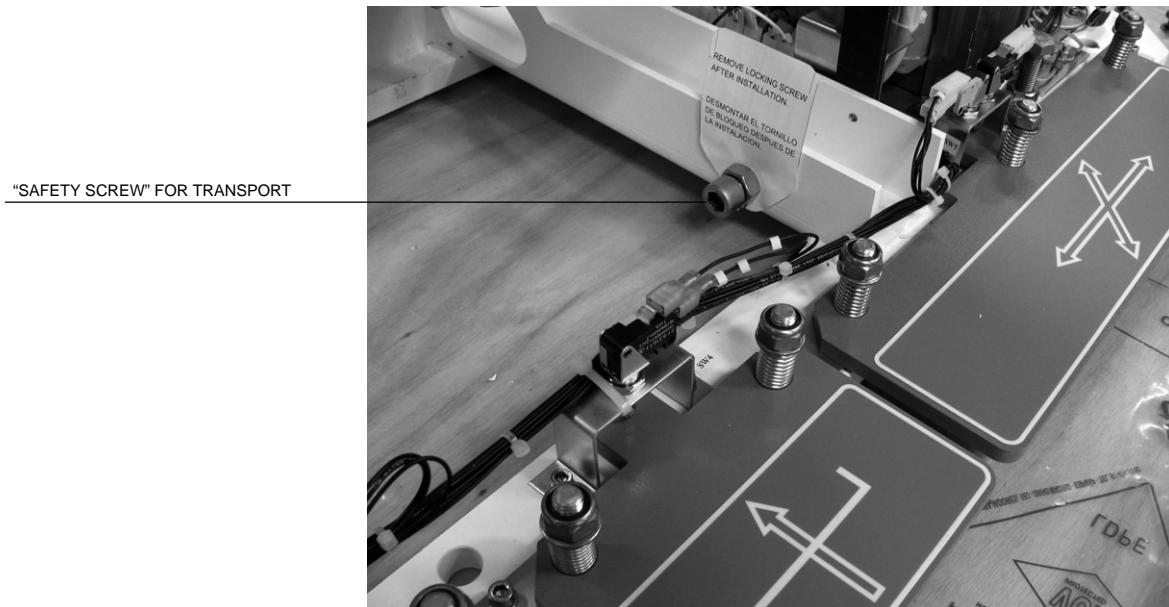
- d. Then, remove two screws located at right and left sides of the lower side of the cover (the same ones as step a) and take the cover away from the Table structure. Disconnect ground cable (GND).
- e. **Middle Covers:** remove the two screws located at the lateral side of cover and remove this cover moving the guide pins away from their slots. Remove ground wire (GND). Repeat procedure for the second middle cover.



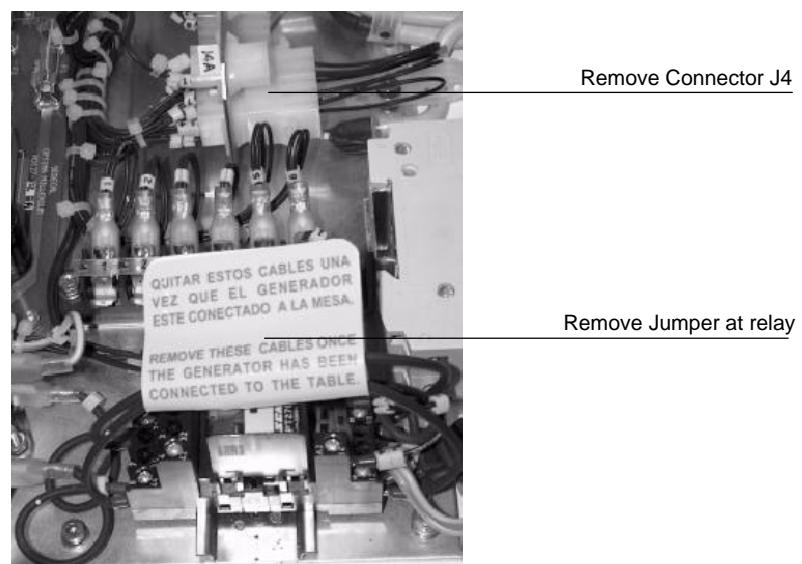
- f. **Lower Covers:** remove all the external screws that fix this cover. Remove ground wire (GND).



9. Remove the Safety Screw and the Warning Label installed for transport.



10. Remove Jumper connector at J4 (this Jumper allows elevating the table without Generator connection).
11. Remove the Jumper located at the Table Base relay just before connecting the Table to the Generator. This Jumper allows general ON/OFF of the Room from the Generator Console.



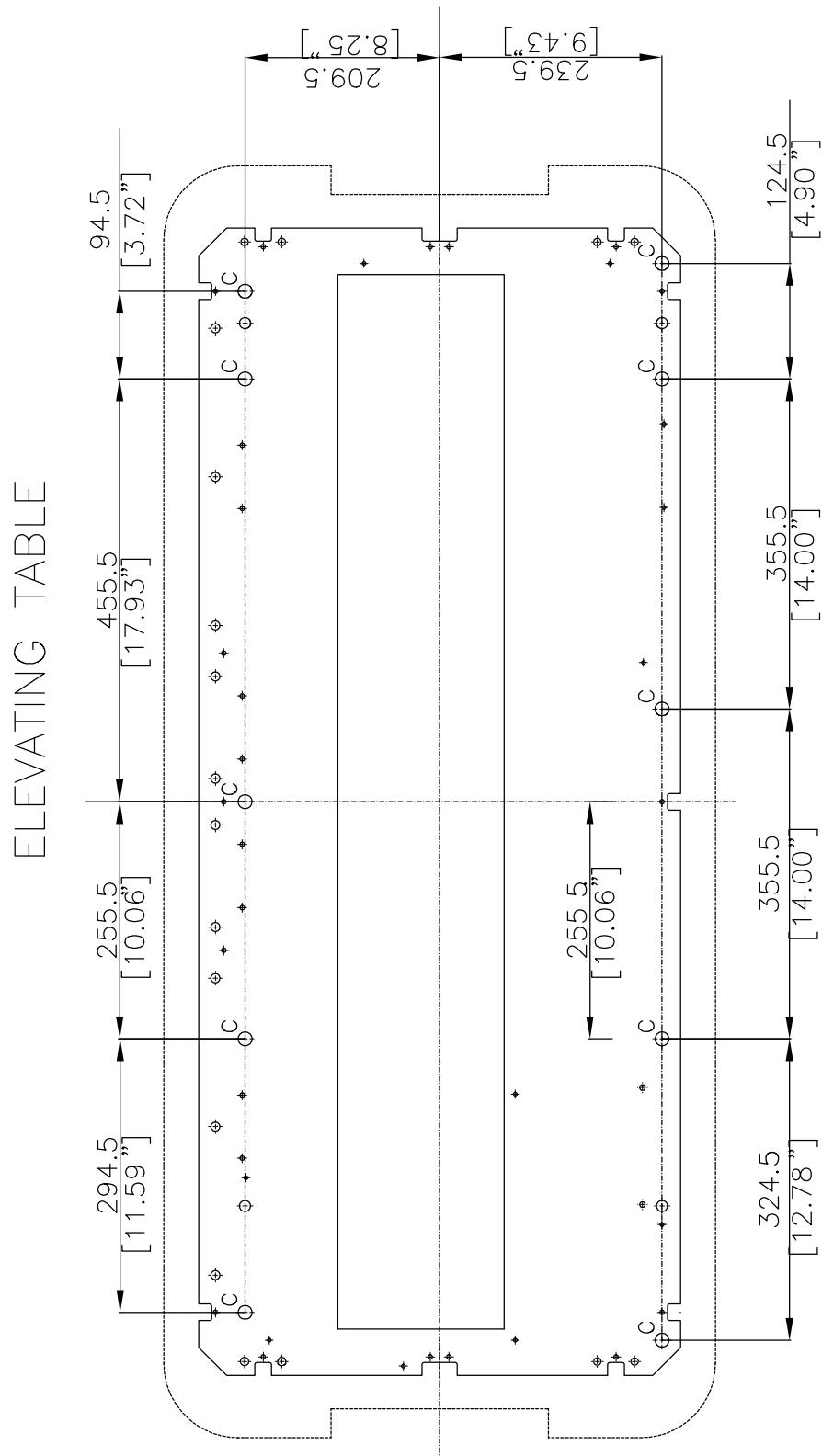
12. Verify that transformer of Table Power Module correspond to correct power input line. If necessary, change transformer TR1 wiring connection marked “\*” at Power Module as per schematics 54301061.
13. Lower Table close to the floor using the wheels threaded rod.
14. Place the Table Base in parallel and centered with reference to the Column Base of the Tube Stand, so the longitudinal axes of the X-ray Tube meets the longitudinal axes of the Table Base (use the mark at Cassette Tray Holder as reference for centering, if applicable). *Refer to illustration of dimensions of the equipments.*

**Note** 

*The Collimator Lamp can be switched ON by pressing its button on the Collimator Panel or stepping on one of the Table-Top motion pedals (whenever Collimator signals are connected to J3 of the Table Base).*

15. Switch ON the Collimator Lamp and align perfectly the Horizontal Receptor axes with the Collimator light beam. During the Receptor alignment place the Receptor and the Floor Mounted Tube Stand in different positions to check that it is correctly aligned.

16. Mark on the floor the ten anchoring holes of the Table Base.



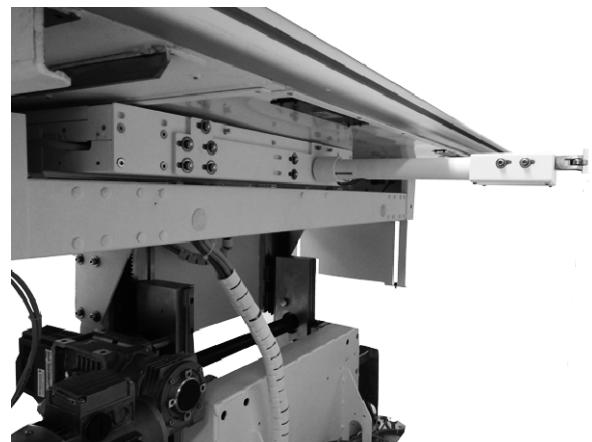
17. Move away the Table Base and prepare its anchors. (10 anchors M8)
18. Position the Table Base at its final place and raise it by means of the leveling screws. Remove the transport accessories (plates and wheels).
19. Attach the Table to the floor but DO NOT tighten the bolts. Check that it is properly leveled placing levels in different points of the Upper Frame. Use the four leveling screws (located close to each corner of the Base) to raise and level the Base, before securing definitively the Table.

**Note** 

*Use an extended level (1 meter) or several standard levels placed in different points in order to level the Table Base.*

20. Firmly tighten the 10 anchors of the Table (apply a torque of 24.1 Nm).
21. Perform and check the following cable connections at the rear side of the Table Base:
  - a. Connect the following Column cables to the connector at the Table Base: J4 (not used in Basic Control Panel), J3, TS8-3/TS8-4 and GND. Column Cables marked TS2 (Stator Cables) will be connected later to the Generator.
  - b. Once these connections are performed, leave cables marked as: IC, Ground and TS1 on the floor for later connection to the Generator.
22. Route the cables through the rear cables outlet along the room for later connection.

23. As an option, install the Table Tracking Bar, attached to the Table Receptor Chassis.
24. Guide the cable to the connector.



25. Install the Tracking Link at the Column side.

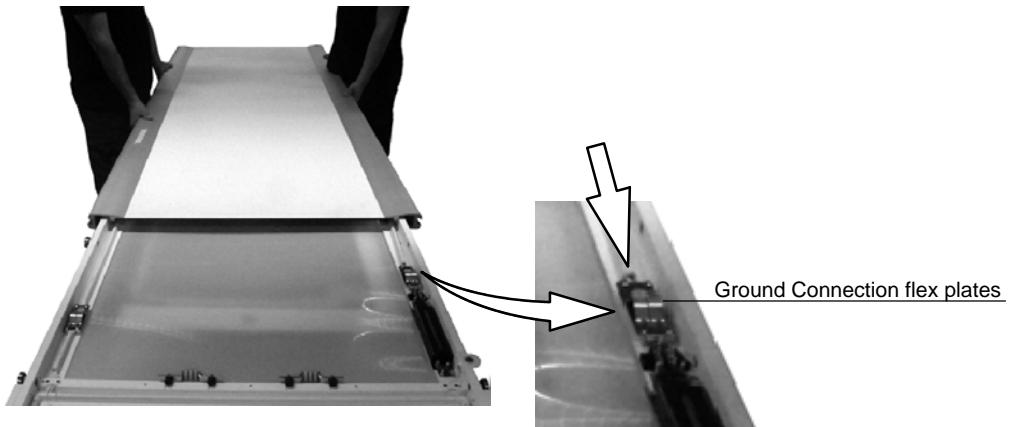


26. Check the correct movements of the column once engaged to the Table Receptor. As well disengage the Assembly at one end of the travel.

27. Remove one of the Stop-Bars under one of the Table-Top ends.
28. With Table power ON, press and hold one of the Table-Top brake pedals to allow motion. Install the Table-Top from one of the Table sides (right or left) inserting the Bearings inside of their Rails. At least two people are required for this operation.

**Note** 

*Table should only be installed in direction that aligns with ground connection flex plates.*



29. Re-install the Stop-Bar under the Table-Top.

### 5.3.2 INSTALLATION OF A TABLE-TOP IN A SMALL ROOM

**Note** 

*At least two people are required for this operation.*

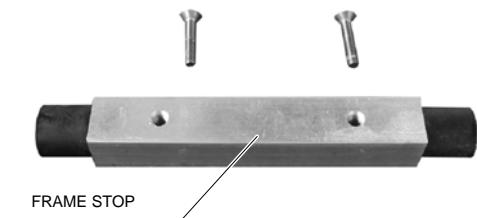
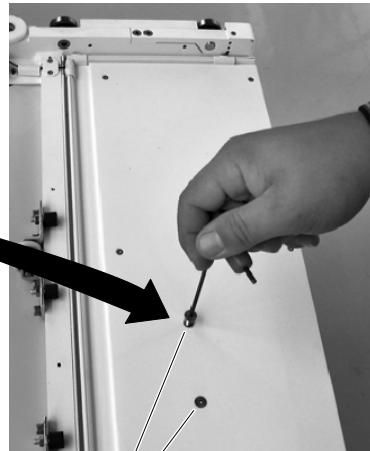
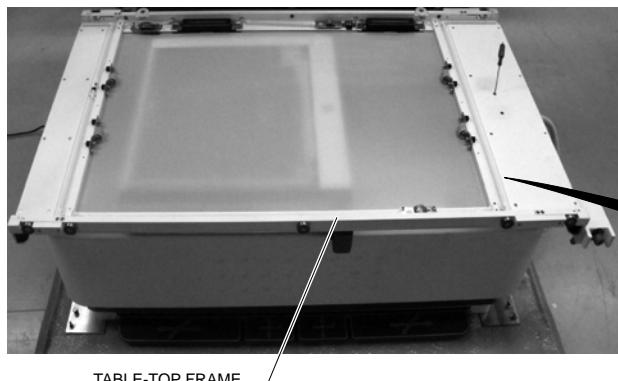
Some rooms may not allow to install the Table-Top inside the Rad Room due to the room length needed. The Small Room Table-Top installation consists of removing the Table-Top frame and install the Table-Top in the frame outside the Rad Room and then install the assembly (Table-Top with frame) on the Table base (without the need of sliding the Table-Top over the frame inside the room).

1. Perform a LOTO procedure as described in Section NO TAG.

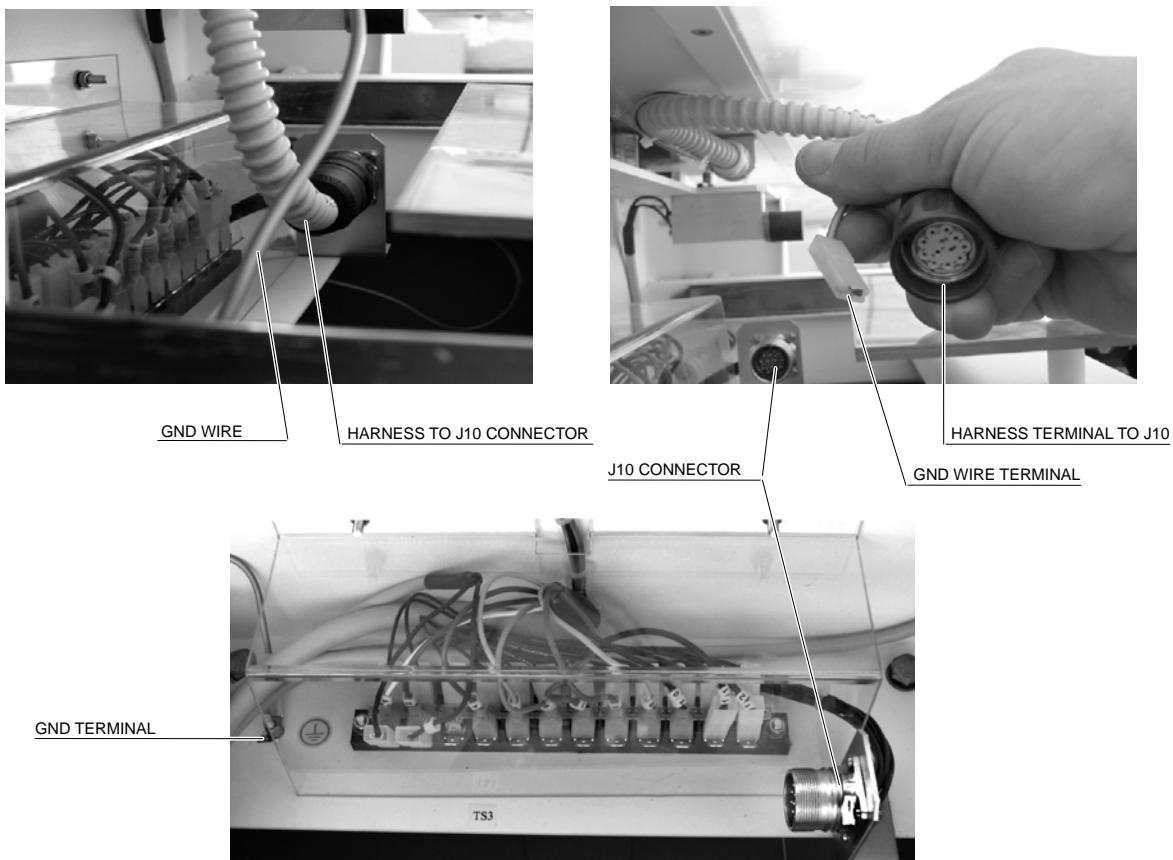
2. While holding the Frame Stop with a hand, carefully remove the two screws and then the Frame Stop under the Table-Top Frame.



*Keep the Frame Stop from falling to prevent any damage inside the table.*



3. Disconnect the GND wire of the Table-Top Frame (faston terminal). Disconnect the Harness plugged into J10 Connector (unscrew the round terminal and pull it).



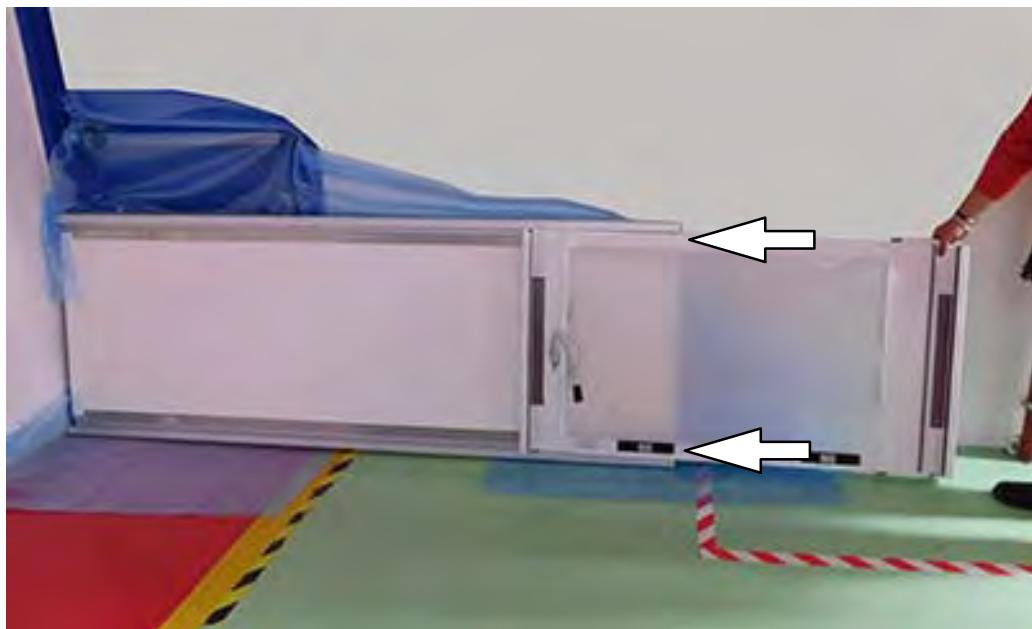
4. Carefully take out the Table-Top Frame from the Table Base by sliding it towards the back side of the Table. Take care not to snare the disconnected GND wire or Harness in the Table Base, or to scratch the Detector Carriage.



***Two people are required to take out the Table-Top Frame and to install the Assembly back on the Table Base.***

5. Remove the Stop bar under the Table-Top.
6. Place the Table-Top on the floor in a corner with the lateral side resting on the wall and protect it with bubble plastic or equivalent to avoid scratches.

7. Insert the Table-Top in the Frame. Push carefully the frame inside the bearing rails.



8. Install the Assembly (Table-Top with Frame) on the Table Base. Tilt the assembly (about 20 degrees) before inserting the guide in the bearing to avoid the brake magnet.



9. Connect the GND wire of the Table-Top (faston terminal). Connect the Harness to J10 Connector (screw the round terminal).
10. Install the Frame Stop under the Table-Top Frame.
11. Re-install the Stop-Bar under the Table-Top.

### 5.3.3 FOUR WAY FLOATING-TOP TABLE

1. Remove Table Front and Back covers.
2. Remove Jumper connector at J4 and the Jumper located at Table relay just before connecting the Table to the Generator. This Jumper allows general ON/OFF of the Room from the Generator Console.



3. Place the Table Base in parallel and centered with reference to the Column Base of the so the longitudinal axes of the X-ray Tube meets the longitudinal axes of the Table Base.

Check with the Collimator Lamp ON and align perfectly the Horizontal Receptor axes with the Collimator light beam. During the Receptor alignment place the Receptor and the Floor Mounted Tube Stand in different positions to check that it is correctly aligned.

**Note**

*The Collimator Lamp can be switched ON by pressing its button on the Collimator Panel or stepping on one of the Table-Top motion pedals (whenever Collimator signals are connected to J3 of the Table Base).*

4. Mark on the floor the six anchoring holes of the Table Base.
5. Move away the Table Base and prepare its anchors.
6. Position the Table Base at its final place
7. Anchor Table Base to the floor. Check that it is properly leveled placing levels in different points of the Upper Frame. Use the four leveling screws (located close to each corner of the Base) to raise and level the Base, before securing definitively the Table.

**Note**

*Use an extended level (1 meter) or several standard levels placed in different points for leveling the Table Base.*

8. Check that the Table Circuit Breaker located at the back of the Table is OFF, then pick up the Power Supply cable from the Table (factory connected to TS1) and connect it to a wall socket (adapt a connector in the Power cable if necessary) in the Room or in the Room Electrical Cabinet.

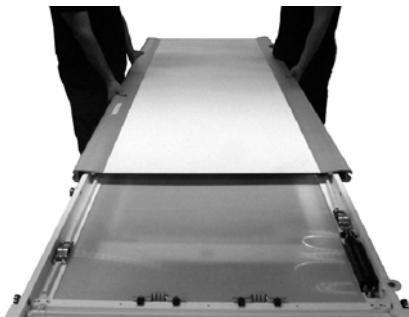
Verify that transformer and fuses of Table Power Module correspond to correct power input line. If necessary, change transformer TR1 wiring connection marked "\*" at Power Module as per schematics 54301063.

9. Perform and check the following cable connections at the rear side of the Table Base:
  - a. Connect the following Column cables to the connector at the Table Base: J4 (not used in Basic Control Panel), J3, TS8-3/TS8-4 and GND. Column Cables marked TS2 (Stator Cables) will be connected later to the Generator).
  - b. Once these connections are performed, leave cables marked as: IC, Ground and TS1 on the floor for later connection to the Generator.
10. Route the cables through the rear cables outlet along the room for their later connection.

**Note** 

*If the Digital Detector is not installed, refer to Section 5.3.4.*

11. Install now the Table-Top, for that remove one of the Stop-Bars under one of the Table-Top ends.
12. With Table power ON, press and hold the Table-Top brake pedal to allow motion. Install the Table-Top from one of the Table sides (right or left) inserting the Bearings inside of their Rails. At least two people are required for this operation.



13. Re-install the Stop-Bar under the Table-Top.

### 5.3.3.1 INSTALLATION OF THE ADHESIVE SCALES FOR SID REFERENCE

The System includes 2 autoadhesive scales for operator easy reference. The scale for the Wall Stand SID reference is stuck on the Column Base and the Scale for the Table SID reference is stuck on the Tube-Support Column.

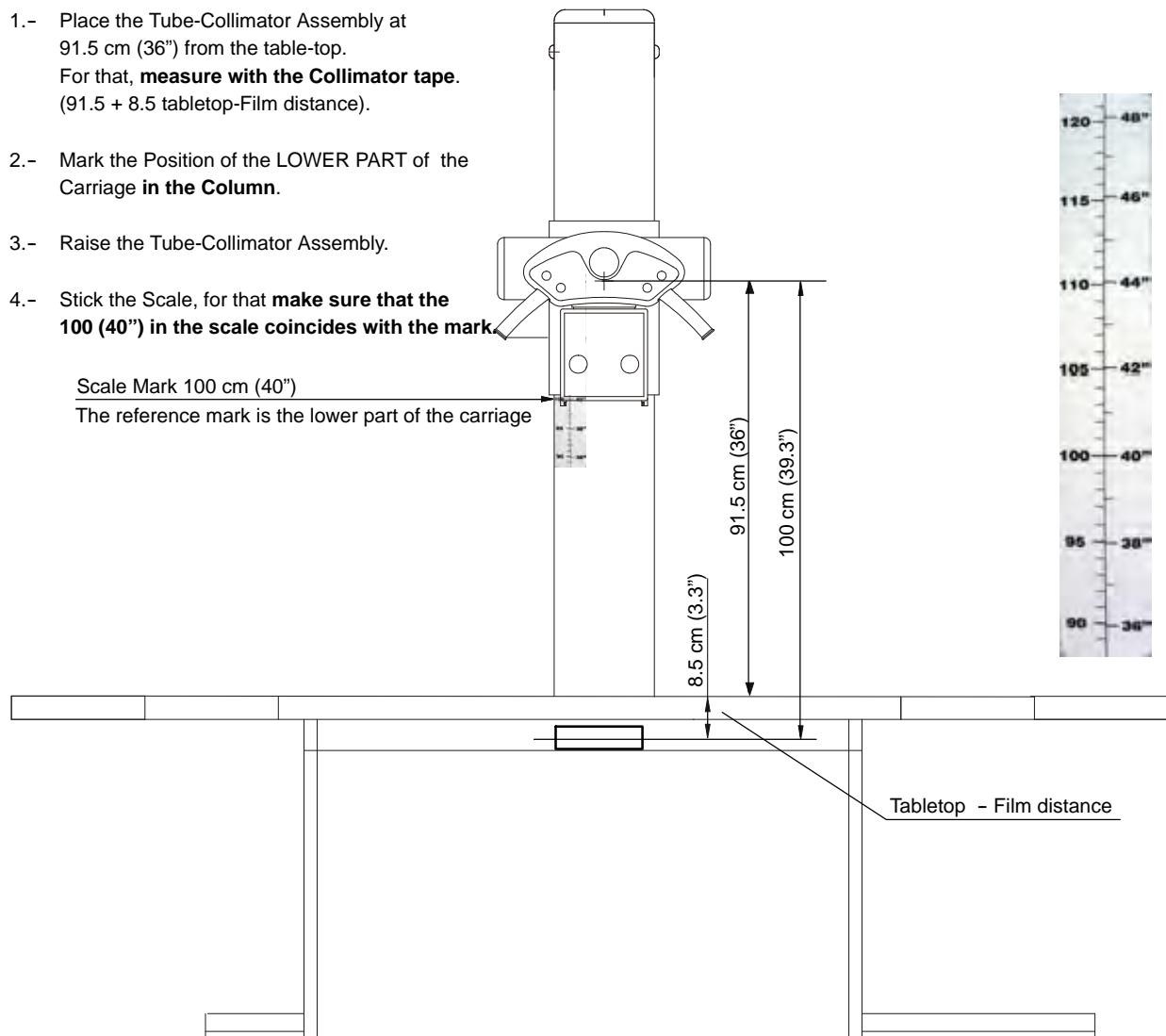
The following illustrations show the recommended placing of the scales although it is the operator convenience what the installer should meet.

**Illustration 5-6**

#### Installation of Vertical SID Scale in the Column

- 1.- Place the Tube-Collimator Assembly at 91.5 cm (36") from the table-top. For that, **measure with the Collimator tape**. (91.5 + 8.5 tabletop-Film distance).
- 2.- Mark the Position of the LOWER PART of the Carriage in the Column.
- 3.- Raise the Tube-Collimator Assembly.
- 4.- Stick the Scale, for that **make sure that the 100 (40") in the scale coincides with the mark**.

**Scale Mark 100 cm (40")**  
The reference mark is the lower part of the carriage



### 5.3.4 INSTALLATION OF THE DIGITAL DETECTOR IN THE RAD TABLE

Note 

*Perform this procedure before installing the Tabletop. In case the Tabletop has been already installed, remove it as explained in this Service Manual.*

1. Remove the two screws that attach the Frame Stop with one hand while holding the Frame Stop under the Table-Top Frame with the other hand.



*Keep the Frame Stop from falling to prevent any damage inside the table.*

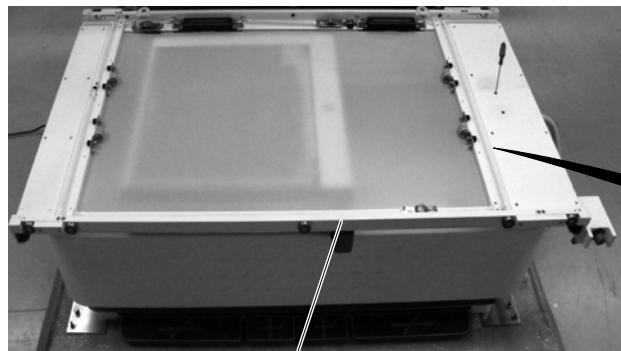
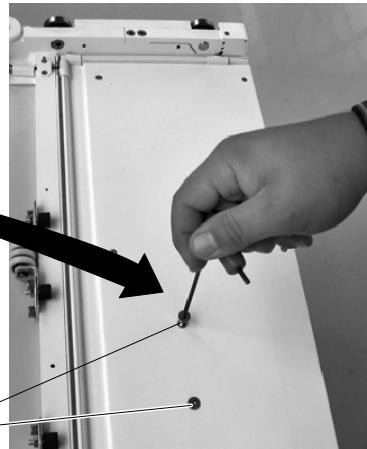
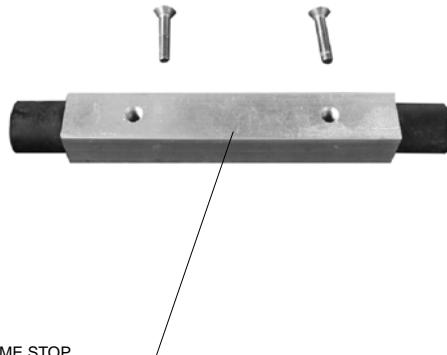


TABLE-TOP FRAME

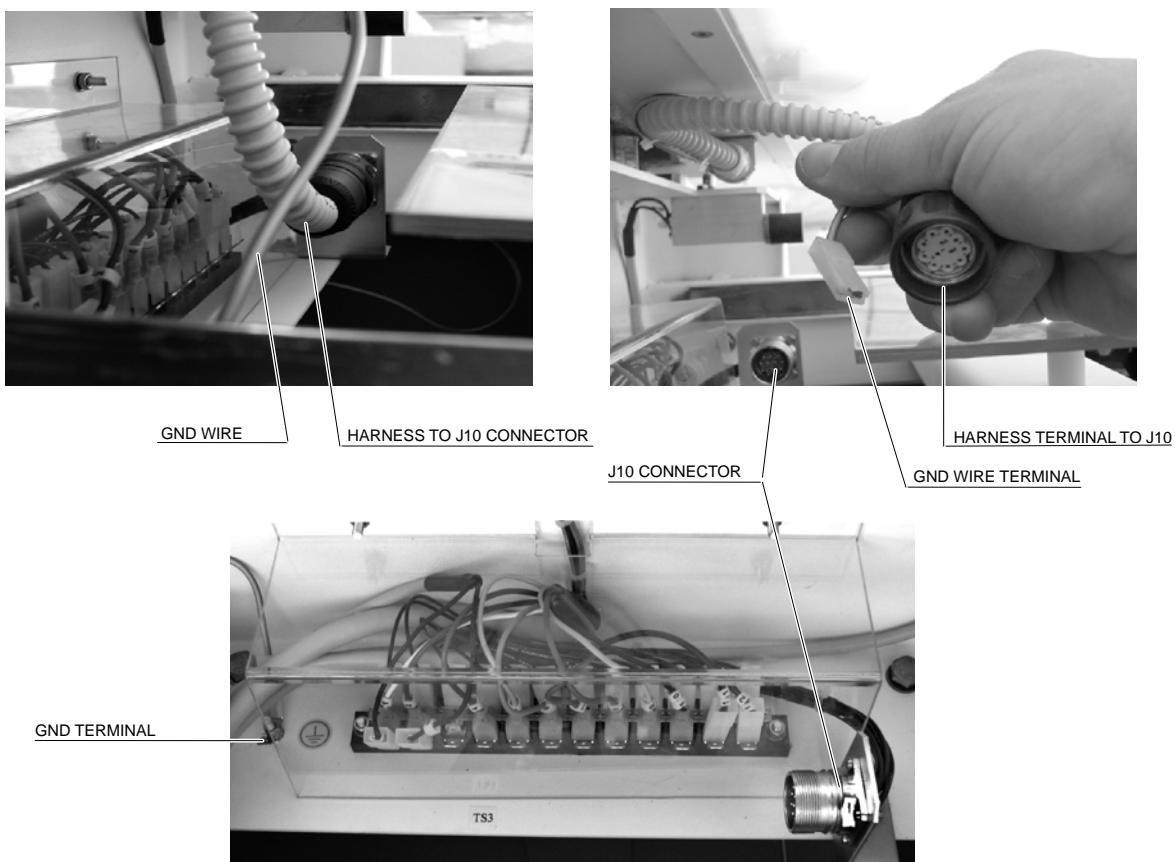
FRAME STOP SCREWS



FRAME STOP

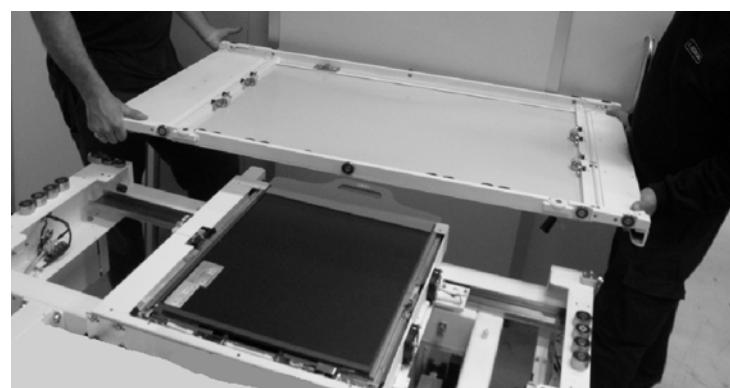


2. Disconnect the GND wire of the Table-Top (faston terminal). Disconnect the Harness plugged into J10 Connector (unscrew the round terminal and pull it).

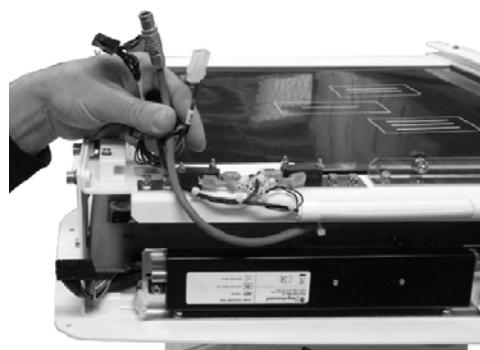
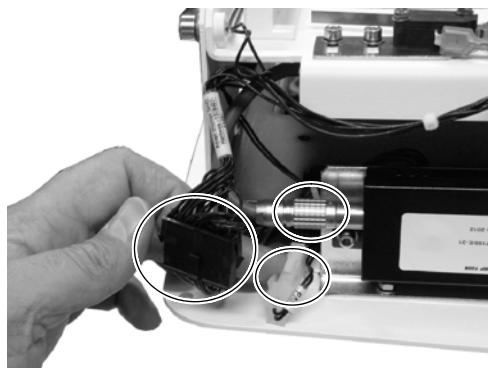


3. Carefully take out the Table-Top Frame from the Table Base by sliding it towards the back side of the Table. Take care not to snare the disconnected GND wire or Harness in the Table Base, or to scratch the Digital Detector Housing.

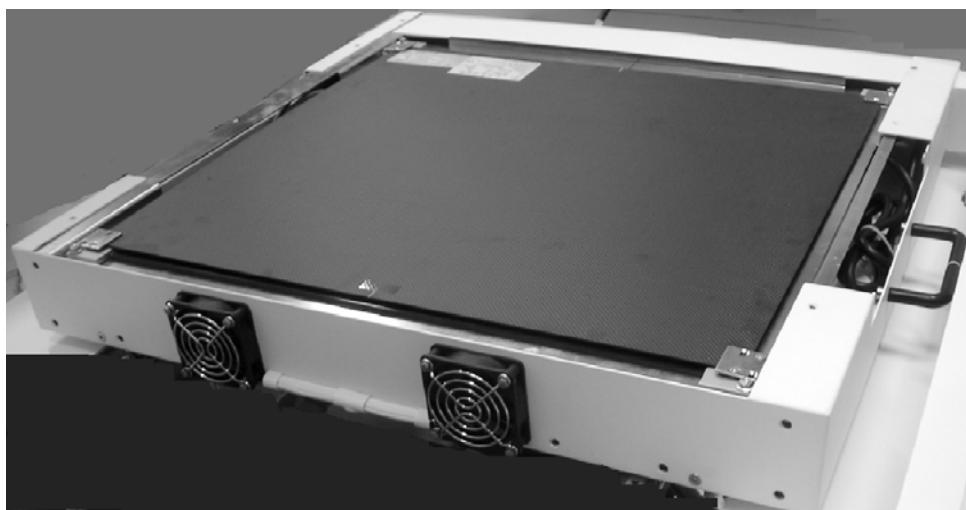
**Two people are required to take out the Table-Top Frame**



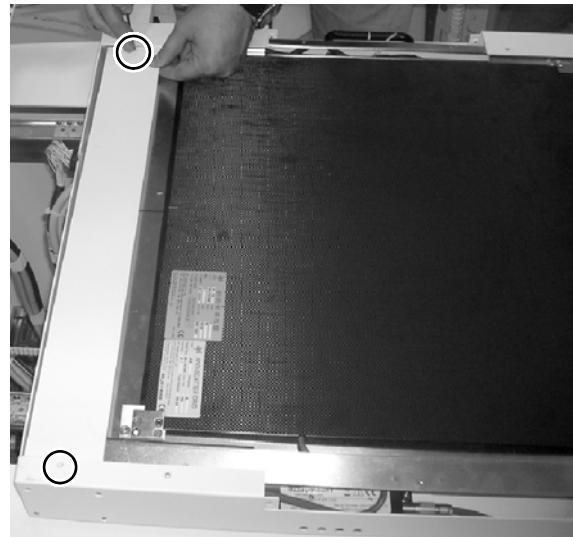
4. Disconnect the Fan connector, the Ion Chamber Molex and the Supply of the Ion Chamber Connector.



5. Remove the front and back upper metal sheets by unscrewing them from the Digital Detector box.



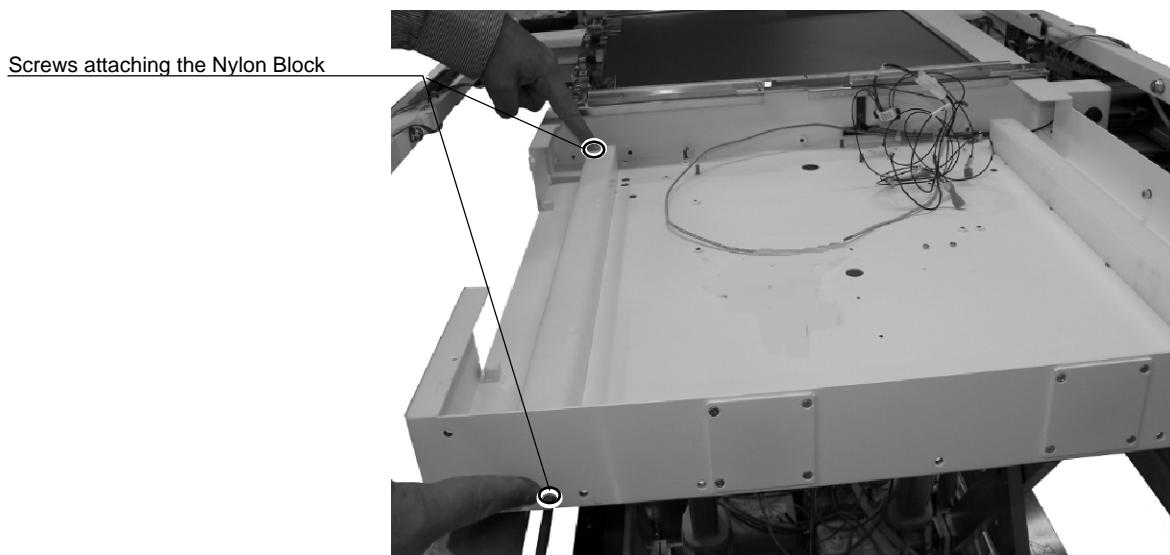
6. Also remove the long metal sheet from the right side. Hold it while unscrewing so it does not fall down.



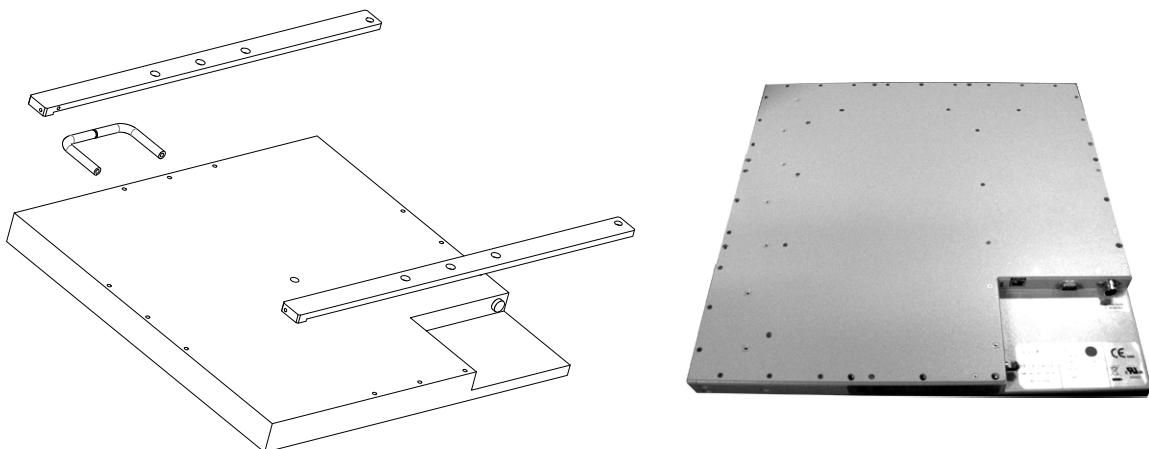
7. Unscrew the Ion Chamber Support Screws located at each corner of the Support.
8. Lift the Ion Chamber and Grid assembly and put it aside.



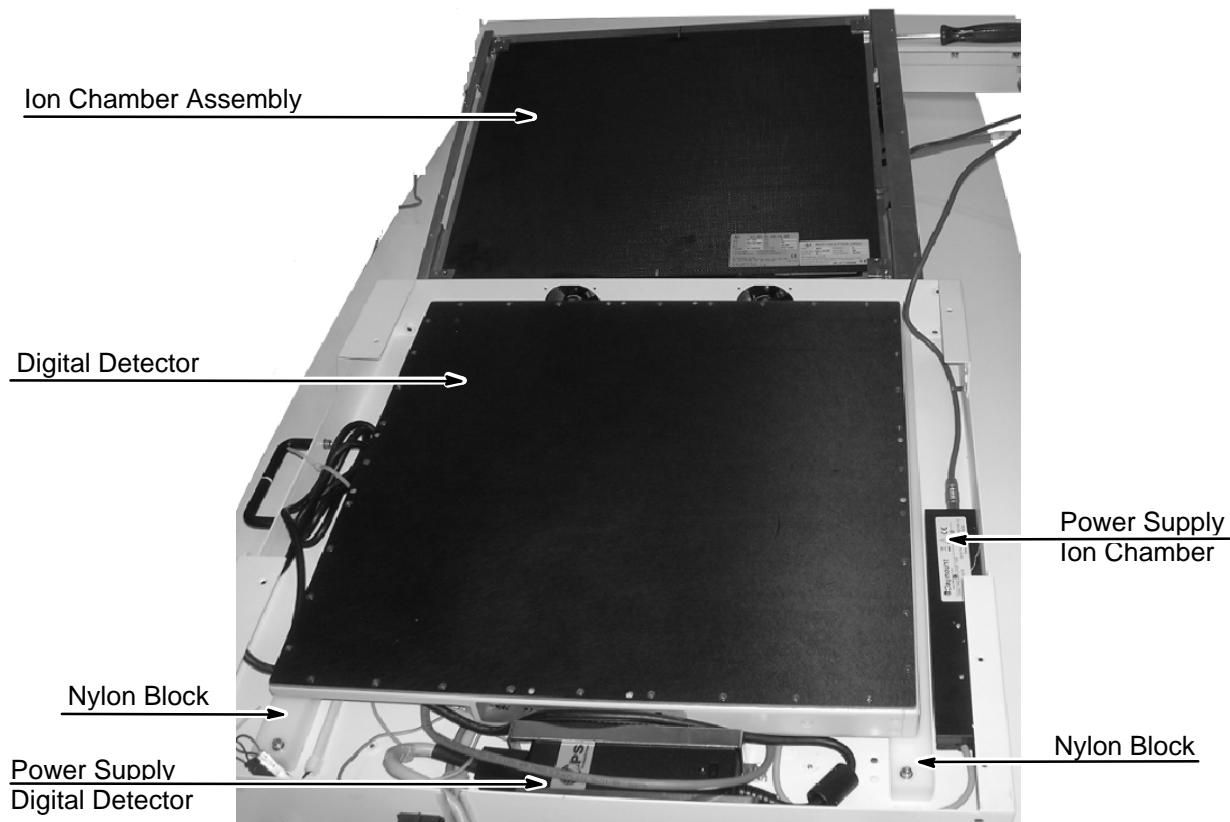
9. Disassembly both Nylon Blocks from the Digital Detector Back Support.



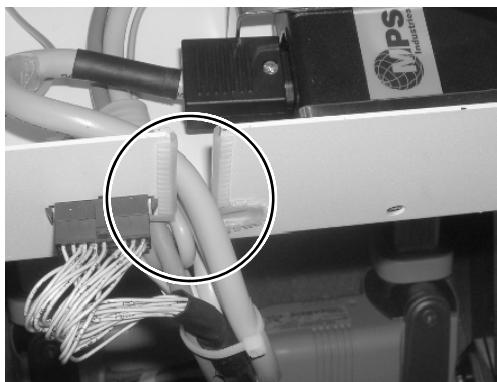
10. Carry the Digital Detector and the Nylon Blocks to a safe Flat surface.
11. Turn the Digital Detector Up side down and install both Nylon Blocks in the Digital Detector with the Screws included in the Digital Detector package.



12. Place the Digital Detector with the Nylon blocks already fixed in the Digital Detector Assembly and fix the assembly to the Digital Detector Assembly (two screws on the left side and two mounting screws through the top of the right side of the spacers).



13. Pass the Digital Detector Cables through the cable slot located on the right side of the Box and guide/ connect them as shown in the pictures below.



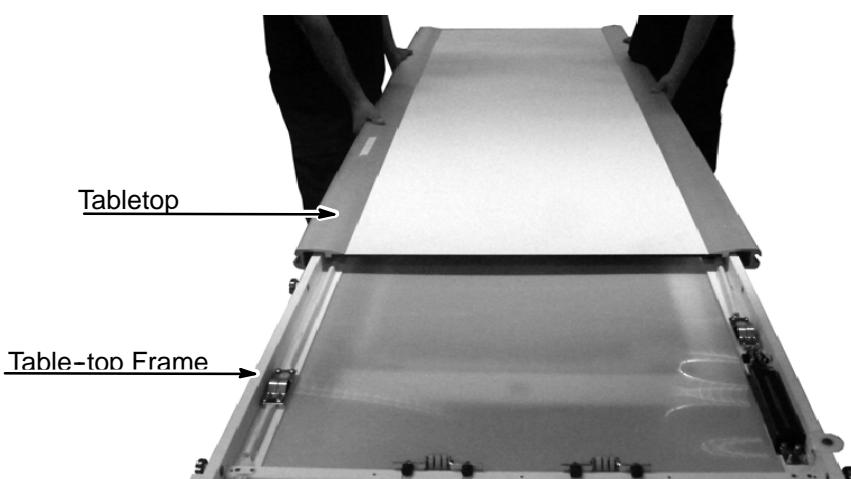
14. Reconnect the cables previously disconnected (Fans, Ion Chamber, Ion Chamber Supply.)



15. Replace the Tie wraps previously removed.
16. Reinstall the Ion Chamber assembly.



17. Reinstall the Tabletop Frame and reconnect J10 and GND.
18. Install the Table Top and install the Tabletop Stop Bar.



## 5.4 WALL STAND

Note 

If the Digital Detector is not installed, refer to Section 5.4.1.



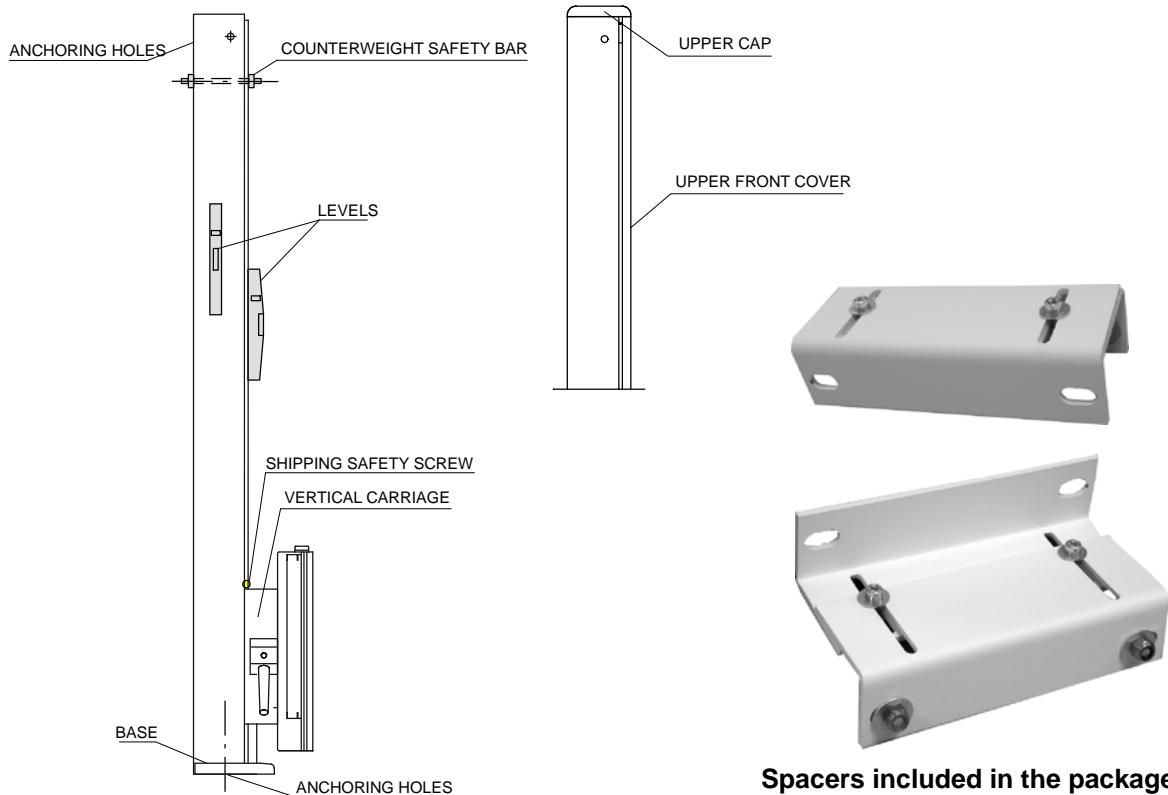
**The Shipping Safety Screws used to block carriage movement as well as the Counterweight Safety Bar are used to prevent not only damage during shipment but also unwanted weight imbalance in the column during installation. The counterweights are factory adjusted.**

There are various options to fix the assembly to the wall and floor: A) Spacers anchored to the wall (included in the package); B) Column anchored directly to the wall and floor (no support between the Wall Stand and the wall). C) Column Base anchored to the floor and column (optional-not included).

1. Place the Wall Stand in Vertical position.

**Illustration 5-7**

**Wall Stand**



**Spacers included in the package**

2. Remove the Upper Cap and Upper Front Cover. The two lower screws shown in the photo below are used to secure the Upper Front Cover to the Column. The tool below is an Allen Type Screwdriver.



3. Remove the Counterweight Safety Bar (behind the Front Cover).
4. Remove the Shipping Safety Screws from the Carriage Rails. For this operation, it is advisable to have a person pushing the Receptor Assembly downwards to ease the removal (Mechanical Brake should be released).



5. Decide whether installing the wall anchors with the supplied Small Spacers, or nothing to separate the Wall Stand from the wall.
6. Place the Column at its final position in the room so that the longitudinal axis of the X-ray Tube meets the vertical axis of the Receptor.
7. Power ON the Collimator Lamp and correctly align the Wall Receptor axes with the Collimator light beam. During alignment, place the Tube-Collimator Assembly and the Vertical Carriage at different heights to check that it is correctly aligned.

8. **If using a Spacer:** Separate the Column from the wall and assemble the Spacer at the upper part of the Column before marking the anchoring holes in the wall.

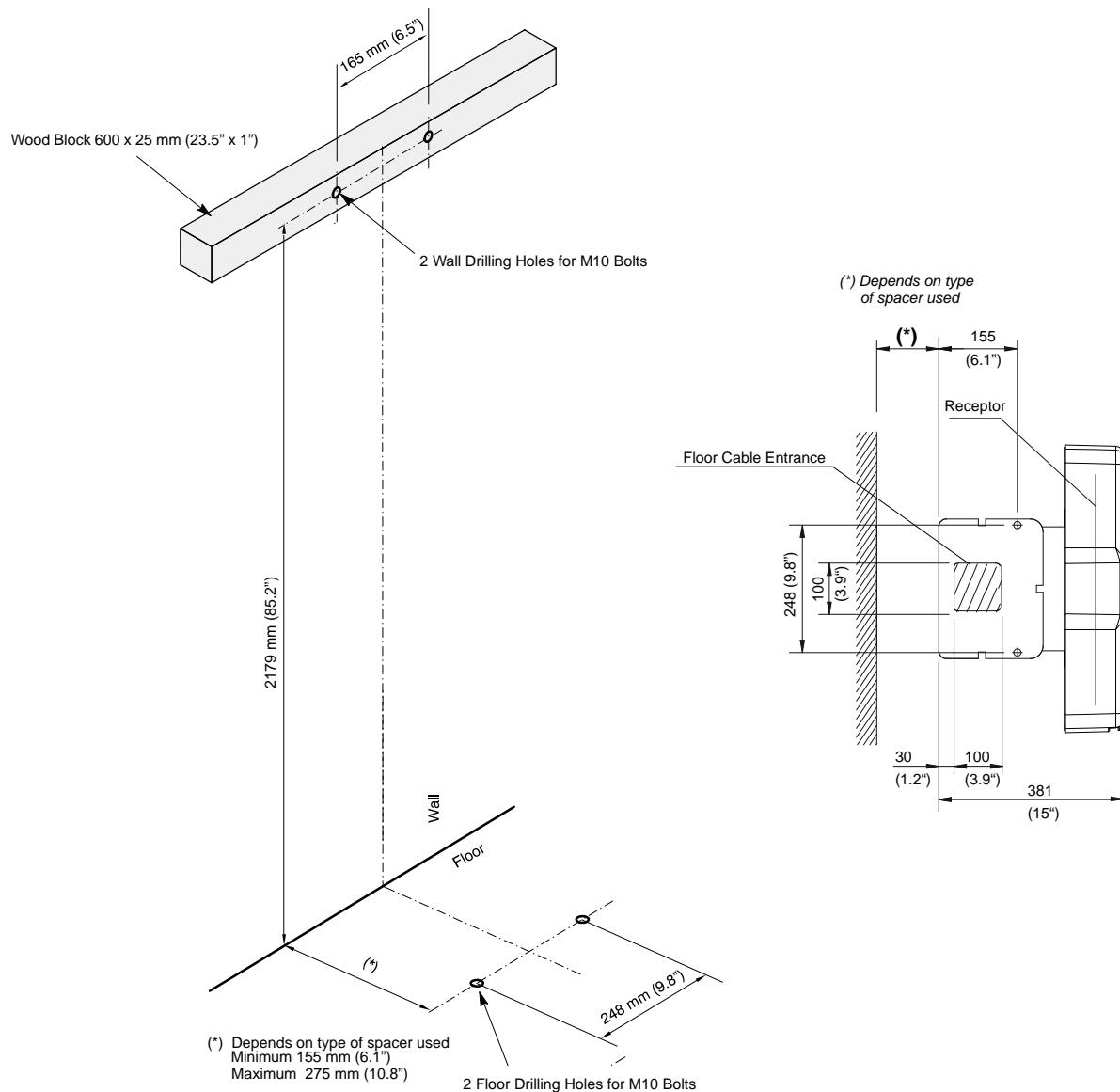
**If the Column is to be anchored directly to the wall:** Mark two of the upper anchoring holes of the Column on the wall as well as the two anchoring holes on the floor.

**If the Column base (optional) is to be anchored directly to the floor:** Mark the anchoring holes of the Column base on the floor and then fix the Column to the Column base as showed in the Illustration 5-9 below.

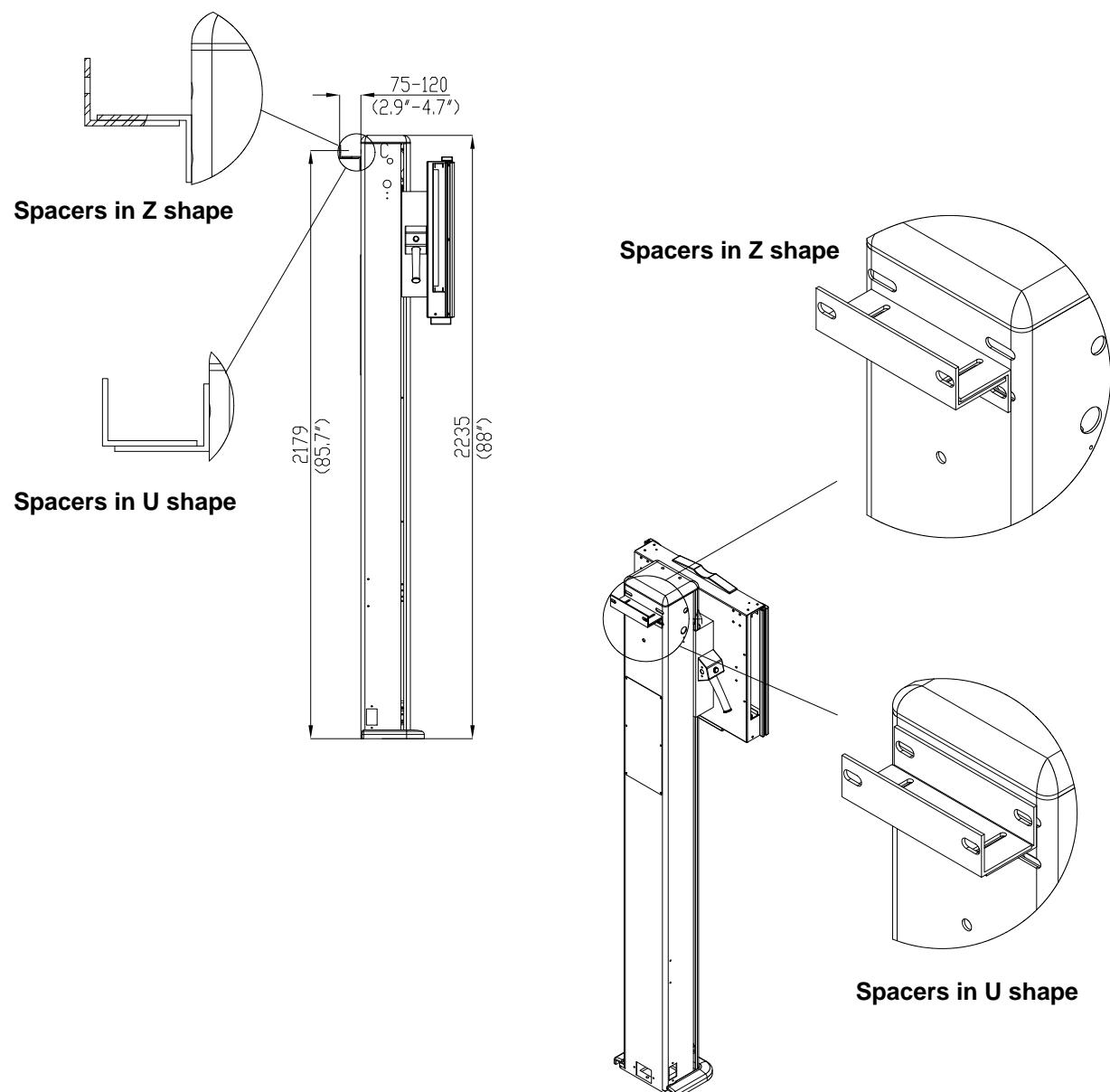
9. Move the Column aside and prepare their anchors.

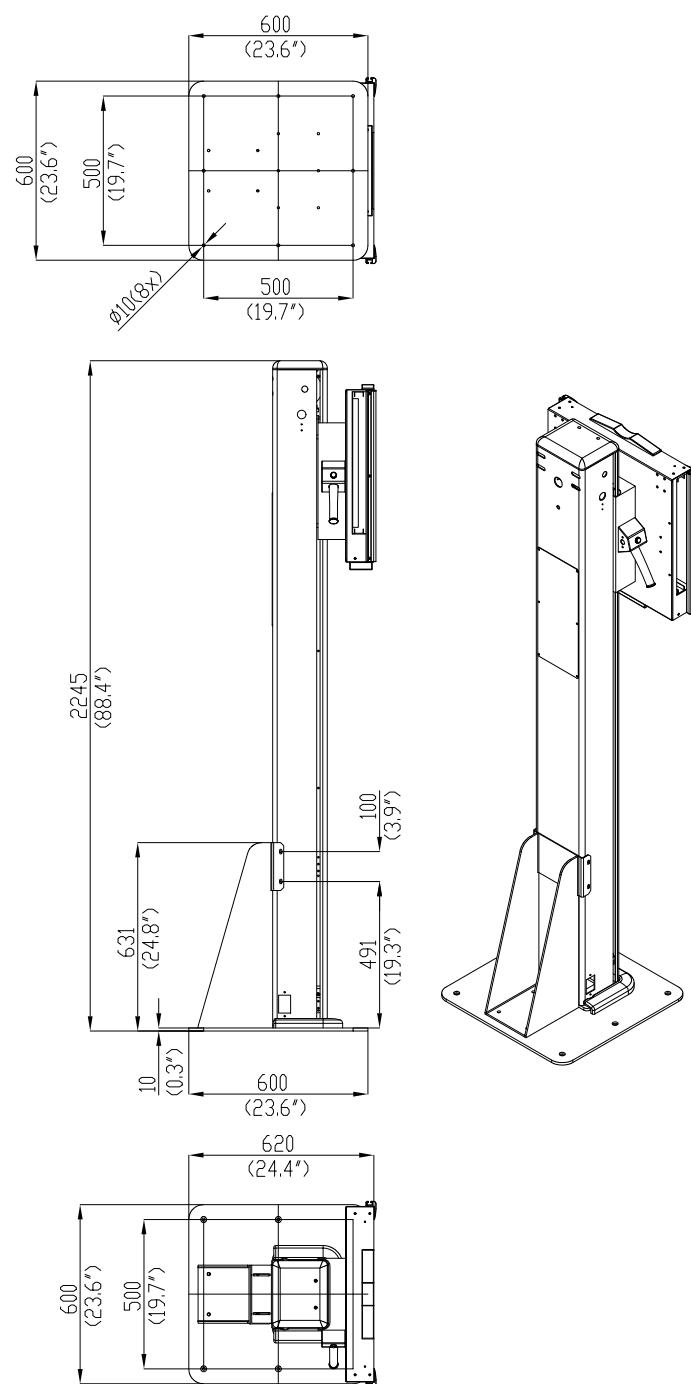
**Illustration 5-8**

**Wall Stand - Anchoring Holes and Dimensions**



**Illustration 5-9**  
**Wall Stand - Spacers**



**Illustration 5-10****Wall Stand - Column Base (optional)**

10. Position the Column and fix it to the floor and wall. Check that it is properly leveled in both laterals and front side. Use the leveling plates provided to raise and level the Column previous to secure it definitively. (*Refer to Illustration 5-7*).
11. Install the Upper Front Cover and then the Upper Cap (both are secured with two screws). Install the Foot Cover of the Column pushing it.
12. Route the cables along the room to the Generator for their later connection.
13. If the Wall Stand has electrical Locks, connect the Power Supply cable for Locks from the Wall Stand to TB7 of the Lock Board in the Generator, and connect the GND cable from the Table Base to the GND Stud in the Generator (*refer to schematics 54301068*).
14. If applicable, connect the Wall Stand Bucky Cable directly to the Terminal Block 3TS1 in the Generator, and the Wall Stand Ion Chamber Cable to the Generator (*refer to schematics 54301068*).

**Note** 

*Refer to the Generator Service Manual for further information.*

#### 5.4.1 INSTALLATION OF THE DIGITAL DETECTOR IN THE WALL STAND

The Detector Assembly of the Wall Stand is factory prepared to install the Digital Detector on both Nylon blocks located inside the Assembly.

The following instructions and illustrations show the recommended disassembly of the Cover, Ion Chamber Assembly and installation of the Digital Detector.



**THIS INSTRUCTION DEPICTS THE INSTALLATION OF THE DIGITAL DETECTOR WITH THE WALL STAND IN HORIZONTAL POSITION ALTHOUGH THIS PROCEDURE CAN BE PERFORMED WITH THE WALL STAND IN VERTICAL POSITION.**

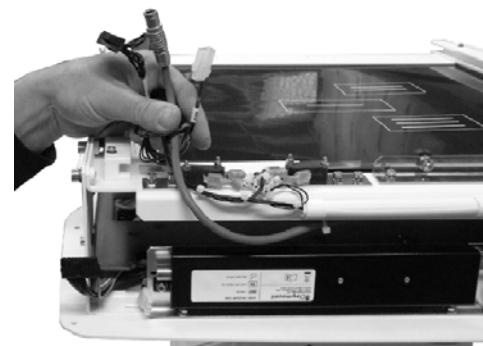
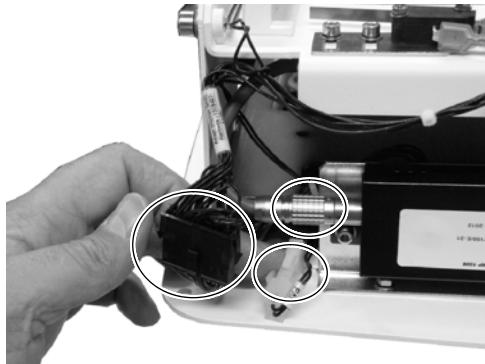
EXAMPLE OF WALL STAND  
IN HORIZONTAL POSITION



1. Remove the fixing allen screws (x8) of the Digital Detector Assembly cover and lift the cover away.



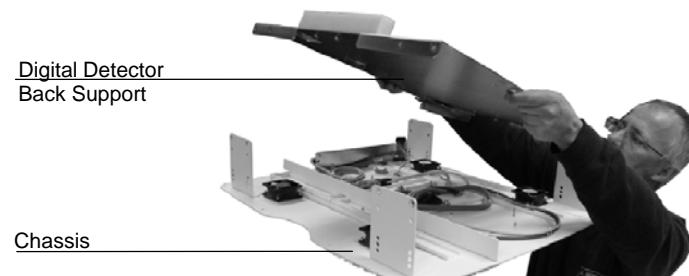
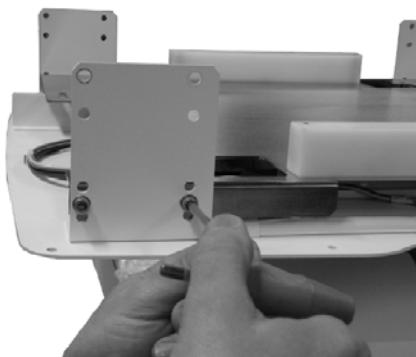
2. Disconnect the Fan connector, the Ion Chamber Molex and the Supply of the Ion Chamber Connector.



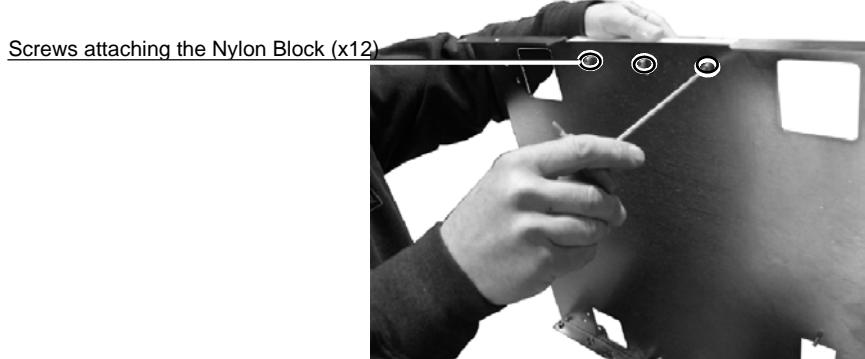
3. Unscrew the Ion Chamber Support Allen Screws (mark the holes for reinstallation reference).
4. Remove the Ion Chamber Assembly.



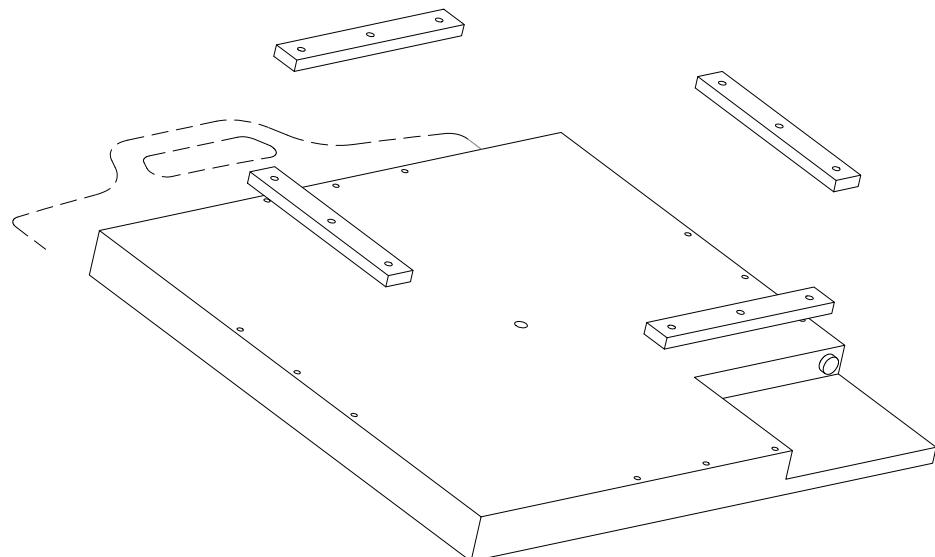
5. Disassembly the Digital Detector Back Support. For that, unscrew the 8 allen screws from the chassis and carefully remove the Digital Detector Back Support.



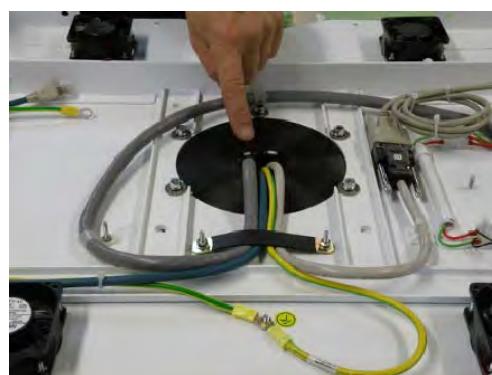
6. Disassembly the Nylon Blocks (x4) from the Digital Detector Back Support..



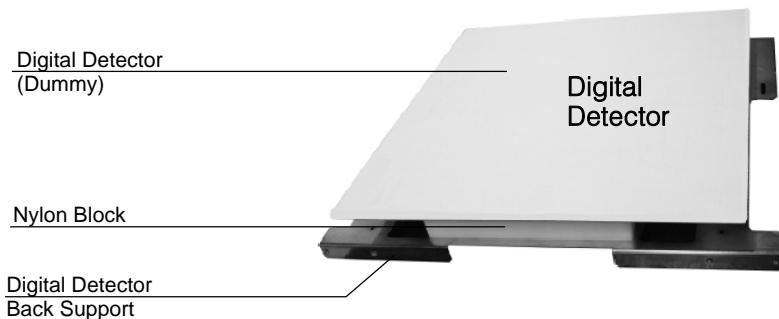
7. Turn the Digital Detector Up side down and install the Nylon Blocks in the Digital Detector.



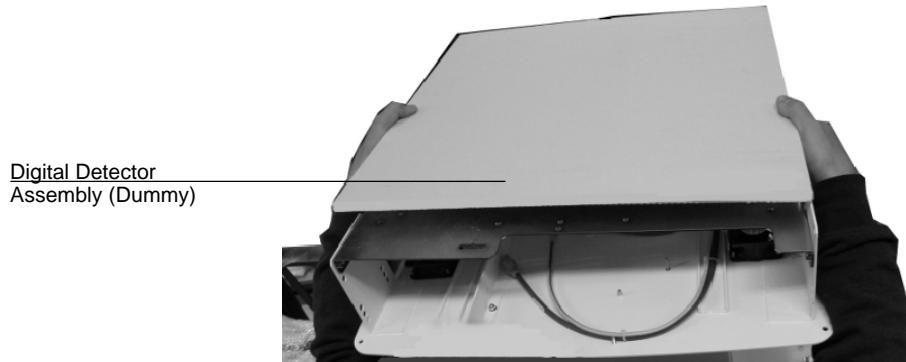
8. Route the cables of the Digital Detector through the Central hole of the Digital Detector Assembly and guide them outside.



9. Place the Digital Detector on the Digital Detector Back Support in its final position, so that the Nylon block is fixed between the Digital Detector and the Digital Detector Back Support (with the screws supplied in the Digital Detector Assembly).



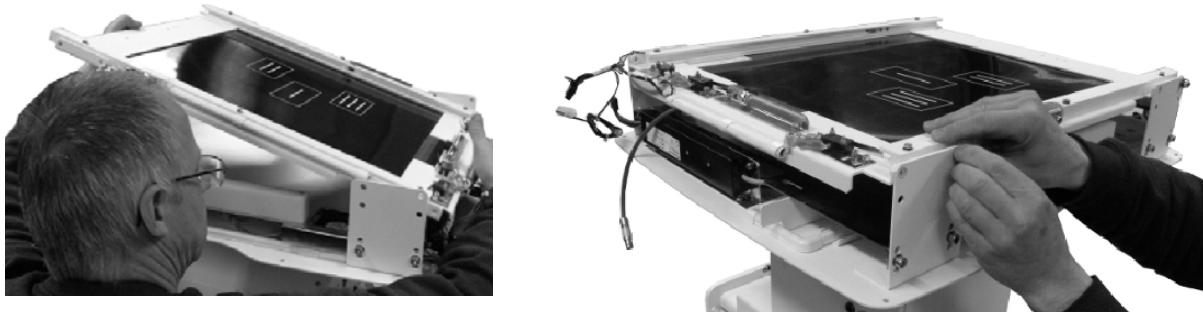
10. Reinstall the Digital Detector Back Support with the Digital Detector on the Digital Detector Assembly.



11. Connect the Detector Cables in the Digital Detector Connectors



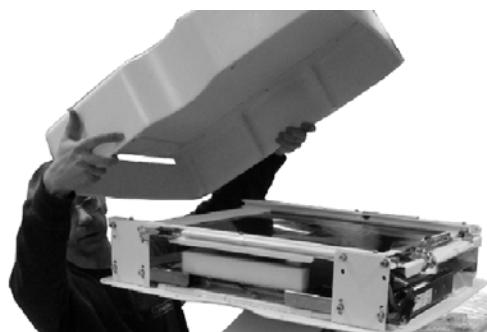
12. Reinstall the Ion Chamber assembly in the Chassis Support Plates using the same holes.



13. Reconnect the cables previously disconnected (Fans, Ion Chamber and Ion Chamber Supply).



14. Reinstall the Digital Detector Assembly Cover.



## 5.5 CABLE ROUTING

Verify that the following cables are properly routed and connected.

CABLE CODE (Mfg. Ref.)	CABLE DESCRIPTION	FROM	TO
A6779-01	Table Power Supply	Tube Stand	Table Base TS8
A6750-01	Table-Column Control	Tube Stand	Table Base J4
A6784-01	Collimator	Tube Stand - Collimator	Table Base J3
A6754-01	+24V Table-Column	Tube Stand	Table Base J4A
HV Cables	Anode and Cathode High Voltage Cables	Tube Stand	Generator Cabinet - HV Transformer
A7014-03	Stator	Tube Stand - X-Ray Tube	Generator Cabinet - TS2
55902025	DAP Interface Cable (optional)	External Dosemeter Vacudap for Manual Collimator	Generator Cabinet - TS2 - Radiation Meter Bd. A3170-01 IC1-P2
A6739-01	Room Power Supply	Table TS1	Mains
A3253-02	Ion Chamber	Table Base IC	Generator Cabinet AEC Adapt Board
A6729-xx A7163-xx	Bucky cable or Digital Detector Cable	Table Base J1	Generator Cabinet TS1
A6383-xx	GND	Table Base GND	Room Electrical Cabinet GND
A6707-03	Locks	Wall Stand	Generator Cabinet - Lock Board
A6703-xx	Bucky cable	Wall Stand J1	Generator Cabinet TS1
A6683-xx	GND	Wall Stand GND	Room Electrical Cabinet GND
A3253-02	Ion Chamber	Wall Stand IC	Generator Cabinet - AEC Adapt Bd
A6383-xx	GND	Generator Cabinet GND	Room Electrical Cabinet

## 5.6 FINAL INSTALLATION CHECKS

1. Check that J4 and bridge at Relay have been removed at Elevating Table.
2. Check all Room cable connections and connectors.
3. Perform Section 6 “Automatic Collimator Installation” if the Tube Stand is provided with the Automatic Collimator option.
4. Perform Section 7 “Adjustments”.
5. Perform Configuration and Calibration processes before installing all covers (Table, Column and Wall Stand).
6. Install the High Voltage Cable Hook if applicable.
7. Install all High Voltage white sleeves.

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## SECTION 6

## SID MAGNETS IN A RAD ROOM WITH AUTOMATIC COLLIMATOR

The following Section describes the installation of the SID Magnet Plates needed in a RAD ROOM that is supplied with an Automatic Collimator.

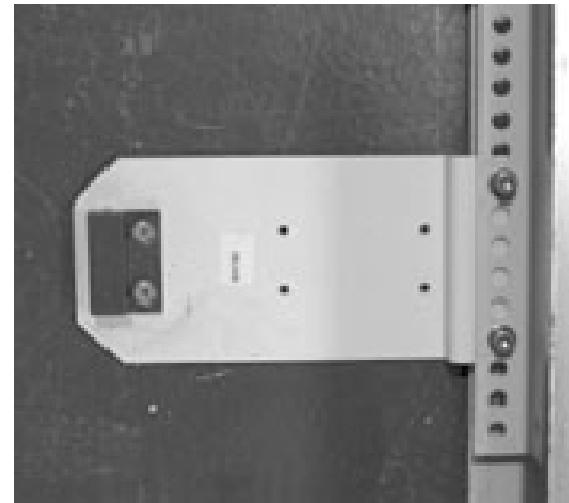
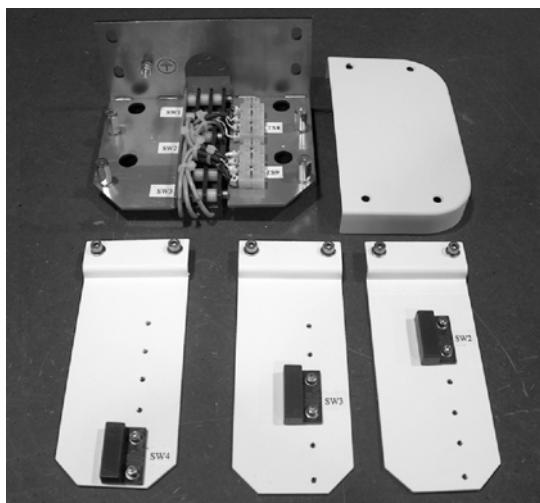
**Note** 

*For Automatic Collimator Configuration, Calibration, Adjustment, Maintenance and Specifications refer to Automatic Collimator Manual.*

### 6.1 SID MAGNETS INSTALLATION IN RAD ROOM WITHOUT TOMOGRAPHY

Once the Base, Column, Table, Wall Stand and Base are installed, configured and calibrated (Refer to this Service Manual), install the Drilled Guide at left or right on the Column Base (depending on the position of the Wall Stand).

1. Install the Magnet plates at exact SID Position from the Wall Stand (Image distance) (for Systems with Digital Control Panel, the Calibration of SID Points must coincide with the closed position of Magnets).



- a. Install the Plate marked "110" at the exact position where the Column display shows 110.

- b. Move the Column to the second SID position configured and calibrated (usually 150 cm). The Column should stop when it arrives to 150 cm. from the Wall Stand Receptor.
  - c. Install the Plate marked "150" at exact position where the Column display shows 150.
  - d. Move the Column to the third SID position configured and calibrated (usually 180). The Column should stop when it arrives to 180 cm. from the Wall Stand Receptor.
  - e. Install the Plate marked "180" centered in front of the "Link" part at exact position where the Column display shows 180 and mark the holes.
2. Double check correct positioning of the Microswitch contacts before final installation.
3. Connect the Automatic Collimator with external PCB as shown in schematics 54303033 located at the Schematics Section of this Manual. The SID that appears on the Collimator Display and the SID showed on SID Display of the Column should coincide.

## SECTION 7 ADJUSTMENTS



DO NOT MODIFY THIS EQUIPMENT WITHOUT  
AUTHORIZATION OF THE MANUFACTURER.

### 7.1 ADJUSTMENT TOOLS

The procedures explained in this Section can be performed with Cassette Film, CR Cassettes or DR (Digital Panel). In case of CR or DR, measure distances in the images with the corresponding measurement tool function as if they were made in a traditional film.

The following special Tools are commonly used for adjustment of the Rad Room (these tools are **not included** with the System. Use the suggested tools or equivalent):

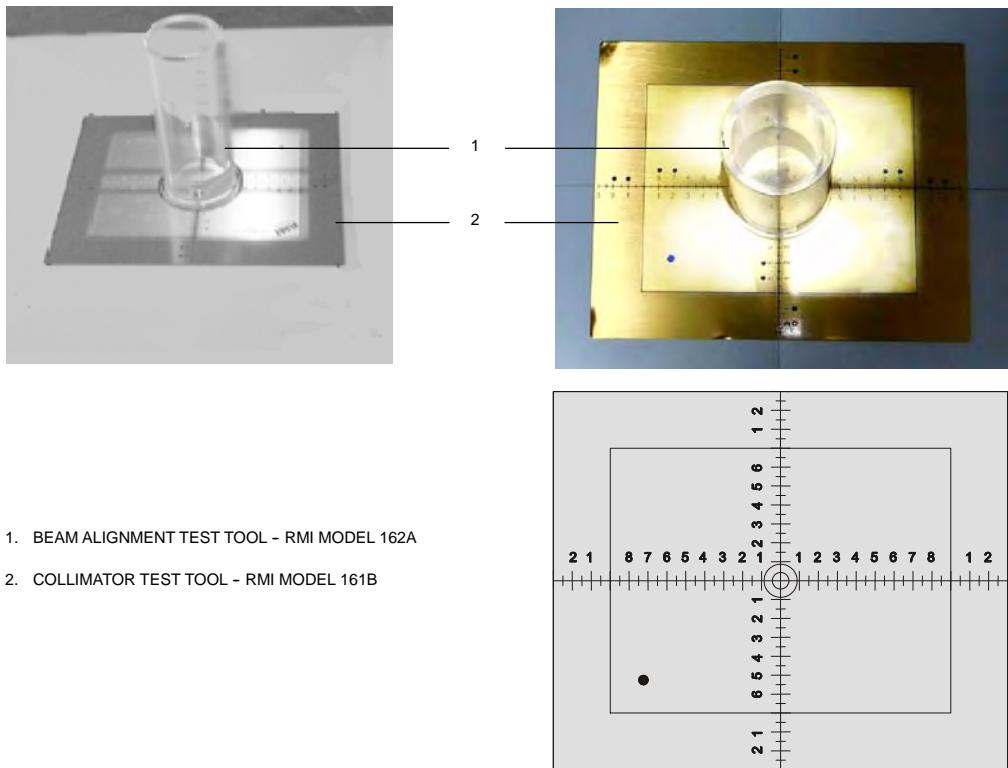
- Collimator Test Tool (Model RMI 161B9).
- Beam Alignment Test Tool (Model RMI 162A).
- Light Meter (Standard).

## 7.2 ALIGNMENT OF X-RAY BEAM

### 7.2.1 ALIGNMENT OF X-RAY BEAM WITH RADIOGRAPHIC TABLE

1. Place the Tube-Collimator Assembly at 100 cm (40") SID of the Horizontal Receptor. Check with a level correct horizontal position of Tube-Collimator Assembly and Table-Top.
2. Turn on Collimator light and center the Collimator with Horizontal Receptor (use the mark at Cassette Tray Holder as reference for centering, if it is present). Horizontal and transverse position of the light axes projected by the Collimator Lamp must be in line with the axes of the Horizontal Receptor.
3. Position the Collimator Test Tool (RMI model 161B) on the Table-Top and center it with the light axes projected by the Collimator Lamp.
4. Adjust the Light Field of the Collimator Lamp to the rectangle drawn inside the Collimator Test Tool.
5. Place centered the Beam Alignment Test Tool (RMI model 162A) on the Collimator Test Tool.

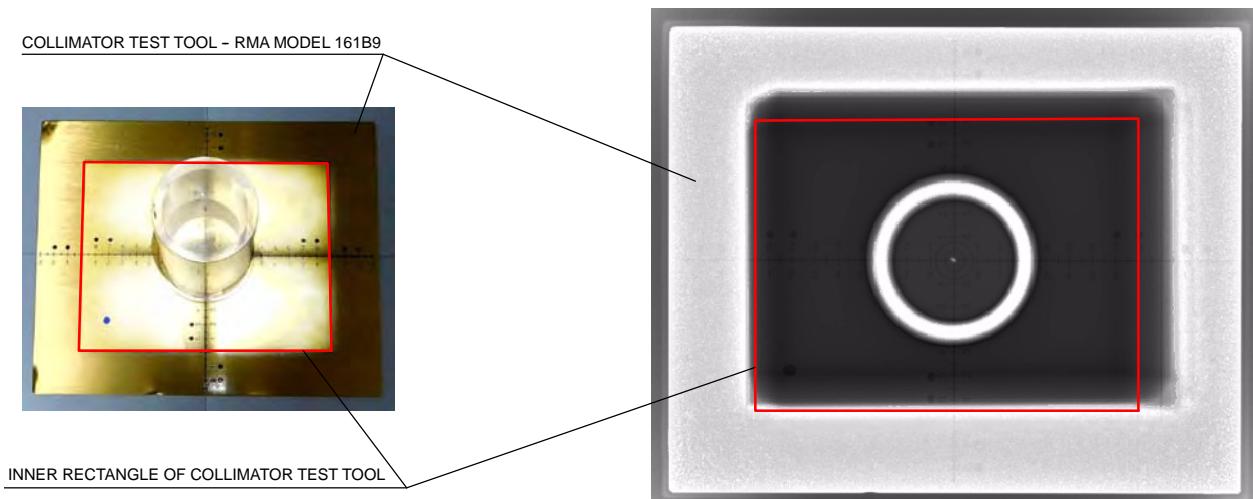
**Illustration 7-1**  
**Alignment Test Tools**



6. Load the Receptor (Cassette Film with 24 x 30 cm Film, or CR, or DR) into the Receptor Tray and align to the Collimator Laser light.
7. If desired, tape a washer on the center of the Receptor area as a reference.
8. Make an exposure at 60 kVp / 5 mAs.
9. Process image and:
  - a. Check that the X-ray Field falls just within the image of the inner rectangle of the Collimator Test Tool.

If an edge of the X-ray Field falls out of the inner rectangle means a misalignment of the Light Field respect to the X-ray Field. The maximum misalignment allowed is 2 % of SID (for SID 100 cm (40") = 2 cm tolerance).

*Refer to Section 7.2.1.1 for alignment of Light Field with X-ray Field.*



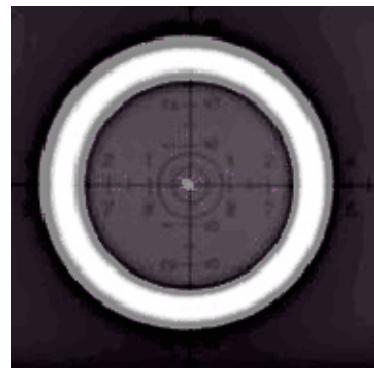
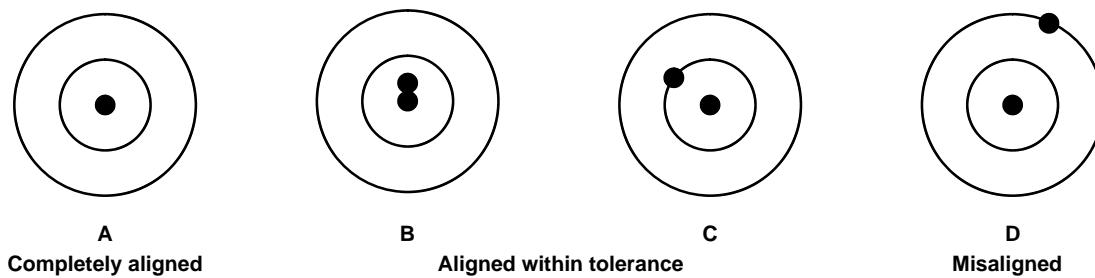
- b. Check that the X-ray Beam is perpendicular to the plane of the Image Receptor. If the Image Receptor is parallel to the Table-Top, the perpendicularity of the X-ray Beam can be checked using the Beam Alignment Test Tool with the Collimator Test Tool.

Based on next illustration, the criteria for SID at 100 cm (40") is:

- If the image of the two balls overlap (A), the X-ray Beam is perpendicular to within 0.5°.
- If the image of the top ball (larger shadow) intercepts the first circle (B), the X-ray Beam is about 1.5° away from the perpendicular.
- If the image of the top ball (larger shadow) intercepts the second circle (C), the X-ray Beam is about 3° away from the perpendicular.

In cases (A) and (B) perpendicularity is within tolerance for SID at 100 cm (40") (top ball is within or intercepting the first circle). The third case (C) needs readjustment.

*Refer to Section 7.2.1.2 for perpendicularity adjustment.*

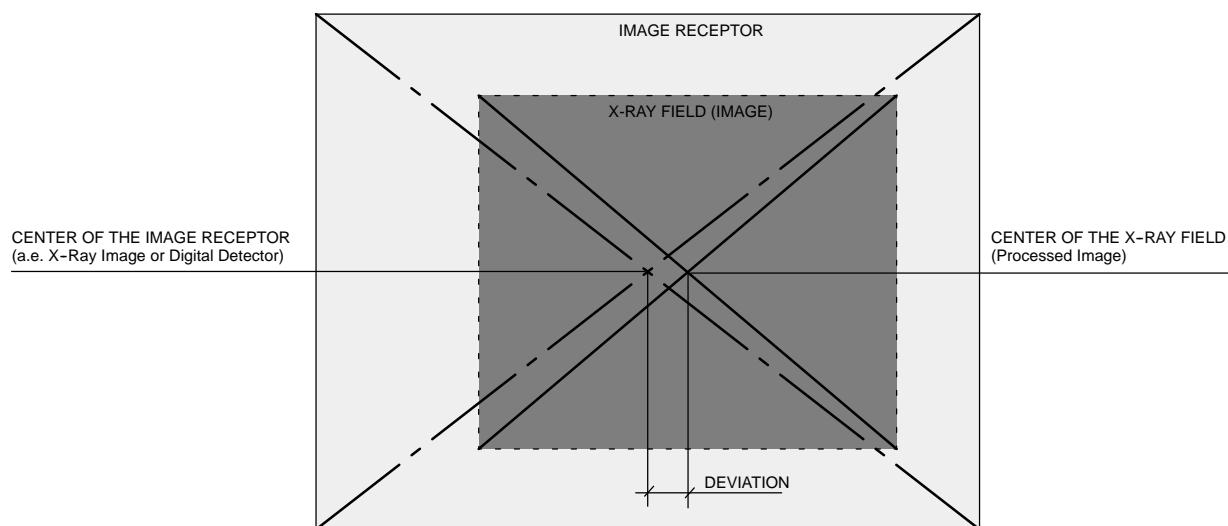


c. Check that the X-ray Beam is properly centered with the Image Receptor, that is,

- For Film, to determine the center of the Image Receptor, draw diagonal lines from corner to corner of the X-ray Film. (Alternately, the film can be folded in half and creased at the center). The two lines will cross in the center of the Image Receptor (film). Then draw diagonal lines from the corners of the imaged X-ray Field.
- For CR or DR, using the Line measurement tool, draw diagonal lines on the image to identifying both the center of the X-ray field and the center of the active area. Measure the separation of the two centers and record the values.

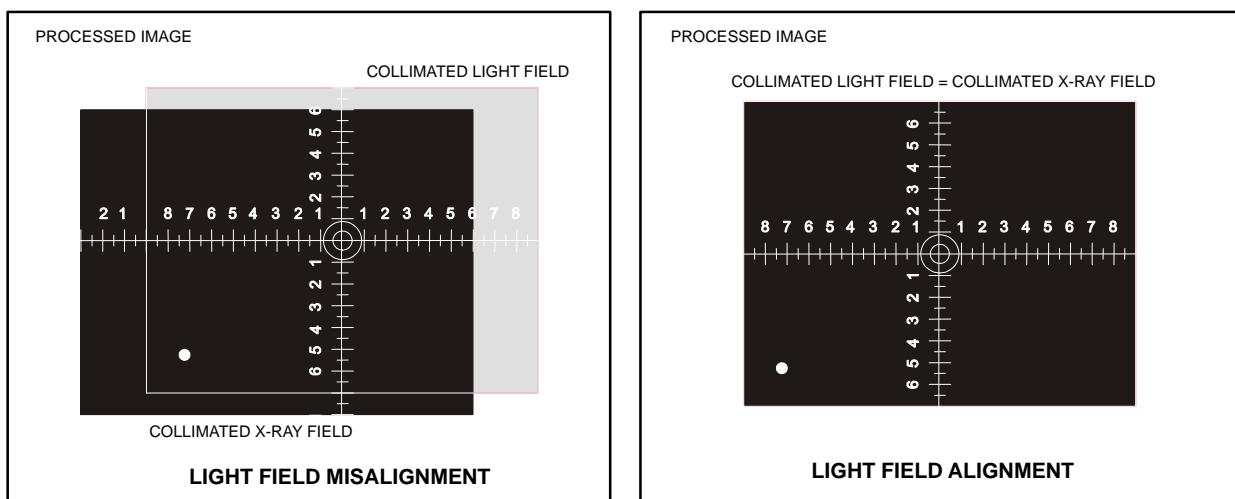
If the center of the X-ray Field and Image Receptor is the same, the diagonals of both sets of lines should cross at the same point. The maximum misalignment allowed is 2 % of SID (for SID 100 cm ( $40''$ ) = 2 cm tolerance).

*Refer to Section 7.2.1.3 for centering of X-ray Field and Image Receptor.*



### 7.2.1.1 ALIGNMENT OF LIGHT FIELD WITH X-RAY FIELD

1. Position the Collimator and Collimator Test Tool (RMI model 161B) as described in steps 1. to 4. of Section 7.2.1.
2. Check on the processed Image the adjustment required to meet the Light Field with the X-ray Field. Identify the deviation on the axes imaged on the image.



3. Do not remove the Collimator Test Tool from its original position and adjust the Light Field by moving the Collimator Lamp as indicated by the Collimator manufacturer (*refer to Collimator Manual - Troubleshooting Section*).
4. Repeat exposure and procedure until the result is satisfactory. The maximum misalignment allowed is 2 % of SID (for SID 100 cm (40") = 2 cm of tolerance).
5. If the adjustment is not possible, replace the Collimator.

### 7.2.1.2 PERPENDICULARITY ADJUSTMENT OF X-RAY BEAM WITH IMAGE RECEPTOR

In case that perpendicularity is out of tolerance (top ball is out of first circle), adjust perpendicularity as follows:

1. Position the Collimator and Collimator Test Tool (RMI model 161B) as described in steps 1. to 4. of Section 7.2.1.
2. Place centered the Beam Alignment Test Tool (RMI model 162A) on the Collimator Test Tool (fix the Test Tool with adhesive or another product). Turn on Collimator light and observe if shadow of the Beam Alignment Test Tool is projected in equal proportion around it.
3. Check on the processed image if adjustment is required to center the top ball mark. Shadow around the Beam Alignment Test Tool can also help to make a first correction.
4. Loosen slightly the four Safety Screws (M6) at the rear side of the Coupling Plate of the Column Arm (at rear side of the Tube-Collimator Assembly). Then loosen or tighten the four (Allen M5) to adjust horizontally the Tube-Collimator Assembly with reference to the Horizontal Receptor. (*Refer to Illustration 7-2*).

Vertical adjustment is not required because the Tube-Collimator Assembly can be placed at any vertical position.

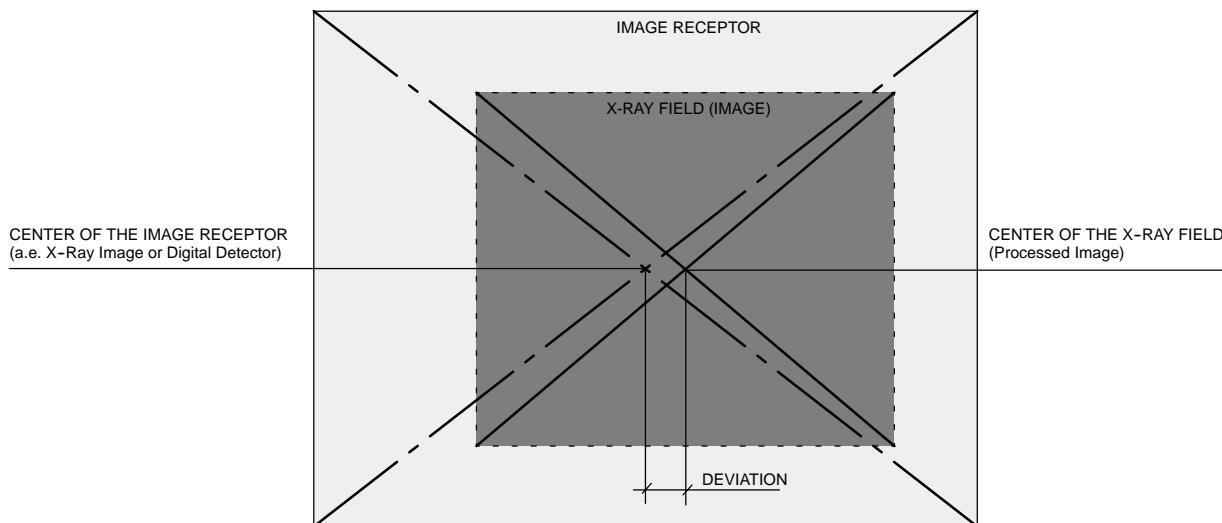
**Illustration 7-2**  
**Safety Screws and Rods for Perpendicularity Adjustment**



5. Repeat exposure and procedure until the result is satisfactory (top ball must be inside of the first circle).

### 7.2.1.3 CENTERING OF X-RAY FIELD AND IMAGE RECEPTOR

The error between centers of the X-ray Field and the Image Receptor should not be greater than 2% of the SID. (for SID 100 cm (40") = 2 cm tolerance).



If the deviation is greater than 2% of SID, perform the following procedure:

1. Check on the processed Image if correction is required for centering the X-ray Field with the Image Receptor. Adjustments will be performed the same way as described for Perpendicularity correction, so only re-adjust if needed.



*Centering adjustments may affect to perpendicularity corrections.*

2. Repeat exposure and check centering until the result is satisfactory (centers position are within tolerance).

### 7.2.2 ALIGNMENT OF X-RAY BEAM WITH WALL STAND

1. Wall Stand has to be properly positioned and aligned respect to the Tube-Collimator Assembly in its central position.
2. Place the Tube-Collimator Assembly at 100 cm (40") SID centered in front of the Wall Stand Receptor. Check with a level correct vertical position of Tube-Collimator Assembly and Wall Stand Front Cover.
3. Turn on Collimator light and center the Collimator in relation to the Wall Stand Front Cover. Horizontal and vertical position of the light axes projected by the Collimator Lamp must be in line with the horizontal and vertical axes or image sizes marked on the Wall Stand Front Cover.

Alignment can also be performed by placing a mirror in the center of the Front Cover and checking the Collimator light reflection.

If needed, readjust position of the Wall Stand.

4. Load the Receptor (Cassette Film with 24 x 30 Film, or CR, or DR) into the Receptor Tray and align to the Collimator Laser light.
5. If desired, tape a washer on the center of the Receptor area as a reference.
6. Make an exposure at 60 kVp / 5 mAs.
7. Check that the X-ray Beam is properly centered with the Image Receptor, that is,

– For Film, to determine the center of the Image Receptor, draw diagonal lines from corner to corner of the X-ray Film. The two lines will cross in the center of the Image Receptor (film). Then draw diagonal lines from the corners of the imaged X-ray Field.

– For CR or DR, using the Line measurement tool, draw diagonal lines on the image to identifying both the center of the X-ray field and the center of the active area. Measure the separation of the two centers and record the values.

If the center of the X-ray Field and Image Receptor is the same, the diagonals of both sets of lines should cross at the same point. The maximum misalignment allowed is 2 % of SID (for SID 100 cm (40") = 2 cm tolerance).

8. If the deviation is greater than 2% of SID, correct position of the Wall Stand adjusting its anchors at the wall and floor.
9. Repeat exposure and check centering until the result is satisfactory (centers position are within tolerance).

## 7.3 SID INDICATOR TEST

**Note** 

*This Section only applies to equipments provided with a SID Indicator in the Control Panel.*

*Before starting with the SID Indicator Test, the Alignment of X-Ray Beam Test and the Alignment of Light Field with X-Ray Field Test should be performed.*

1. Place the Tube-Collimator in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with respect to the Table Receptor.
2. Position SID at 100 cm (40"). Use the Collimator tape and measure to the top of the Receptor (keep in mind the distance from the Table-top surface to the Receptor faceplate).
3. Insert the Receptor tray and check for correct reading on the Control Panel. Write down the distances measured with the Collimator tape and the distance readout of the Control Panel.
4. Rotate the Tube-Collimator and place it in horizontal position facing the Wall Stand Receptor. The Tube-Collimator Assembly has to be perfectly aligned with respect to the Wall Stand Receptor.
5. Position SID at 100 cm (40"). Use the Collimator tape and measure to the top of the Receptor (keep in mind the distance from the Front Cover of the Wall Stand to the Receptor faceplate).
6. Insert the Receptor tray and check for correct reading on the Control Panel. Write down the distances measured with the Collimator tape and the distance readout of the Control Panel.
7. The difference between the indicated SID and the measured SID may not exceed 2% (rejection limit) of indicated SID. Therefore the deviation of SID calculated should be not higher than 2 cm for SID at 100 cm (40").

If the SID value displayed on the Control Panel is out acceptance limits, it will be necessary to check the Configuration and Calibration Menus related to the SID.

**Note** 

*Repeat the check at other SID distances (150 cm, 180 cm).*

**Note** 

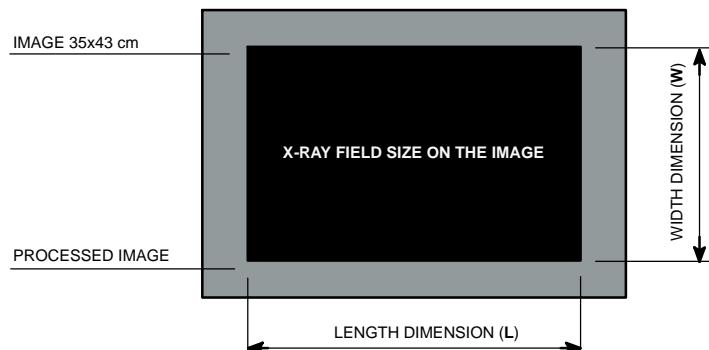
*For Systems with Automatic Collimator, a Collimator Blade SID Tracking test can be performed: While observing the light field pattern on the Table-top, move the Tube-Collimator Assembly vertically from the initial 100 cm (40") SID to the maximum SID available and then back to 100 cm (40") SID. As the SID is varied, the field size should remain approximately the same size. Blades should open as SID decreases and close as SID is increases.*

## 7.4 FIELD SIZE INDICATOR TEST

**Note** 

*Before starting with the Field Size Indicator Test, the Alignment of X-Ray Beam Test and the Alignment of Light Field with X-Ray Field Test should be performed.*

1. Place the Tube-Collimator Assembly perfectly centered with the Horizontal Receptor (use the mark at the Receptor Tray Handle as reference for centering). Check with a level correct horizontal position of Tube-Collimator Assembly and Table-Top.
2. Position SID at 100 cm (40") (use the SID Display on the Column Control Panel if available).
3. Open the Collimator blades to set a Field Size of 24 x 30 cm for SID 100 cm (40").
4. Turn on the Collimator Light and center the Collimator in relation to the Horizontal Receptor. Horizontal and Transferral position of the light axes projected by the Collimator Lamp must be in line with the axes of the Horizontal Receptor.
5. Load the Receptor (Cassette Film with 35 x 43 cm Film, or CR, or DR) into the Receptor Tray and align to the Collimator Laser light.
6. Make an exposure at 60 kVp, 1 mAs.
7. Process Image and check the following measurements known (*refer to Illustration 7-3*):
  - a. Measure the length of the X-ray Field on the Processed Image (identified as **L**)
  - b. Measure the width of the X-ray Field on the Processed Image (Identified as **W**)

**Illustration 7-3**  
**X-ray Field Size**

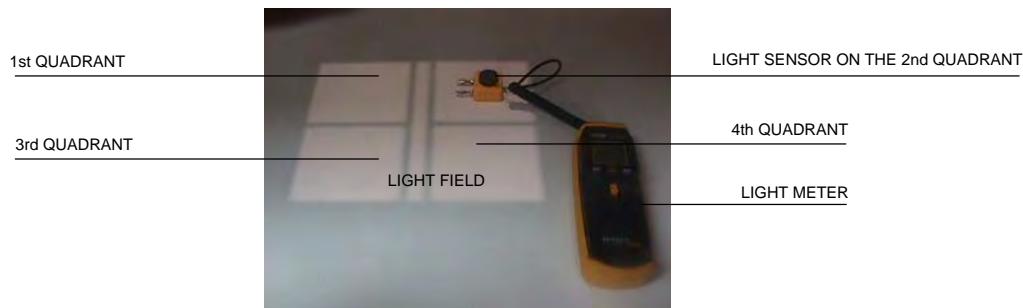
8. With the measurements obtained and according to the field size indication selected, the results should be:
  - Length dimension (**L**) = 300 mm
  - Width dimension (**W**) = 240 mm
9. The difference between the indicated Field Size and the obtained Field Size may not exceed 1.5 % (rejection limit) of the SID in either direction. Therefore the deviation in any direction should not be higher than 15 mm (rejection limit) for SID at 100 cm (40").
10. If the deviation of Field Size Indication is out acceptance limits, it is necessary to readjust the index of Collimator Blades Control Knobs. For that, loosen each Collimator Control Knob and position it according to deviation. Repeat the complete tests until the X-Ray Field Size selected is obtained.

## 7.5 COLLIMATOR LAMP BRIGHTNESS TEST

### 7.5.1 COLLIMATOR LIGHT FIELD INTENSITY

1. Place the Tube-Collimator Assembly perfectly centered with the Table Receptor. Check with a level correct horizontal position of Tube-Collimator Assembly and Table-Top.
2. Position SID at 100 cm (40").
3. Open the Collimator Blades by means of Collimator Control Knobs and set a Field Size of 25 x 25 cm for SID 100 cm (40").
4. Turn on the Collimator Light and center the Collimator in relation to the Table Receptor. Horizontal and transverse position of the light axes projected by the Collimator Lamp must be in line with the axes of Horizontal Receptor.
5. Place the Light Meter on the Table-Top with sensor directed toward the Light Source.
6. Place the Light Meter in the center of one quadrant of the light field (*refer to Illustration 7-4*).

**Illustration 7-4**  
**Light Meter on Table-Top**



7. With Collimator Lamp OFF, measure and record of the ambient light level.
8. Do not move the Light Meter. With the Collimator Lamp ON, measure and record of light level of that quadrant.
9. Determine the light intensity of that quadrant by subtracting the ambient light level from the corresponding light level.
10. Repeat measurements at the approximate center of remaining three quadrants of light field.
11. With the measurements obtained on the step-10., the results of Light Field Intensity in all quadrants should be higher of 170 lux (16 foot-candles) and among all the quadrants the intensity light field shall not differ more than 10%.
12. The average illumination at a distance of 100 cm (40") from the focal spot shall not be less than 160 lux (15 foot-candles). Rejection limit is 170 lux (16 foot-candles) or the established local regulatory values.
13. If the deviation of Light Field Intensity is out acceptance limits, it is necessary to take into account the following:
  - a. If the difference of Light Field Intensity among all quadrants is higher than 10%, we need to readjust the Collimator Lamp socket. (*Refer to Collimator Manual*).
  - b. If the light level in all quadrants is less than 170 lux, it is necessary to check the following:
    - Check that the Collimator Led, the Mirror and the Mylar window are not dirty or discolored.
    - Check the correct position of the Mirror (*Refer to Collimator Manual*).
  - c. If the light level is still low:
    - Replace the Collimator LED.

### 7.5.2 COLLIMATOR LIGHT FIELD CONTRAST RATIO

1. Place the Tube-Collimator Assembly perfectly centered with the Table Receptor. Check with a level correct horizontal position of Tube-Collimator Assembly and Table-Top.
2. Position SID at 100 cm (40").
3. Open the Collimator Blades to set a Field Size of 25 x 25 cm for SID 100 cm (40").
4. Turn ON the Collimator Light and center the Collimator in relation to the Horizontal Receptor. Horizontal and transverse position of the light axes projected by the Collimator Lamp must be in line with the axes of Horizontal Receptor.
5. Place the Light Meter on the Table-Top with sensor directed toward Light Source.
6. Place the Light Meter in the center of one quadrant of the light field. (*Refer to Illustration 7-5*).
7. Minimize the room lighting. With the Collimator Lamp OFF, measure and record the ambient light level.
8. Turn ON the Collimator Light. Measure the maximum illumination; this should occur near the field center. Slide the light sensor along the Table-Top and locate the point where the illumination drops to a 75% of the maximum. This point is defined by BRH as lying on the edge of the Light Field (*refer to Illustration 7-5*). All subsequent measurements will be referenced to this point and to this definition of "edge".

**Illustration 7-5**  
**Light Contrast Calculation**



9. Measure the illumination at a point 3 mm from the edge of the field toward the center of the field (Light sensor on the left of edge). (*Refer to Illustration 7-5*). Record this as  $I_1$ .
10. Measure the illumination at a point 3 mm from the edge of the field away from the center of the field (Light sensor on the right of edge). (*Refer to Illustration 7-5*). Record this as  $I_2$ .
11. Correct the values of  $I_1$  and  $I_2$  by subtracting from each value the ambient light level measured in step-7. Now divide the corrected value of  $I_1$  by  $I_2$ . This ratio should be 4 or more.

$$\frac{I_1 - \text{Ambient Light}}{I_2 - \text{Ambient Light}} = \geq 4$$

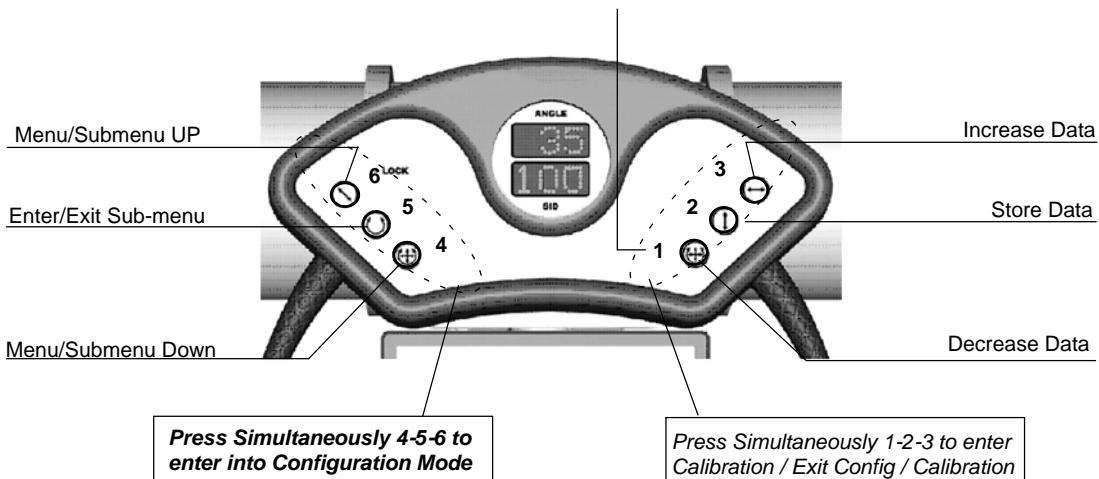
12. Repeat the process from step-8. for all quadrants of Light Field.
13. If the deviation of Light Field Contrast Ratio is out acceptance limits, it is necessary check the following:
  - Check that the Collimator Lamp, the Mirror and the Mylar window are not dirty or discolored.
  - The Light Field Intensity level shall be higher of 170 lux.
  - The ambient light level shall be low as it affects the accuracy of the measurements.

## SECTION 8      CONFIGURATION AND CALIBRATION OF THE TUBE STAND

**Note** 

*Only for Rad Rooms with Digital Control Panel Rad. Perform the Configuration and Calibration Process as described in this Section. As every installation has its own features, all Configuration and Calibration points must be checked.*

PRESS AND HOLD 1 AND TURN ON THE TABLE ON TO ENTER INTO SERVICE MODE



### 8.1 TAKE A FEW MINUTES TO LEARN HOW TO USE THE DIGITAL CONTROL PANEL

If this is the first time that you are going to perform a Configuration and Calibration of the Column device, follow the Steps below to familiarize yourself with the front panel and its functions during the configuration and calibration process.

#### Configuration

1. With the System OFF, press and hold button "1" while turning On the System until "CAL" appears on the "Angle Display", which means that the Unit is Service Mode.
2. Press simultaneously buttons "4 + 5 + 6" to enter in Configuration Main Menu until "CON" appears on the "Angle Display". After releasing these buttons "C01" appears on the "Angle Display" (and nothing in "SID Display").
3. Press "5". You will see "C1.1" and "1". You will be in Configuration Sub-Menu.

4. Press "1" to raise number or "3" to lower number within Sub Menu. (These numbers appear in SID display.)  
Set "1" for Fixed height Table or "2" if you have an Elevating Table.
5. Press "2". The display shows OK and the number configured at the Angle display. ATTENTION: You have just set the type of Table, please Complete the Configuration and Calibration process of the Column as indicated in this Section and the following.
6. Press "5" and then press simultaneously "1 + 2 + 3". Now you have exited Configuration Mode. Turn off the system.

### Calibration

1. If the Configuration process have just been set (the System is ON), press simultaneously buttons "1 + 2 + 3" to enter in Calibration Main Menu until "CAL" appears on the "Angle Display". After releasing these buttons, "P01" appears on the "Angle Display" (and nothing in "SID Display").
2. Press "6" two times. You will see "P03".
3. Press "5". You will see "P3.1" and "110" (the number Factory Set for SID with respect to a Vertical Bucky).
4. Press "2". The display shows OK and a number at the Angle display (the potentiometer readout). ATTENTION: You have just set the SID distance with respect to a Vertical Bucky. Please Complete the Configuration and Calibration process of the Column as indicated in this Section and the following.
5. Press "5" and then press simultaneously "1 + 2 + 3". Now you have exited Calibration Mode. You will see regular parameters. Turn off the system.

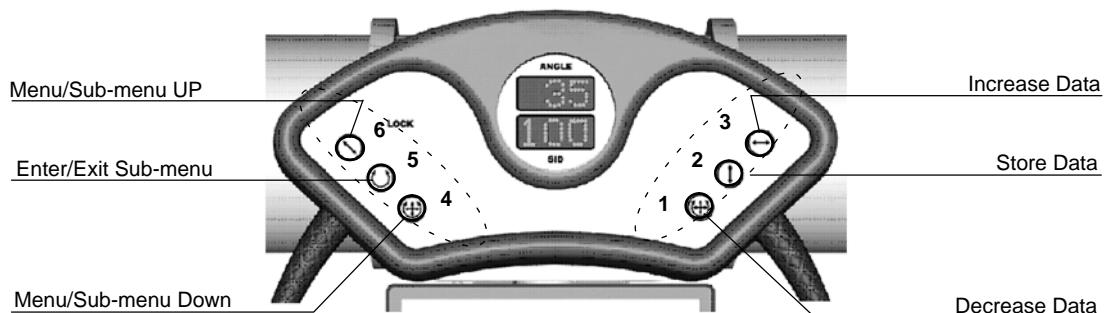
**Note** 

*Before starting and in order to ease the process, take out the Tomographic Bar (if applicable), position the column at one side of the rail, measure with metric tape the maximum and minimum height of the Elevating Table from Table-top to floor (discount 85 mm. of the Tabletop-Film distance) (for Fixed Height Table measure the height of the Table in the same way and discount 85mm.) and also measure the minimum and maximum height of the Tube-Collimator Assembly to the floor with the Collimator metric Tape. (Write the data in the configuration Tables).*

**Note** 

*Once a calibration point is memorized, "OK" and the potentiometer readout appear on display, if the readout is the same in different points, check the potentiometer.*

## 8.2 CONFIGURATION PROCESS



1. With the System OFF, press and hold button "1" while turning On the System until "CAL" appears on the "Angle Display", which means that the Unit is Service Mode.
2. Press simultaneously buttons "4 + 5 + 6" to enter in Configuration Main Menu until "CON" appears on the "Angle Display". After releasing these buttons "C01" appears on the "Angle Display" (and nothing in "SID Display").

**Note**

After selecting a Sub-menu, its indication is shown in the "Angle Display" and the variable value is shown in the "SID Display".

3. Follow the configuration steps described in the Table 8-1. Write down the configurated values in the right column of the Table 8-1.

**Table 8-1**  
**Configuration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CONFIGURED	OPTIONS	PRESET VALUE	STORED VALUE
C01	C1.1	Type of Table. (Fixed Height Table / Elevating Height Table).  STEP 1: Press 5 to select C1.1.  STEP 2: Press 1 or 3 to select "1" Fixed Height Table or "2" Elevating Height Table.  STEP 3: Press 2 to store the value.	1/2	1	
		SID measure unit. (Centimeters / Inches).  Step 1: Press 6 to select C1.2.  Step 2: Press 1 or 3 to select CM or INC.  Step 3: Press 2 to store the value			
		Type of Column. Without Tomography ( <b>MSW</b> ) or with Tomography ( <b>POT</b> ).  Step 1: Press 6 to select C1.3.  Step 2: Press 1 or 3 to select MSW or POT.  Step 3: Press 2 to store the value.	MSW / POT	MSW	
		Height of Fixed Table. <i>C1.4 is only for Fixed Height Table, if it is not needed, skip this point and go to C1.5.</i> (if not done before) Measure from the floor to the Tabletop surface and discount 85 mm of Tabletop-Film distance.  (Enter this data also in C2.1 and C2.2.).  Step 1: Press 6 to select C1.4.  Step 2: Press 1 or 3 to select the value measured.  Step 3: Press 2 to store the value.			
	C1.5	Detent for Elevating Table. <i>C1.5 is only for Elevating Table.</i> This detent will stop the travel of the Elevating Table at the height specified by user and does not require calibration.  Step 1: Press 6 to select C1.5.  Step 2: Press 1 or 3 to adjust the desired value.  Step 3: Press 2 to store the value.	Measured at site	70 cm	
		Press 5 to exit from Sub-menu level C1.5.			

**Table 8-1 (cont.)**  
**Configuration Parameters**

MENU	SUBMENU	PARAMETER TO BE CONFIGURED	OPTIONS	PRESET VALUE	STORED VALUE
<b>Press 6 to select Menu C02</b>					
C02	C2.1	<b>Minimum height of Elevating Table.</b> (if not done before) Position Table at minimum height and measure from floor to Tabletop surface. Discount 85 mm of Tabletop–Film distance.  <b>Step 1:</b> Press 5 to select C2.1. <b>Step 2:</b> Press 1 or 3 to display the value measured. <b>Step 3:</b> Press 2 to store the value.	Measured at site	50 cm	
	C2.2	<b>Maximum height of Elevating Table.</b> (if not done before) Position Table at maximum height and measure from floor to Tabletop surface. Discount 85 mm of Tabletop–Film distance.  <b>Step 1:</b> Press 6 to select C2.2. <b>Step 2:</b> Press 1 or 3 to display the value measured. <b>Step 3:</b> Press 2 to store the value.	Measured at site	90 cm	
<b>Press 5 to exit from Sub-menu level C2.2</b>					
<b>Press 6 to select Menu C03</b>					
C03	C3.1	<b>Minimum height of Tube.</b> (if not done before) Position Tube at minimum height and measure with the Collimator Metric Tape to the floor.  <b>Step 1:</b> Press 5 to select C3.1. <b>Step 2:</b> Press 1 or 3 to display the value measured. <b>Step 3:</b> Press 2 to store the value.	Measured at site	40 cm	
	C3.2	<b>Maximum height of Tube.</b> (if not done before) Position Tube at maximum height and measure with the Collimator Metric Tape to the floor.  <b>Step 1:</b> Press 6 to select C3.2. <b>Step 2:</b> Press 1 or 3 to display the value measured. <b>Step 3:</b> Press 2 to store the value.	Measured at site	200 cm	
<b>Press 5 to exit from Sub-menu level C3.2</b>					

**Table 8-1 (cont.)****Configuration Parameters**

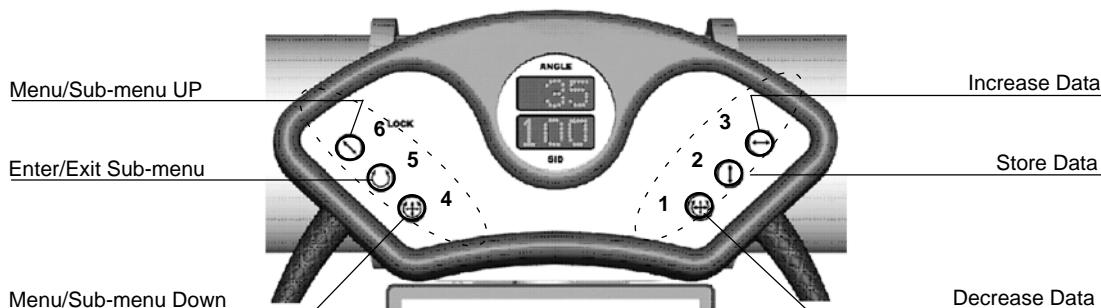
MENU	SUBMENU	PARAMETER TO BE CONFIGURED	OPTIONS	PRESET VALUE	STORED VALUE		
C04	<b>Press 6 to select Menu C04</b>						
	<b>Wall Stand SID reference points.</b>						
	These values are set during installation by Service Engineer depending on the SID distances from the Wall Stand.						
	For Systems without Tomography, the microswitches should be placed at distances specified in site. The distances should correspond to the configuration and calibration points: SW2 for first distance, SW3 for second distance and SW4 for third distance.						
	C4.1 C4.2 C4.3	Step 1: Press 5 to select C4.1.	Wall Stand at right side: 110-150-180	110 (C4.1)			
		Step 2: Press 1 or 3 to select the corresponding data.		150 (C4.2)			
		Step 3: Press 2 to store the value.		180 (C4.3)			
		Step 4: Press 6 to select C4.2, then repeat steps 2 – 3					
		Step 5: Press 6 to select C4.3, then repeat steps 2 – 3					
	<b>Press 5 to exit from Sub-menu level C4.3</b>						
C05	<b>Press 6 to select Menu C05</b>						
	<b>Tube Angle.</b>						
	<i>C05 is factory set.</i>						
	<i>Do not modify values for C5.1, C5.2 and C5.3.</i>						
	<i>Skip this menu and go to C06 by pressing 5.</i>						
	C5.1 C5.2 C5.3	Step 1: Press 5 to select C5.1.	Do not change	-90° (C5.1)			
		Step 2: Press 1 or 3 to select the corresponding data for C5.1 (-90°)		0° (C5.2)			
		Step 3: Press 2 to store the value.		+90° (C5.3)			
		Step 4: Press 5 to select C5.2.					
		Step 5: Press 1 or 3 to select the corresponding data for C5.2 (0°)					
		Step 6: Press 2 to store the value.					
		Step 7: Press 5 to select C5.3.					
		Step 8: Press 1 or 3 to select the corresponding data for C5.3 (+90°)					
		Step 9: Press 2 to store the value.					
	<b>Press 5 to exit from Sub-menu level C5.3</b>						
C06	<b>Press 6 to select Menu C06</b>						
	C6.1	Type of Braking: Negative / Positive (Negative Brakes are used in ships)	NEG POS	NEG			
		Step 1: Press 5 to select C6.1.					
		Step 2: Press 1 or 3 to select NEG or POS.					
		Step 3: Press 2 to store the value.					
	<b>Press 5 to exit from Sub-menu level C6.1</b>						

4. Press simultaneously buttons “1 + 2 + 3” to exit from Configuration Main Menu. “Angle” and “SID” display the normal operation values.
5. To follow with calibration process go directly to Section 8.3.

In case that calibration process is not needed, exit from Service Mode by turning OFF the System.

### 8.3 CALIBRATION OF THE TUBE STAND

Before starting and in order to facilitate the process position the column at one side of the rail. Calibrate and store the corresponding Calibration data according to Table 8-2. The values of the submenus must be entered in the order specified in the table.



1. If the Configuration process have just been set (the System is ON), press simultaneously buttons “1 + 2 + 3” to enter in Calibration Main Menu until “CAL” appears on the “Angle Display”. After releasing these buttons, “P01” appears on the “Angle Display” (and nothing in “SID Display”).

If the System is OFF, press and hold button “1” while turning On the System until “CAL” appears on the “Angle Display”, which means that the Unit is Service Mode. Press simultaneously buttons “1 + 2 + 3” to enter in Calibration Main Menu until “CAL” appears on the “Angle Display”. After releasing these buttons, “P01” appears on the “Angle Display” (and nothing in “SID Display”).

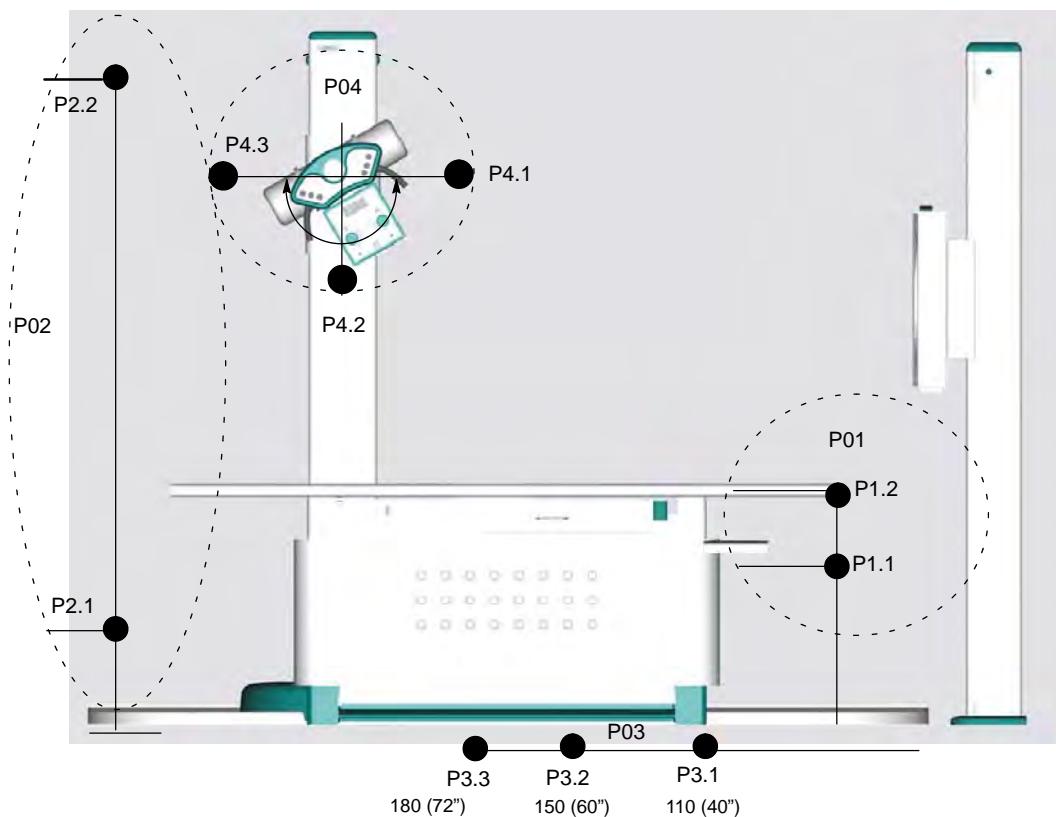
**Note**

After selecting a Sub-menu, its indication is shown in the “Angle Display” and the stored Configuration value is shown in the “SID Display”.

Once a calibration point is memorized, “OK” is shown in the “SID Display” and the potentiometer readout is shown in the “Angle Display” for two seconds. If the readouts are the same in different Calibration points of the same Menu, check the corresponding potentiometer.

2. The following illustration shows the calibration points to be set during the calibration process.

**Illustration 8-1**  
**Calibration Points**



3. Follow the calibration steps described in the Table 8-2 in the order specified. Write down the potentiometer readouts in the right column of the Table 8-2.

**Table 8-2**  
**Calibration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE		
P01	P1.1	<b>Minimum height of Table.</b> <i>P1.1 is only for Elevating Table, if it is not needed, skip this point and go to P2.1.</i> <b>STEP 1:</b> Press 5 to select P1.1. P1.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press the Table down pedal and position the Table at the minimum height (value configured in C2.1) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	50 cm			
	P1.2	<b>Maximum height of Table.</b> <i>P1.2 is only for Elevating Table, if it is not needed, skip this point and go to P2.1.</i> <b>STEP 1:</b> Press 6 to select P1.2. P1.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press the Table up pedal and position the Table at the maximum height (value configured in C2.2) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	90 cm			
<b>Press 5 to exit from Sub-menu level P1.2</b>						
P02	<b>Press 6 to select Menu P02</b>					
	P2.1	<b>Minimum height of Tube.</b> <b>STEP 1:</b> Press 5 to select P2.1. P2.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press 1 and with the Tube at 0°, position the Tube at the minimum height (value configured in C3.1) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	40 cm			
	P2.2	<b>Maximum height of Tube.</b> <b>STEP 1:</b> Press 6 to select P2.2. P2.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press 1 and with the Tube at 0°, position the Tube at the maximum height (value configured in C3.2) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	197 cm			
<b>Press 5 to exit from Sub-menu level P2.2</b>						

**Table 8-2 (cont.)**  
**Calibration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE	
<b>Press 6 to select Menu P03</b>					
		<b>Wall Stand SID reference Points.</b>			
		<p>These values are set during installation by Service Engineer depending on the SID distances from the Wall Stand. For Systems without Tomography, the microswitches should be placed at distances specified in site. The distances should correspond to the configuration and calibration points: SW2 for first distance, SW3 for second distance and SW4 for third distance.</p> <p>Turn the Tube respect to the Wall Stand; position the Column at configured distances from the Wall Stand. Measure SID with the Collimator Metric Tape (keep in mind the Tabletop-Receptor distance). Once these points have been calibrated, the Column will stop the motion when arriving to each point. Standard distances have been factory set but they can be modified.</p>			
<b>P03</b>	<b>P3.1</b>	<b>STEP 1:</b> Press 5 to select P3.1. P3.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".	<b>Wall Stand at right side: 110 cm</b>		
		<b>STEP 2:</b> With the Tube facing the Wall Stand, press 1 and position the Tube at the required SID to set the first point (value configured in C4.1)			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".			
	<b>P3.2</b>	<b>STEP 1:</b> Press 6 to select P3.2. P3.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".	<b>150 cm</b>		
		<b>STEP 2:</b> With the Tube facing the Wall Stand, press 1 and position the Tube at the required SID to set the second point (value configured in C4.2)			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".			
	<b>P3.3</b>	<b>STEP 1:</b> Press 6 to select P3.3. P3.3 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".	<b>Wall Stand at right side: 180 cm</b>	<b>Wall Stand at left side: 110 cm</b>	
		<b>STEP 2:</b> With the Tube facing the Wall Stand, press 1 and position the Tube at the required SID to set the third point (value configured in C4.3)			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".			
<b>Press 5 to exit from Sub-menu level P3.3</b>					

**Table 8-2 (cont.)****Calibration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE	
P04	<b>Press 6 to select Menu P04</b>				
	<b>Tube Angle reference Points.</b>				
	These values are factory set. Recalibrate only in case of detecting wrong reading in the Tube Angle.				
	P4.1	<b>STEP 1:</b> Press 5 to select P4.1. P4.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".		-90°	
		<b>STEP 2:</b> Press 1 and turn the Tube -90° Counterclockwise. Use the mechanical detent and check with a level to obtain the correct calibration point (value configured in C5.1).			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".			
	P4.2	<b>STEP 1:</b> Press 6 to select P4.2. P4.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".		0°	
		<b>STEP 2:</b> Press 1 and turn the Tube to 0° (pointing the Table). Use the mechanical detent and check with a level to obtain the correct calibration point (value configured in C5.2).			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".			
	P4.3	<b>STEP 1:</b> Press 6 to select P4.3. P4.3 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".		+90°	
		<b>STEP 2:</b> Press 1 and turn the Tube +90° Clockwise. Use the mechanical detent and check with a level to obtain the correct calibration point (value configured in C5.3).			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".			
<b>Press 5 to exit from Sub-menu level P4.3</b>					

4. Press simultaneously buttons "1 + 2 + 3" to exit from Calibration Main Menu. "Angle" and "SID" display the normal operation values.
5. Exit from Service Mode by turning OFF the System.

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## SECTION 9 TROUBLESHOOTING



**REPLACEMENT AND ADJUSTING ACTIVITIES REQUIRE  
PROTECTIVE EQUIPMENT.**

### 9.1 ERROR CODES

Error codes indicate the potential cause of a system failure. They appear on the Control Panel Display at Column and will enable the service personnel to identify and fix the problem.

**Table 2-1**  
**Control Panel Error Codes**

WARNING	DESCRIPTION	SUGGESTION
"E06"	"Exposure" or/and "Preparation" orders are activated during power-up.	Turn the generator OFF, check the proper external Handswitch cable connections and then turn the generator ON. If the error remains disconnect the signal "Prep" at generator, a) if error disappears check Handswitch cable and "prep" signal in generator, b) if error remains, replace PCB A3507-01
"E10"	Failure in memory Integrated Circuit.	Check distance between potentiometer read-outs, they must be 20% away one from each other. Calibrate again the corresponding menu and check potentiometer connection and potentiometer status.
"rAN Err"	Failure in memory Integrated Circuit.	Turn the System OFF / ON. If the error remains, initialize the EEPROM and calibrate again. If the error remains, replace the PCB A3507-01.

## 9.2 ELEVATING TABLE SWITCH LOCATIONS

SWITCH	LOCATION	FUNCTION
SW1	BEHIND LEFT TABLE TOP RELEASE PEDAL.	TABLE TOP LOCK RELEASE
SW2	BEHIND LEFT TABLE TOP RELEASE PEDAL	COLLIMATOR LAMP ENABLE
SW3	BEHIND TABLE DOWN PEDAL	TABLE DOWN
SW4	BEHIND TABLE UP PEDAL	TABLE UP
SW5	BEHIND RIGHT TABLE TOP RELEASE PEDAL	TABLE TOP LOCK RELEASE
SW6	BEHIND RIGHT TABLE TOP RELEASE PEDAL	COLLIMATOR LAMP ENABLE
SW7	LOWER LEFT FRONT OF TABLE BASE	DOWN LIMIT
SW8	LOWER LEFT FRONT OF TABLE BASE	DOWN SAFETY-INVERTER POWER SHUTOFF
SW9	LEFT SIDE BASE-NEAR GEAR RACK	UP LIMIT
SW10	LEFT SIDE BASE-NEAR GEAR RACK	UP SAFETY - INVERTER POWER SHUTOFF
SW11	RT FRONT TOP BEARING	"A" LIMIT DOWN COLLISION
SW12	LT FRONT TOP BEARING	"B" LIMIT DOWN COLLISION
SW13	LT REAR TOP BEARING	"C" LIMIT DOWN COLLISION
SW14	RT REAR TOP BEARING	"D" LIMIT DOWN COLLISION
SW15	HANDLE OF BUCKY	BUCKY LOCK RELEASE
SW16	EMERGENCY SW HOUSING	LOCKS INTERLOCK-REMOVE TOP LOCK POWER
SW17	TOP LEFT REAR	TABLE TOP CENTERED

## 9.3 INITIALIZING EEPROM MEMORY IN THE COLUMN CONTROL PANEL

The EEPROM memory that contains the Column Configuration and Calibration Data can be initialized due to a Data corruption.

Re-start the system and press lower right button (to enter in Service Mode).

As soon as "CAL" appears on display, press and hold at the same time Upper and Lower buttons at both sides of the Control panel. The message "INI EEPR" confirms the EEPROM initialization. Release all buttons, now the EEPROM has been initialized. this way the preconfigured data are loaded but they are not valid for real operation.

Once an EEPROM initialization is performed it is necessary to carry out the Column Configuration and Calibration processes.

## SECTION 10      JOB CARDS FOR ADJUSTMENT/ REPLACEMENT PROCEDURES

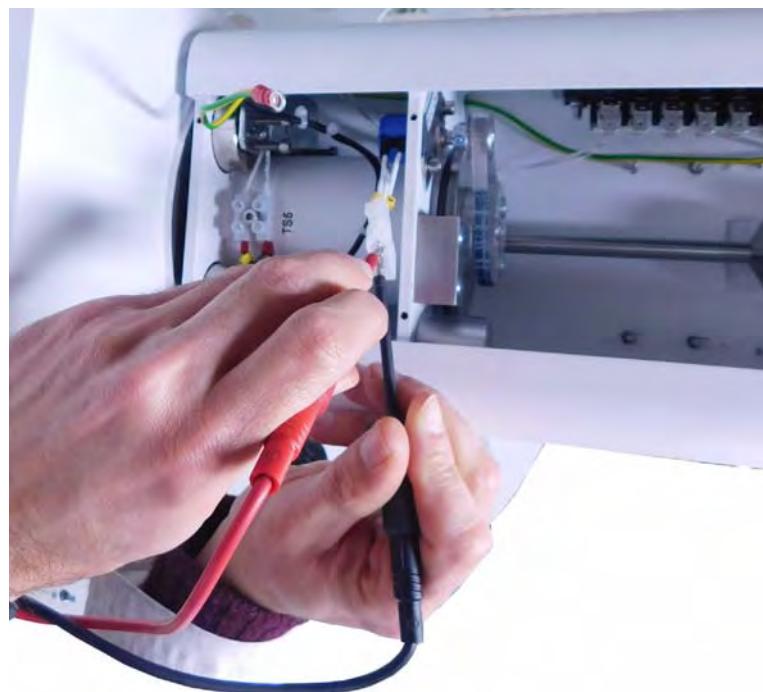


**REPLACEMENT ACTIVITIES REQUIRE PROTECTIVE EQUIPMENT.**

<b>JOB CARD LIST</b>	
<b>JOB CARD</b>	<b>DESCRIPTION</b>
<b>ADJUSTMENTS</b>	
1.1	ADJUSTMENT / REPLACEMENT OF THE TUBE-COLLIMATOR ARM POTENTIOMETER
1.2	ADJUSTMENT / REPLACEMENT OF THE COLUMN TOP POTENTIOMETER
1.3	ADJUSTMENT / REPLACEMENT OF THE ELEVATING TABLE POTENTIOMETER
1.4	ADJUSTMENT / REPLACEMENT OF THE TUBE STAND COLUMN BRAKES
<b>REPLACEMENT</b>	
2.1	REPLACEMENT OF THE X-RAY TUBE OR COLLIMATOR
2.2	REPLACEMENT OF THE COLUMN CONTROL PCB A3507-01
2.3	REPLACEMENT OF THE COLUMN STEEL CABLES - TUBE STAND
2.4	REPLACEMENT OF THE TUBE ARM BRAKES
2.5	ADDING OR REMOVING COUNTERWEIGHT PLATES IN COLUMN
2.6	REPLACEMENT OF THE MOTOR INVERTER
2.7	RESTORING VERTICAL MOVEMENT FOR THE RAD ELEVATING TABLE DUE TO "DOWN SAFETY" (SW8) MICROSWITCH ACTIVATION
2.8	REPLACEMENT OF THE ELEVATING TABLE-TOP
2.9	REPLACEMENT OF THE TABLE-TOP IN A SMALL ROOM
2.10	DISASSEMBLY OF COVERS WITH ELEVATING TABLE DOWN
2.11	REPLACEMENT OF THE ELEVATING TABLE MOTOR
2.12	REPLACEMENT OF THE OPTIMA MILLENNIUM PCB A3127-02
2.13	REPLACEMENT OF THE TABLE ION CHAMBER
2.14	REPLACEMENT OF THE TABLE-TOP BRAKES
2.15	REPLACEMENT OF THE MYLAR SHEET
2.16	GAINING ACCESS TO THE TABLE RECEPTOR ASSEMBLY
2.17	REPLACEMENT OF THE TABLE DETECTOR TRAY
2.18	REPLACEMENT OF THE COLUMN STEEL CABLES - WALL STAND
2.19	REPLACEMENT OF THE WALL STAND ION CHAMBER
2.20	GAINING ACCESS TO THE WALL STAND RECEPTOR ASSEMBLY
2.21	REPLACEMENT OF THE WALL STAND DETECTOR TRAY

**JOB CARD 1.1 :      ADJUSTMENT / REPLACEMENT OF THE  
TUBE-COLLIMATOR ARM POTENTIOMETER****SUBASSEMBLY :**      **Tube Stand Arm****TOOLS :**      Standard Tool kit.**PERSONNEL :**      1 Service Engineer**PROCEDURE**

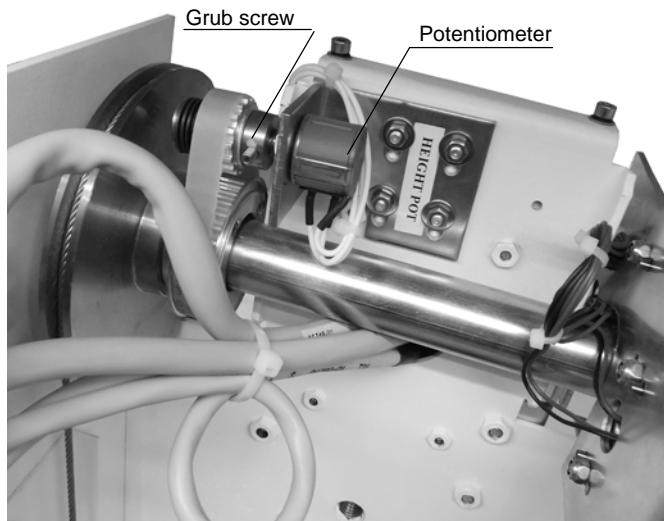
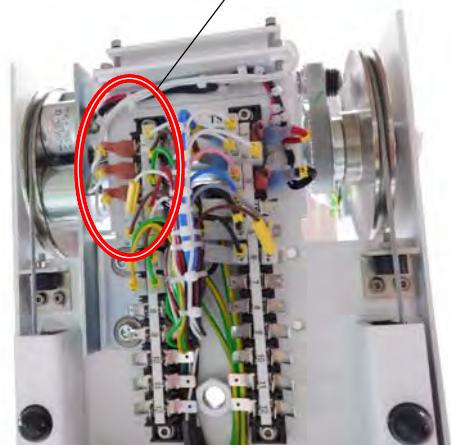
1. Turn the System off.
2. Take out the Upper Cover of the Arm.
3. Turn On the System and position Tube Collimator Assembly at exact center of the Arm rotation ( $0^\circ$ ).
4. Measure between pins 2 to 3 in the connector with a voltmeter or equivalent. The readout should be 2.5V.



5. If the Potentiometer needs an adjustment, release the Grub screws, release the Pot nut and adjust at 2.5V.
6. If the Potentiometer needs replacement, release the Grub screws, release the Pot nut, unsolder the Pot from the cables and replace. Proceed in reverse order.
7. Turn the System Off and Assemble the Cover.

**JOB CARD 1.2 : ADJUSTMENT / REPLACEMENT OF THE COLUMN TOP POTENTIOMETER****SUBASSEMBLY :** Tube Stand Column**TOOLS :** Standard Tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Turn the System off.
2. Take out the Upper Cover of the Column.
3. Turn On the System and position Tube Collimator Assembly at exact center of the vertical travel.
4. Measure between TS2 and TS3 in the Terminal Strip with a voltmeter or equivalent. The readout should be 2.5V.

Measure between TS2 and TS3

5. If the Potentiometer needs an adjustment, release the Grub screws, release the Pot nut and adjust at 2.5V.
6. If the Potentiometer needs replacement, release the Grub screws, release the Pot nut, remove the faston connector at TS and replace. Proceed in reverse order.
7. Turn the System Off and Assemble the Cover.

**JOB CARD 1.3 :      ADJUSTMENT / REPLACEMENT OF THE ELEVATING  
TABLE POTENTIOMETER****SUBASSEMBLY :**      Table Base**TOOLS :**      Standard Tool kit.**PERSONNEL :**      1 Service Engineer**PROCEDURE**

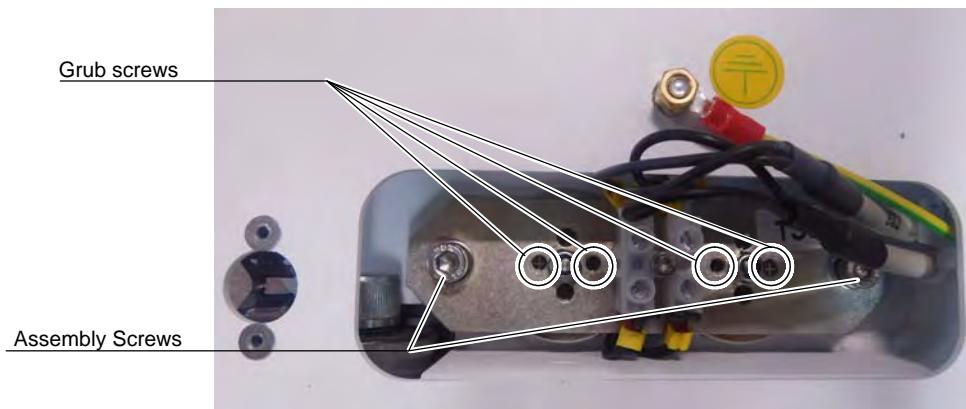
1. Take out Elevating Table covers (*refer to Section 5.3*).
2. Turn the System off.
3. Turn On the System.
4. Position Table at exact center of the travel.
5. Measure between pins 2 to 3 in the connector with a voltmeter or equivalent. The readout should be 2.5V.



6. If the Potentiometer needs an adjustment, release the Grub screws, release the Pot nut and adjust at 2.5V.
7. If the Potentiometer needs replacement, release the Grub screws, release the Pot nut, unsolder the Pot from the cables and replace. Proceed in reverse order.
8. Turn the System Off and Assemble the Covers.

**JOB CARD 1.4 : ADJUSTMENT / REPLACEMENT OF THE TUBE STAND COLUMN BRAKES****SUBASSEMBLY :** Column Base**TOOLS :** Standard Tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Turn the System off.
2. Take out the Brake plate cover.
3. For adjustment of the Column Base Brake use the Grub Screws located at both sides of the brakes until the braking action is smooth and with no bumps.

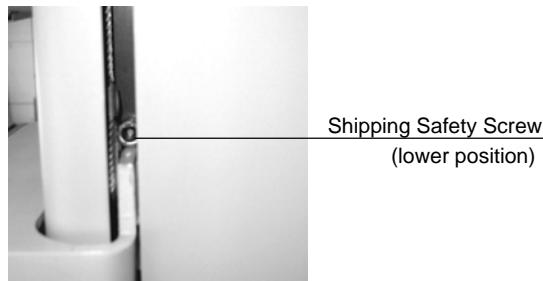


4. For Brake replacement, remove both fixing screws of the assembly, disconnect the Brake Cables, and replace the Assembly.
5. Adjust the Assembly with the Grub Screws.
6. Reinstall the Brake plate cover.

**JOB CARD 2.1 : REPLACEMENT OF THE X-RAY TUBE OR COLLIMATOR****SUBASSEMBLY :** Tube-Collimator Assembly**TOOLS :** Standard Tool kit.**PERSONNEL :** 2 Service Engineers**PROCEDURE****Note** 

*This section only applies to systems where the X-ray Tube or the Collimator have to be replaced by a new X-ray Tube or Collimator different to the one already installed (different weight).*

1. Lower the Tube-Collimator Assembly to its minimum height and install the security screws at both Carriage Rails of the Column. This way the Counterweights will be at the top position.



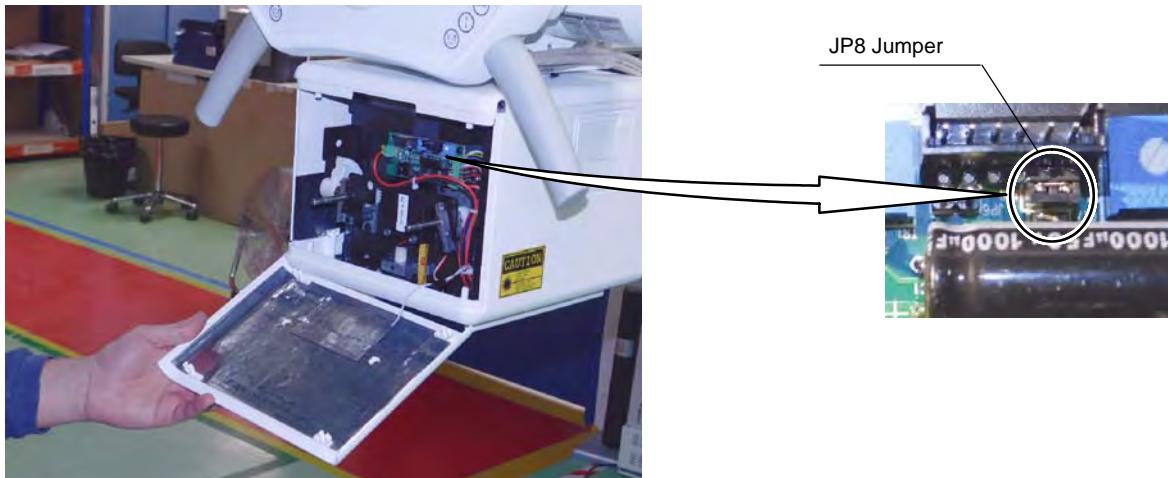
2. Turn the System off.



***When working around suspended mass (ex. Wall stand, collimator, etc.), extreme caution is to be taken prior to performing work.***

3. Disconnect High Voltage Cables, stator cables and Collimator Cables.

4. Unscrew the four Centering Adjustment and Security Screws of the Collimator using the same number of turns.
5. Carefully remove the Collimator. Do not forget to use the same spacers when installing the new Collimator (if applicable). Refer to Installation Section.
6. Remove the Collimator Adaptation Ring from the Collimator Support.
7. Remove the old X-Ray Tube (only if the X-Ray Tube is to be replaced)
8. Place the new X-Ray Tube on the Tube Support (only if the X-Ray Tube is to be replaced).
9. Install the Collimator as described in the Installation Section of this manual Step 26.
10. Insert a Jumper in JP8 of the new Collimator Timer PCB, for that, remove both control knobs, open collimator front cover and insert the Jumper in JP8 as it was in the removed collimator.



11. Level the Tube-Collimator Assembly on the Tube and Collimator base. Adjust the horizontal level by using the two rods on the backside of the Coupling Plate (Arm).
12. Reconnect the HV Cables, Stator cables and Collimator cables attached to the Tube Collimator Assembly.

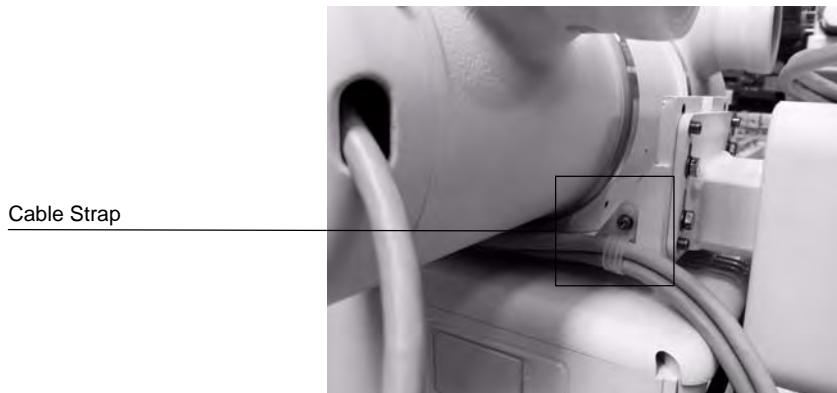
**Note** 

*Refer to the Generator Service Manual for further information on X-Ray Tube Configuration and Calibration.*

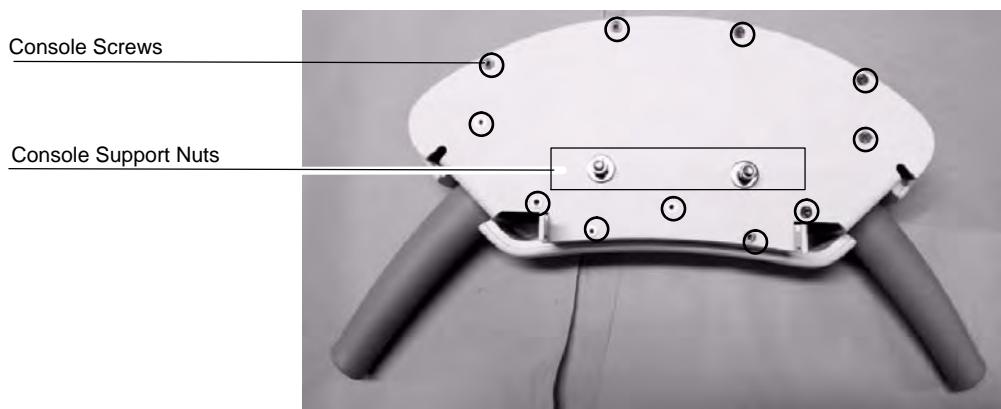
13. Remove the security screws from both Carriage Rails of the Column.
14. Check balance of the unit and if necessary, add or remove counterweight plates inside the Column in order to counterbalance the Column with the Tube-Collimator Assembly.
15. Perform Tube calibrations.

**JOB CARD 2.2 : REPLACEMENT OF THE COLUMN CONTROL PCB  
A3507-01****SUBASSEMBLY :** Tube Stand Column**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Turn the System off.
2. Remove the cable straps at both sides of the X-ray Tube to allow bending the Console.

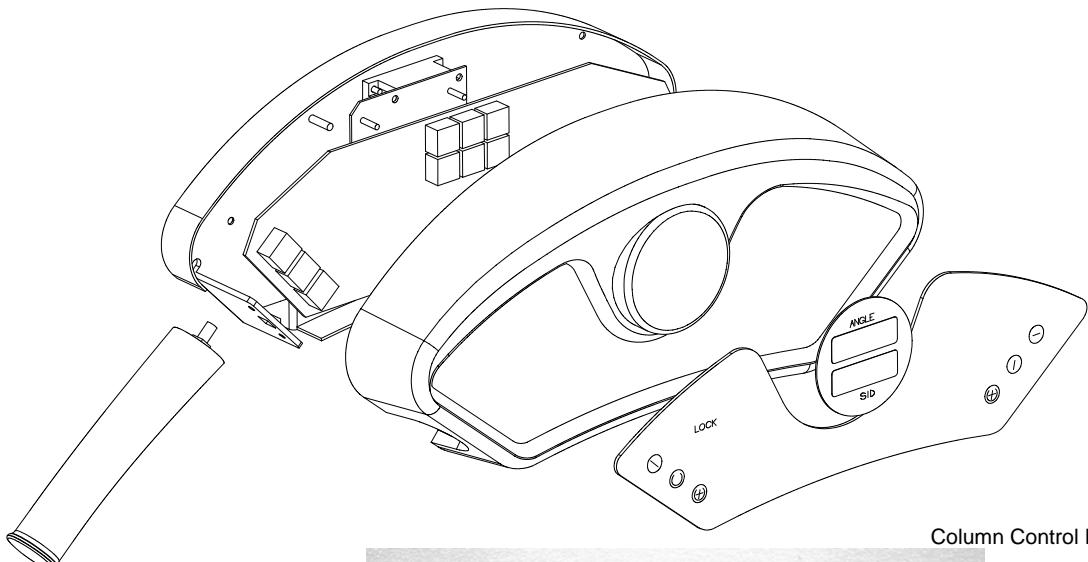


3. Loosen the Console nuts at back and raise the Console.
4. Unscrew all the cover screws and open the assembly.

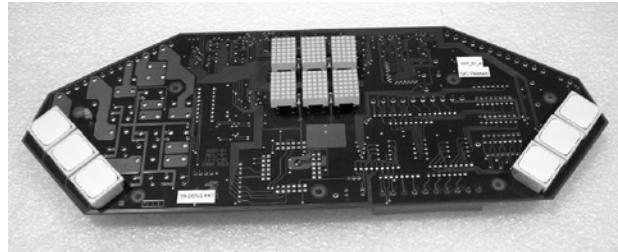


5. Disconnect the PCB connectors.
6. Unscrew the PCB Supports.
7. Replace the PCB.

8. Connect cable connectors.



Column Control PCB (A3507-01)



9. Reinstall the console cover.
10. Install the console in the support and tighten the Nuts.
11. Turn the System ON.
12. Perform a functional check.

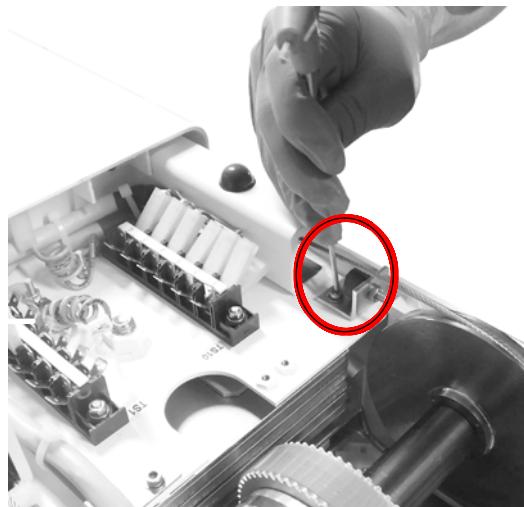
**JOB CARD 2.3 : REPLACEMENT OF THE COLUMN STEEL CABLES  
- TUBE STAND****SUBASSEMBLY :** **Tube Stand Column****TOOLS :**  
Standard tool kit.  
Counterweight Safety Bar  
Shipping safety screws  
2 Service Engineers**PROCEDURE**

1. Remove the Tube Collimator Assembly, as explained in the JOB CARD 2.1.



2. Slide the Column to the end where the top has just been removed and carefully disengage the Column from the rail.
3. Remove the cap cover and the upper front cover of the Column.
4. Place the Column body on the floore, place the Wooden Block below.
5. Remove the Front Cover of the Column.
6. Remove the Shipping Safety Screws and the Counterweight Safety Bar.

7. Remove the Carriage stop plates to allow the carriage go to the end and access to the steel cable retainer

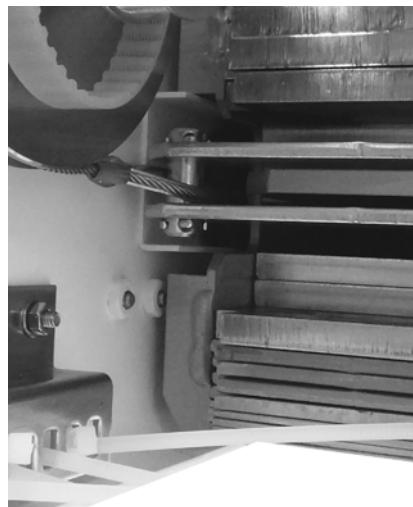


8. Push the Arm Carriage to the top of the Column.
9. Remove Steel Cable Retainer Screw.



10. Access the other end of the steel cable from the top back of the column.

11. Dismount the Steel Cable end from the shaft by opening the clips.



12. Replace the Steel Cable and proceed in reverse order.



***Make sure that the steel cables are properly routed around the pulleys before standing the Column up.***

**JOB CARD 2.4 : REPLACEMENT OF THE TUBE ARM BRAKES****SUBASSEMBLY :** Tube Stand Arm**TOOLS :** Standard tool kit.**PERSONNEL :** 2 Service Engineer**PROCEDURE***Two people are needed for the following task.*

1. Place the Tube-Collimator Pointing the Table.
2. Lower the Elevating table to the minimum height.
3. Lower the Arm at mid height and install the Column locking screws at both sides of the column.



4. Extend the Tube-Collimator telescope to its maximum position.
5. Carefully raise the table until the Collimator rests on it.
6. Turn the System off.
7. Remove the six (6) allen screws of the upper cover of the Arm and raise the cover .



8. Remove the potentiometer belt.

9. Remove 3 screws that fix the Gear wheel to the support and remove it.

3 Screws at Gear wheel



10. Turn the System ON.

11. While one person presses the Arm Rotation Button, the other carefully slides a maximum of 10 cm (3.9") out the arm until the back screws of the brakes can be unscrewed.



***Do not pull the arm away the arm more than 10 cm (3.9") so it does not fall off the shaft.***

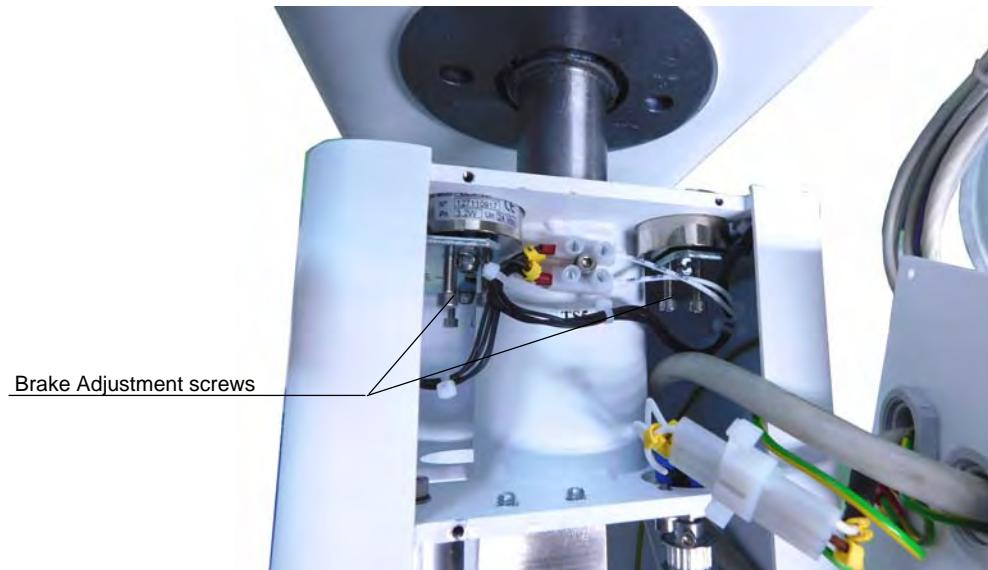


Back screw of brake



12. Turn the System off.

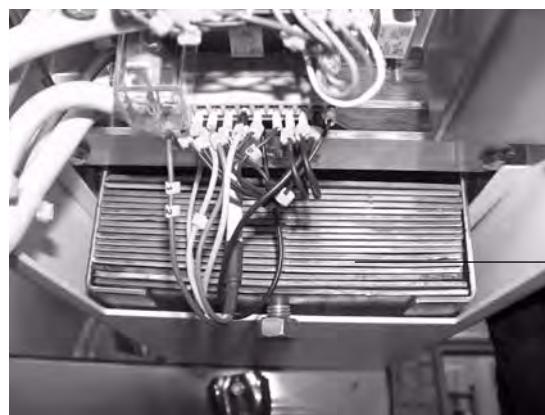
13. Disassembly, disconnect and replace the brakes.



14. Turn the System ON.
15. Test the Brakes and adjust the brake screws to avoid misalignment or strong bumps when activating the brake.
16. Reinstall in reverse order.

**JOB CARD 2.5 : ADDING OR REMOVING COUNTERWEIGHT PLATES IN COLUMN****SUBASSEMBLY :** Column ASSEMBLY**TOOLS :** Standard Service Tool Kit**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Lower the Tube-Collimator Assembly to its minimum height and install the security screws at both Carriage Rails of the Column. This way the Counterweights will be at the top position.
2. Turn the System off.
3. Remove the upper cover of the column.
4. Add or remove counterweight plates as required.



UPPER VIEW

COUNTERWEIGHT PLATES.

5. After replacement, perform a check of the X-ray alignment, refer to Section NO TAG "Adjustments".

**JOB CARD 2.6 :      REPLACEMENT OF THE MOTOR INVERTER**
**SUBASSEMBLY :**      **Table Base**
**TOOLS :**      Standard Tool set

**PERSONNEL :**      1 Service Engineer
**PROCEDURE****Note** 

*This section only applies to Elevating Tables where the Motor Inverter has to be replaced by a new one.*

1. Remove Telescopic Covers. (Refer to Installation of Elevating Table).
2. Turn the System off.
3. Disconnect the cables attached to the old inverter.
4. Remove the old inverter from the table base.
5. Remove the Protective Filter to avoid overpassing the allowed leakage current (IEC60601-1), for that, break the plastic cover of the filter with a flat screwdriver and remove the filter.



6. Install the new inverter, the base plate is to be attached to the Table base using the holes of the former inverter.
7. Connect the cables to the new Inverter as follows:
  - I1 -7 to L1 // I2 -7 to L3 // I3 -7 to +24V// I4 -7 to S1 // I5 -7 to S2
  - U, V, W from motor to T1, T2, T3 respectively.



8. Turn the Table On.
9. Configure the Inverter as indicated in Table 1-1 (*refer also to the Inverter Manual*):



Type	Item	Function
Digital display & Leds	Main Digital Displays	Frequency Display, Parameter, voltage, Current, Temperature, Fault messages.
	LED Status	Hz/RPM: ON when the frequency or line speed is displayed. OFF when the parameters are displayed. FWD: ON while the inverter is running forward. Flashes while stopped. REV: ON while the inverter is running reverse. Flashes while stopped. FUN: ON when the parameters are displayed. OFF when the frequency is displayed.
Variable Resistor	FREQ SET	Used to Set the frequency.
Keys On Keypad	RUN	RUN: Run at the set frequency.
	STOP/RESET (Dual function keys)	STOP: Decelerate or Coast to Stop. RESET: Use to Reset alarms or resettable faults.
	Arrow UP	Increment parameter number and preset values.
	Arrow Down	Decrement parameter number and preset values.
	MODE	Switch between available displays.
	</ENTER (Dual function keys, a short press for left shift function, a long press for ENTER function)	“<” Left Shift: Used while changing the parameters or parameter values ENTER: Used to display the preset value of parameters and for saving the changed parameter values.

**Table 1-1**  
**Configuration Settings for the Elevating Table**

**Note** 

*Configure only the values indicated in the below table.*

	Description	value	Comments
00-02	Main Run Source Selection	1	Ext Run/Stop Control
00-03	Alternative Run Source	1	Ext Run/Stop Control
00-04	Ext. term. operation mode	0	Fw/Stop-Rev/Stop
00-12	Freq. Upper limit	60	
00-13	Freq. Lower Limit	0	
01-00	V/Hz Pattern	5	60Hz, high start torque
01-10	Torque Boost	10	10% enhancement
02-01	Motor Rated Current	0.78	Amperes
02-03	Motor Rated Speed (Rpm)	1650	
03-00	Multifunct Input Term.S1	0	Forward/Stop Command
03-01	Multifunct Input Term.S2	1	Reverse/Stop Command
07-02	Number of Auto Restart Attempts	0	No attempts
07-04	Direct Running After Power On	0	Enable
07-06	DC Injection Brake Start Freq.	1.5	Hertz
07-07	DC Injection Brake Level (%)	10	
07-08	DC Injection Brake Time	0.1	Seconds
07-09	Stop method	0	Decc to stop
11-01	Carrier Frequency (KHz)	16	

10. Perform functional check of table.

**JOB CARD 2.7 : RESTORING VERTICAL MOVEMENT FOR THE ELEVATING TABLE DUE TO "DOWN SAFETY" (SW8) MICROSWITCH ACTIVATION****SUBASSEMBLY :** Table Base**TOOLS :** Standard Tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

The object of this troubleshooting is to deactivate (close) the "Down Safety" (SW8) Microswitch allowing the Table to be raised.

1. Turn the System off and remove the Table-top.
2. While holding the Frame Stop with a hand, carefully remove the two screws and then the Frame Stop under the Table-Top Frame.



*Keep the Frame Stop from falling to prevent any damage inside the table.*

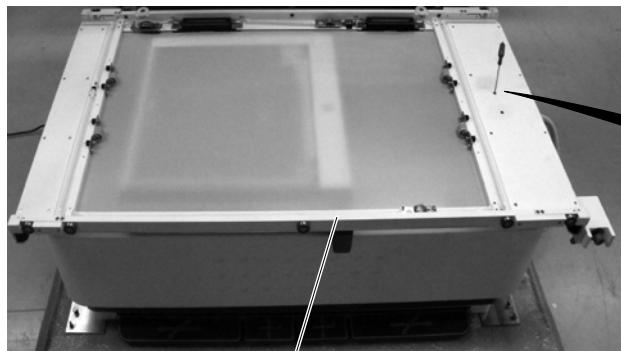
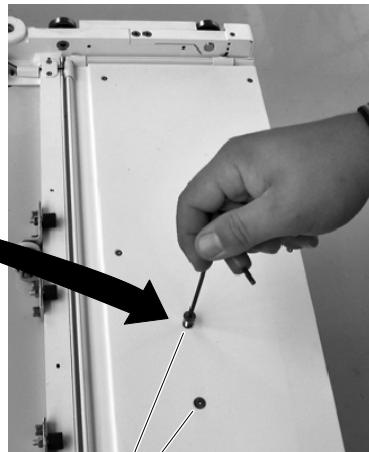


TABLE-TOP FRAME



FRAME STOP SCREWS



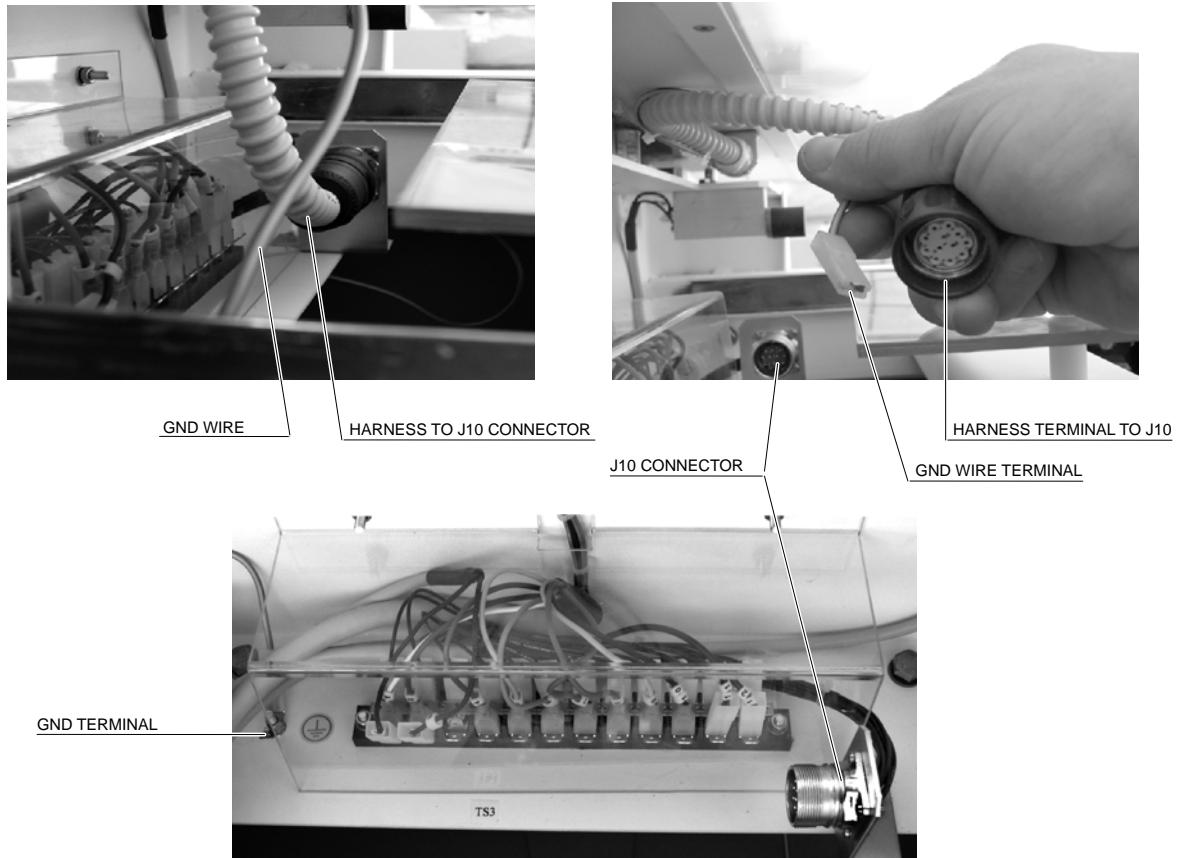
FRAME STOP





***There can be mains voltage in this connector.***

3. Disconnect the GND wire of the Table-Top (faston terminal). Disconnect the Harness plugged into J10 Connector (unscrew the round terminal and pull it).

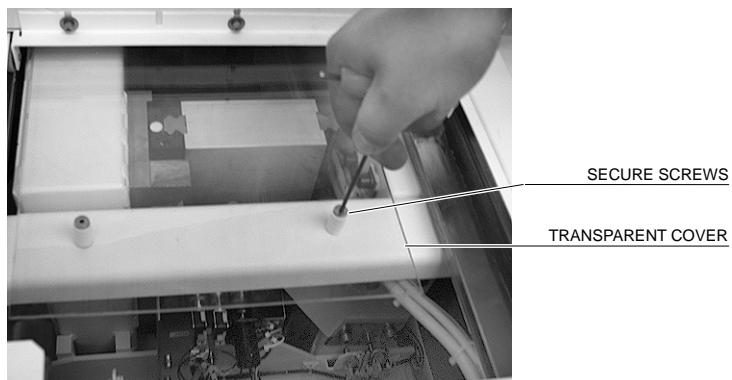


4. Carefully take out the Table-Top Frame from the Table Base by sliding it towards the back side of the Table. Take care not to snare the disconnected GND wire or Harness in the Table Base, or to scratch the Bucky Carriage.

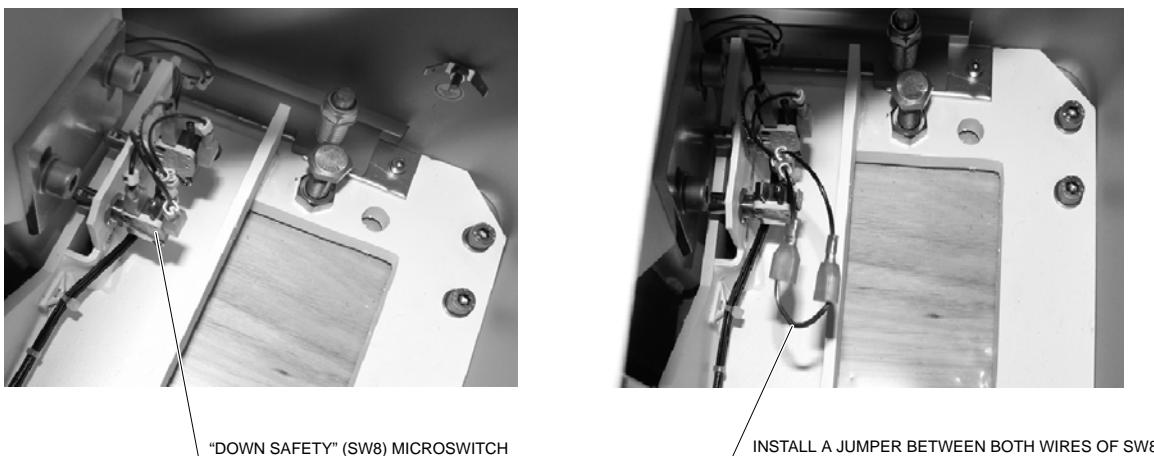


***Two people are required to take out the Table-Top Frame.***

5. Remove the four screws which secure the Transparent Cover under the Table-Top Frame. Move the cover towards the right side to facilitate the access to the "Down Safety" (SW8) Microswitch.



6. Remove both wires from the terminals of the "Down Safety" (SW8) Microswitch and Install a jumper between both wires.



7. Re-install the Transparent Cover.



***There can be mains voltage in this connector.***

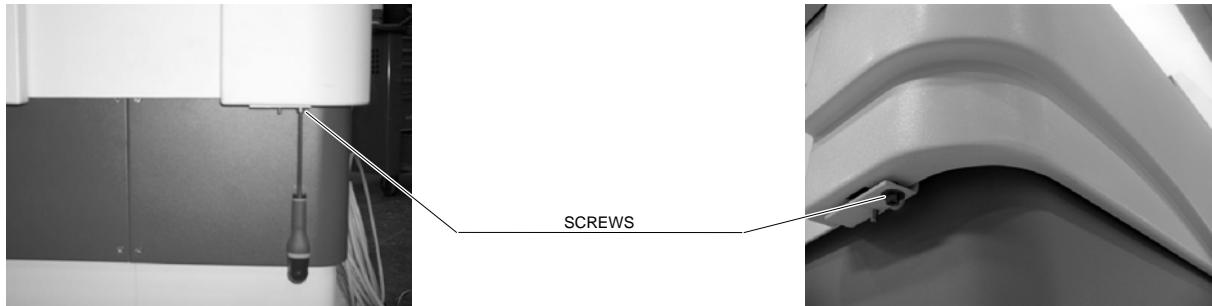
8. Carefully slide the Table-Top Frame onto the Table Base from the backside of the Table. Connect the GND wire and Harness to J10 of the Table Base.
9. Assemble the Frame Stop under the Table-Top Frame.

10. Check that the Table Circuit Breaker located at the back of the Table is OFF, connect the Power Supply cable from the Table (factory connected to TS1) to the Room Electrical Cabinet.

**Note** 

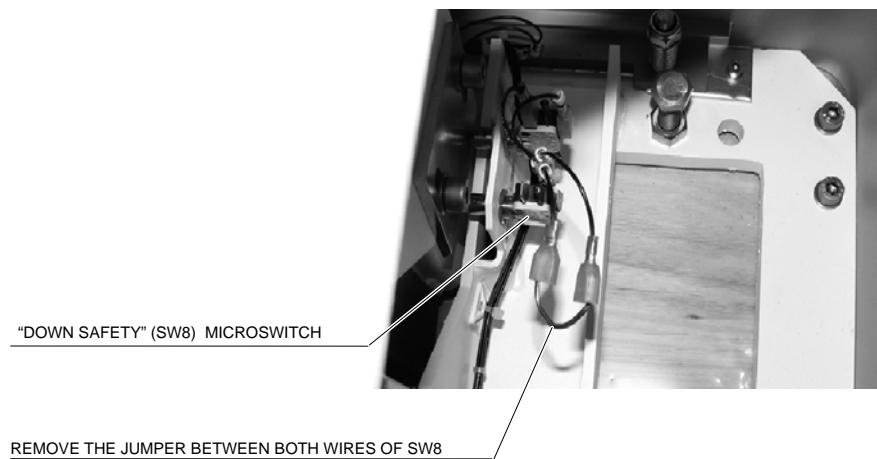
*The Table Transformer is factory configured according to the Mains voltage specified in the customer order.*

11. Turn ON the Circuit Breaker located at the backside of the Table and turn ON the Red Emergency Switch located at the front of the Table.
12. Raise the Table to the top stepping on the "Up" Pedal.
13. Remove the Upper Front Cover from the Table Base by removing the two screws located at the right and left sides of the lower side of the cover. Then raise the Upper Front Cover with both hands and remove it from the Table. Disconnect the ground cable (GND) if applicable.

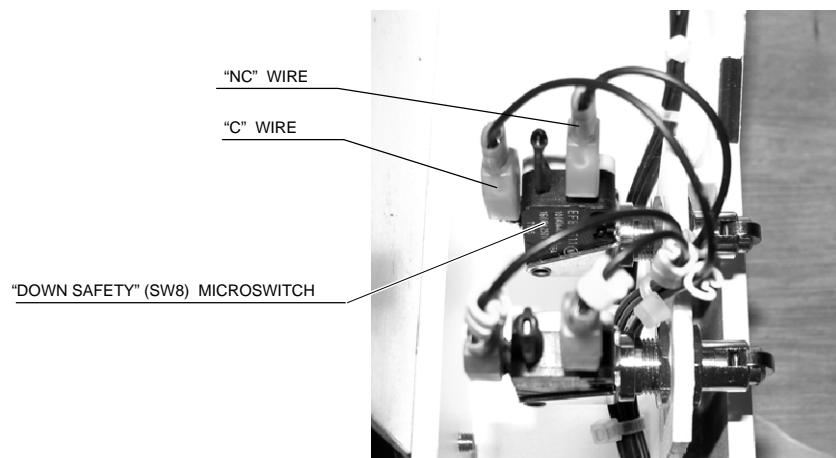


14. Raise the Table to the top by stepping on the "Up" Pedal.
15. Lower the Table to a comfortable position (by stepping on the "Down" Pedal) which thus allows access to the "Down Safety" (SW8) Microswitch.
16. Turn OFF the Red Emergency Switch located at the front of the Table and turn OFF the Circuit Breaker located at the back of the Table.

17. Remove the Jumper that short-circuited both wires of the "Down Safety" (SW8) Microswitch.



18. Connect both wires in the respective terminals of the "Down Safety" (SW8) Microswitch.



19. Reinstall the Upper Front Cover and the Table-top.

**JOB CARD 2.8 : REPLACEMENT OF THE ELEVATING TABLE-TOP****SUBASSEMBLY :** Table Carriage**TOOLS :** Standard Tool set**PERSONNEL :** 2 Service Engineers**PROCEDURE****Note** *At least two people are required for this operation.*

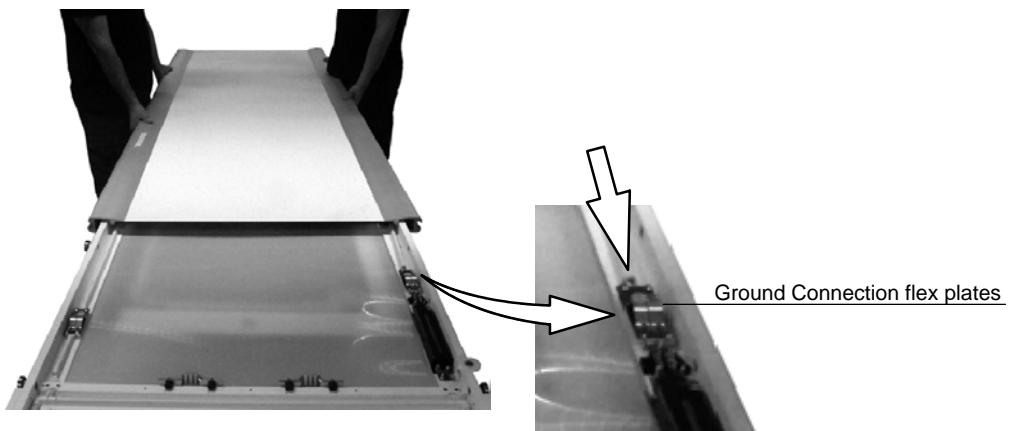
1. Remove the Stop bar under the old Table-Top.



2. With Table power ON, press and hold one of the Table-Top brake pedals to allow motion and slide the old Table-Top out.
3. Remove the Stop bar under the new Table-Top.

**Note** *Table-top should only be installed in direction that aligns with ground connection flex plates. If the ground connection flex plates are in the wrong direction for insertion, insert the Table-Top from the other side.*

4. With Table power ON, keep pressed one of the Table-Top brake pedals to allow motion and install the Table-Top inserting the Bearings inside their Rails.



5. Re-install the Stop-Bar under the Table-Top.



### JOB CARD 2.9 : REPLACEMENT OF THE TABLE-TOP IN A SMALL ROOM

**SUBASSEMBLY :** **Table Carriage**

**TOOLS :** Standard Service Tool kit

**PERSONNEL :** 2 Service Engineers

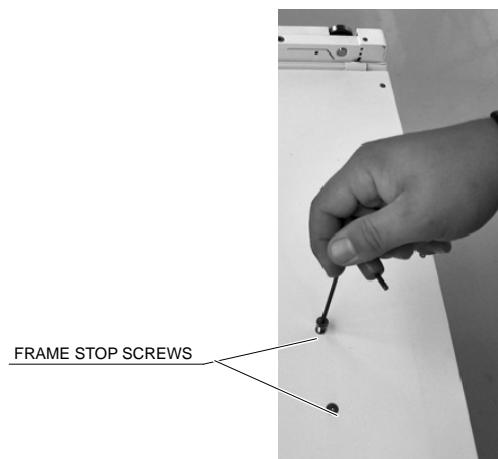
#### PROCEDURE

**Note**

*At least two people are required for this operation.*

Some rooms may not allow to replace the Table-Top inside the Rad Room due to the room length needed. The Small Room Table-Top installation consists of removing the Table-Top frame, remove the old Table-top and install the new Table-Top in the frame outside the Rad Room and then install the assembly (Table-Top with frame) on the Table base (without the need of sliding the Table-Top over the frame inside the room).

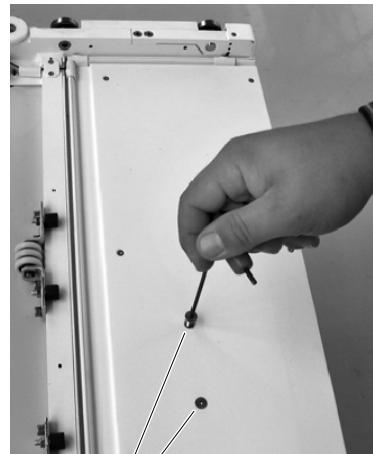
1. Turn the System off.
2. Push the Table-top to gain access to the Frame Stop screws.



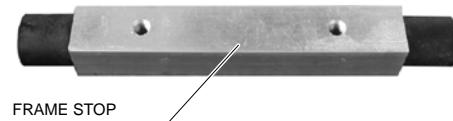
3. While holding the Frame Stop with a hand, carefully remove the two screws and then the Frame Stop under the Table-Top Frame.



***Keep the Frame Stop from falling to prevent any damage inside the table.***

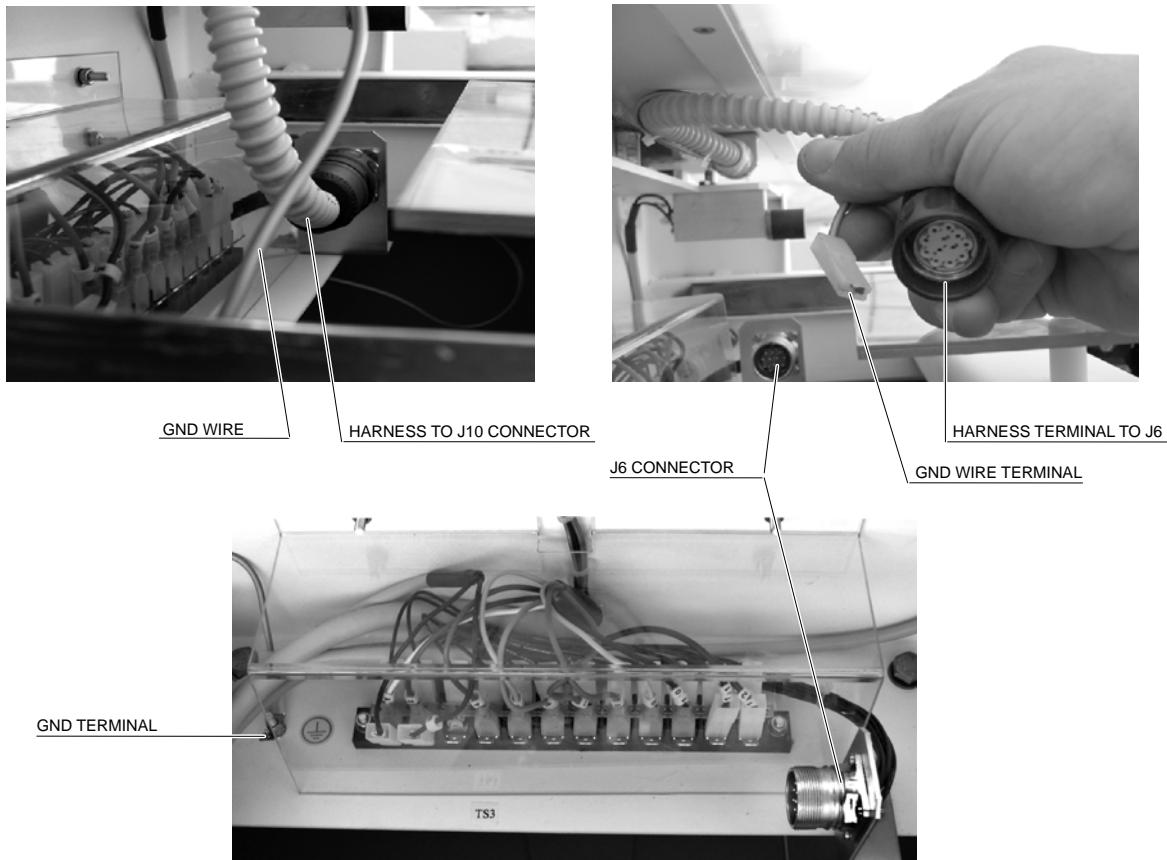


FRAME STOP SCREWS



FRAME STOP

4. Disconnect the GND wire of the Table-Top Frame (faston terminal). Disconnect the Harness plugged into J6 Connector (unscrew the round terminal and pull it).



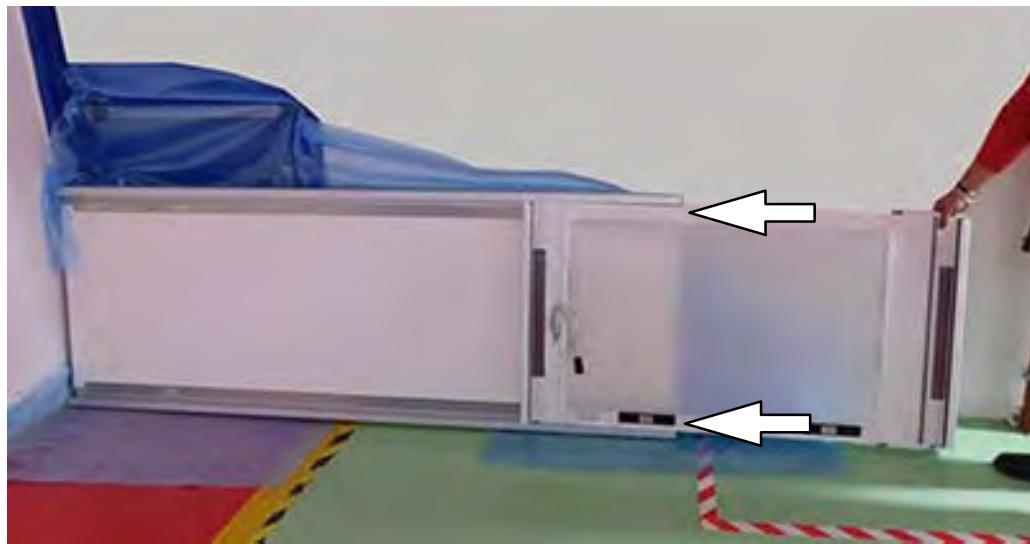
5. Carefully take out the Table-Top Frame from the Table Base by sliding it towards the back or front side of the Table. Take care not to snare the disconnected GND wire or Harness in the Table Base, or to scratch the Detector Carriage.



***Two people are required to take out the Table-Top Frame and to install the Assembly back on the Table Base.***

6. Remove the Stop bar under the new Table-Top.
7. Place the new Table-Top on the floor in a corner with the lateral side resting on the wall and protect it with bubble plastic or equivalent to avoid scratches.

8. Insert the Table-Top in the Frame. Push carefully the frame inside the bearing rails.



9. Install the Assembly (Table-Top with Frame) on the Table Base. Tilt the assembly (about 20 degrees) before inserting the guide in the bearing to avoid the brake magnet.



10. Connect the GND wire of the Table-Top (faston terminal). Connect the Harness to J6 Connector (screw the round terminal).

**Note** 

*J6 is a keyed connector. Align it properly before putting it in since the pins are easy to bend.*

11. Install the E-Stop support.
12. Install the Frame Stop under the Table-Top Frame.
13. Re-install the Stop-Bar under the Table-Top.

**JOB CARD 2.10 : DISASSEMBLY OF COVERS WITH ELEVATING TABLE DOWN****SUBASSEMBLY :** Table Base**TOOLS :** Standard Service Tool kit**PERSONNEL :** 1 Service Engineers**PROCEDURE****Note** 

*This procedure is intended to explain the cover disassembling when an electrical or mechanical problem or both do not allow the Elevating Table to move up.*

1. Turn the System off.

**Note** 

*Every Table cover includes a GND cable attached to a terminal. When disassembling the cover, carefully disconnect the GND cable by hand.*

2. **Upper Front Cover:** Remove two screws located at right and left sides of the lower side of the cover.



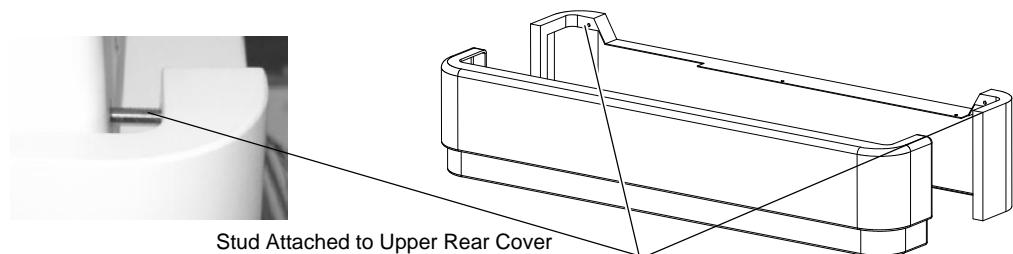
3. Remove the side screw attached to a plate. The plate will fall down inside the table, pick it up later. Repeat the process in the other side of the cover.



4. Then raise the Upper Front Cover with both hands and remove it from the Table. If the Upper cover is made of Fibre (not metal), it is recommended to bend slightly the cover on right side first and then on the left to release the Upper Cover from the Stud attached to the middle covers. Disconnect ground cable (GND) if applicable.



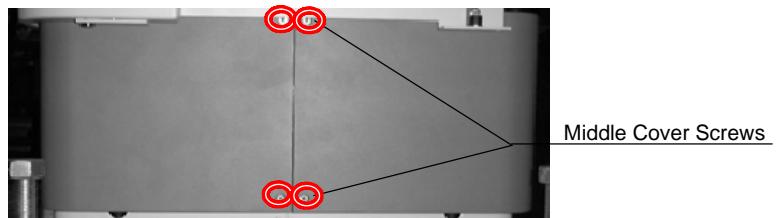
5. **Upper Rear Cover:** Remove both nuts and washers located at upper side of the cover attached to the table chassis (inside the table) .



6. Then, remove two screws located at right and left sides of the lower side of the cover (the same ones as step b) and take the cover away from the Table structure. Disconnect ground cable (GND).
7. **Cover Support with Slot:** remove the Cover Support with Slot that is attached to the Table chassis with two screws at each side.



8. **Middle Covers:** remove the two screws located at the lateral side of cover and take it away. Remove ground wire (GND). Repeat procedure for the second cover.

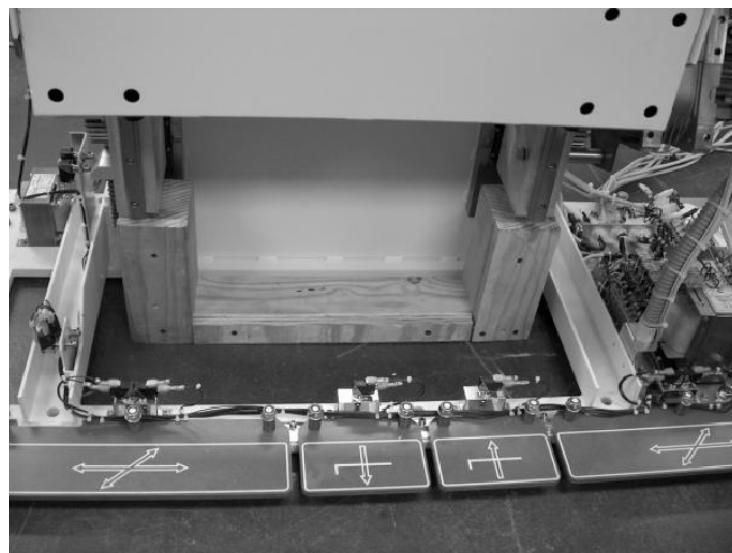


9. **Lower Covers:** remove all the external screws that fix this cover. Remove ground wire (GND).



**JOB CARD 2.11 : REPLACEMENT OF THE ELEVATING TABLE MOTOR****SUBASSEMBLY :** Table Base**TOOLS :** Standard tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Raise the elevating table to the top.
2. Turn the System off.
3. Remove the Elevating Table Covers as described in Section 5.3..
4. Place wood blocks or equivalent under the table body to avoid the table to come down after removing the motor. The height of the wood blocks may vary depending on the point where the motor stopped working, use spacers if needed or turn the fan wheel manually to raise or lower the table to rest on the wood blocks.



5. Disconnect the cables connected to the motor.
6. Remove the Safety ring located in the axe of the motor.



7. Slide out the old Motor (a nylon hammer may help).

8. Insert the new motor, make sure it is fully slide to the top.
9. Insert the safety ring in the motor axe.
10. Connect cables previously disconnected and reinstall the motor Inverter.
11. Reinstall the Table Covers.

<b>JOB CARD 2.12 :</b>	<b>REPLACEMENT OF THE OPTIMA MILLENNIUM PCB A3127-02</b>
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**SUBASSEMBLY :** **Table Base**

**TOOLS :** Standard tool kit.

**PERSONNEL :** 1 Service Engineer

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**PROCEDURE**

1. Raise the elevating table to the top.
2. Turn the System off.
3. Remove the Elevating Table Covers as described in Section 5.3.
4. Remove the Pedal Base plate.
  
5. Disconnect all cables attached to the PCB.
6. Replace the PCB.
7. Connect all cables previously disconnected.
8. Turn the System ON.
9. Check functionality.
10. Reinstall the covers.

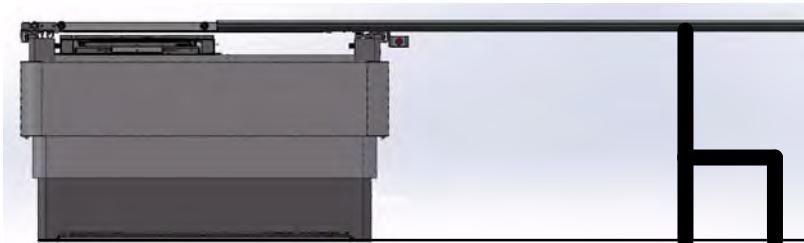
**JOB CARD 2.13 : REPLACEMENT OF THE TABLE ION CHAMBER****SUBASSEMBLY :** Table Receptor Assembly**TOOLS :** Standard tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE****Note** 

*The following procedure can be performed in a room with a minimum size of 2340 mm from the Center of the Table to the wall opposite to the Wall Stand. In case of smaller rooms or two people available to slide back the Table-Top with the frame, gain access to the Receptor Assembly by removing the Tabletop with its frame, refer to JOB CARD 2.9 Replacement of a Table-Top in a Small Room.*

1. Turn the System off.
2. Remove the Table-Top Stop Bar. It is suggested to remove the Wall Stand side as being the most common to remove but every room will require to check which is the most suitable.



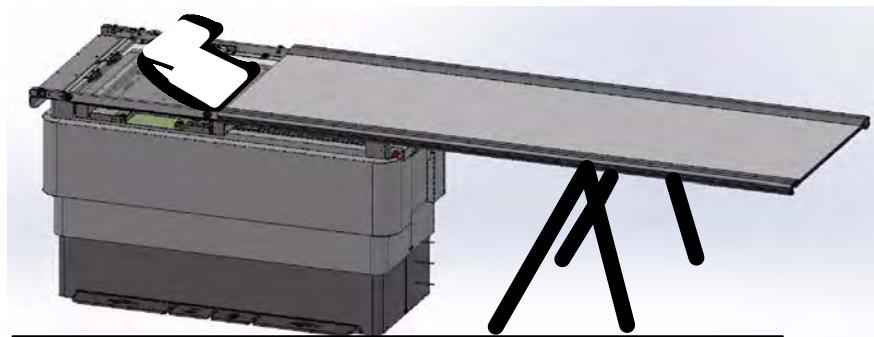
3. Place a chair or similar to support the Table-Top when fully slid to one side.
4. Carefully Slide the Table-Top toward the chair and let the Table-Top rest on it.



5. Remove 3 sides of the Mylar sheet, two lateral sides and one front.



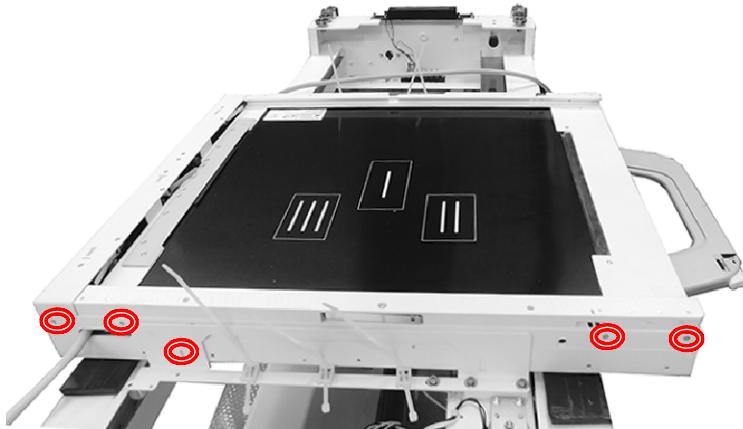
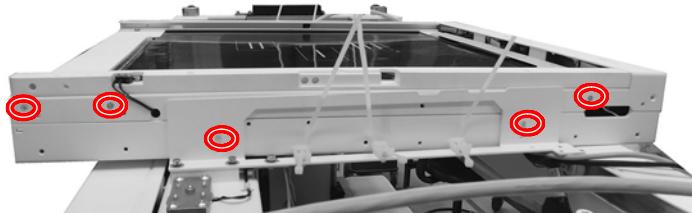
6. Fold back the Mylar and insert it through the gap between the frame and the Table Base.



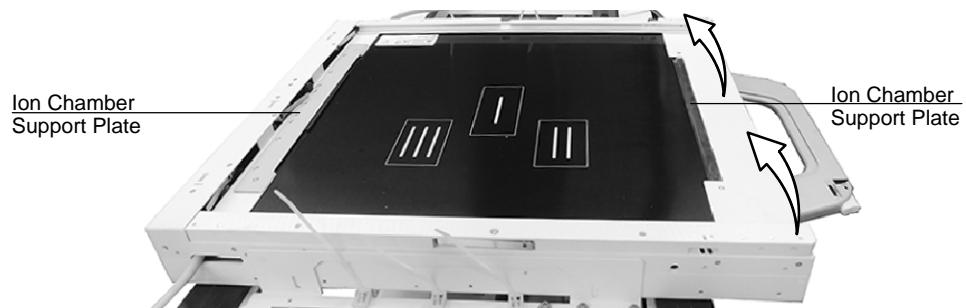
7. If applicable, remove the mechanical link between the bucky module and the tube column. Secure to the tabletop frame out of the way.
8. Open the plate to access to the Ion Chamber pre-amplifier, cut the cable tie wraps, disconnect the cables and remove the Ion Chamber pre-amplifier.



9. Remove the screws that surround the Ion Chamber assembly.



10. Lift the assembly, disconnect the Black Connector (microswitches) and disattach the Ion Chamber Support plates.



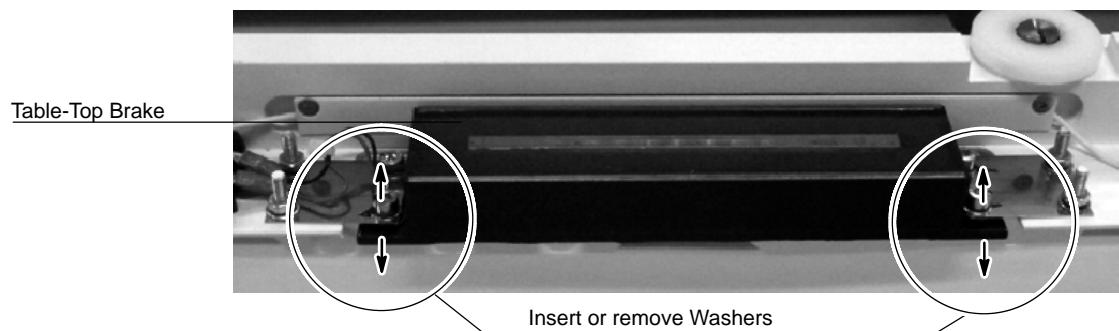
11. Slide the Ion Chamber out.
12. Reverse the steps to install the replacement AEC Chamber.
13. Place the DR Detector plate in the bucky tray, insert and verify the connection to the Interface plug in the rear of the bucky module.

14. If applicable and prior to reinstalling the tabletop, take time to ensure the mechanical link of the bucky module to the tube column correctly connects. Move the tube column from the head end to the foot end and back, ensuring smooth movements of the bucky module with the tube column.
15. Proceed to install the rest of the assembly in reverse order.
16. Turn the System ON.
17. Test system operation and recalibrate the AEC Chamber as needed.

**JOB CARD 2.14 : REPLACEMENT OF THE TABLE-TOP BRAKES****SUBASSEMBLY :** Table carriage**TOOLS :** Standard tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Turn the System off.
2. Remove the Table Top as explained in JOB CARD 2.9.
3. Disconnect the brake cables attached to the screw terminal.
4. Dismount the corresponding brakes.
5. Replace the brakes.
6. Turn the System ON and check correct functioning of the Table-top brakes.

In case the Table-Top does not completely brake when releasing the pedal, adjust the height of the Brakes by inserting or removing Flat Washers M4 between the Brakes and their Brake Plates. See photo below.



**JOB CARD 2.15 : REPLACEMENT OF THE MYLAR SHEET****SUBASSEMBLY :** Table carriage**TOOLS :** Standard tool kit.**PERSONNEL :** 2 Service Engineer**PROCEDURE**

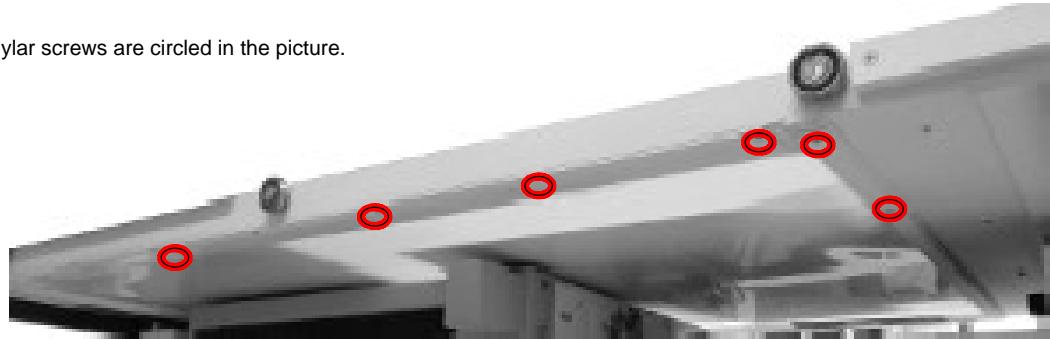
1. Turn the System off.
2. Perform the carriage removal as explained in JOB CARD 2.9.



***Two people are required to take out the Table-Top Frame and to install the Assembly back on the Table Base.***

3. Disassemble the Mylar from its frame, 5 screws at each side and 7 screws in the front and back.
4. Notice the shape of the Mylar frame in reference to the table brakes and install the new Mylar in the frame. Before tightening the screws, try to leave the Mylar surface as flat as possible.

\* Not all Mylar screws are circled in the picture.



5. Reinstall in reverse order.

**JOB CARD 2.16 : GAINING ACCESS TO THE TABLE RECEPTOR ASSEMBLY****SUBASSEMBLY :** Table Receptor Assembly**TOOLS :** Standard Service Tool Kit**PERSONNEL :** 1 Service Engineer**PROCEDURE****Note** 

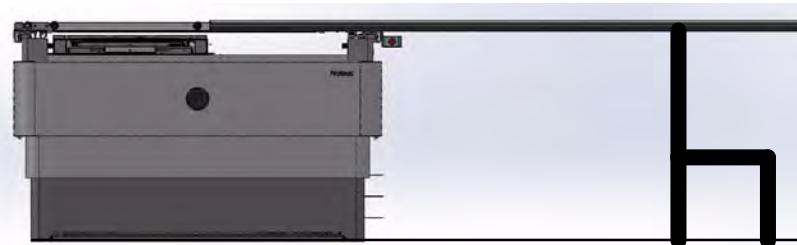
*The following procedure can be performed in a room with a minimum size of 2340 mm from the Center of the Table to the wall opposite to the Wall Stand.*

*In case of smaller rooms or two people available to slide back the Table-Top with the frame, gain access to the Receptor Assembly by removing the Tabletop with its frame, refer to JOB CARD 2.9 Replacement of a Table-Top in a Small Room.*

1. Turn the System off.
2. Remove the Table-Top Stop Bar (from the Wall Stand Side).



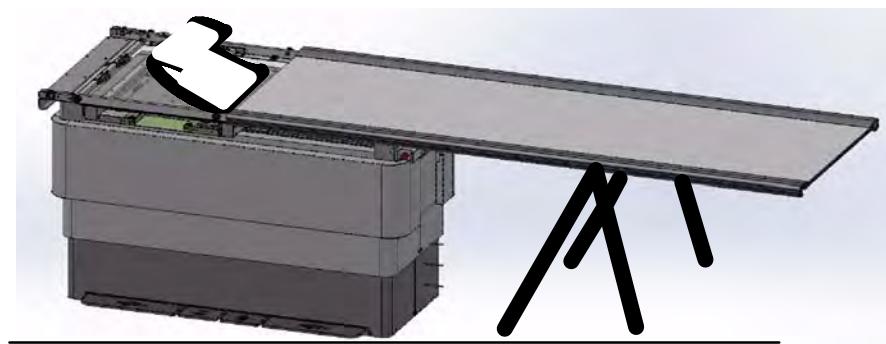
3. Place a chair or similar to support the Table-Top when fully slide to one side.
4. Carefully Slide the Table-Top toward the chair and let the Table-Top rest on it.



5. Remove 3 sides of the Mylar sheet, two lateral sides and one front.



6. Fold back the Mylar and insert it through the gap between the frame and the Table Base.



**JOB CARD 2.17 : REPLACEMENT OF THE TABLE DETECTOR TRAY****SUBASSEMBLY :** Table Receptor Assembly**TOOLS :** Standard Service Tool Kit with Torx wrench set.**PERSONNEL :** 1 Service Engineer**PROCEDURE****Note** 

*The following procedure can be performed in a room with a minimum size of 2340 mm from the Center of the Table to the wall opposite to the Wall Stand.*

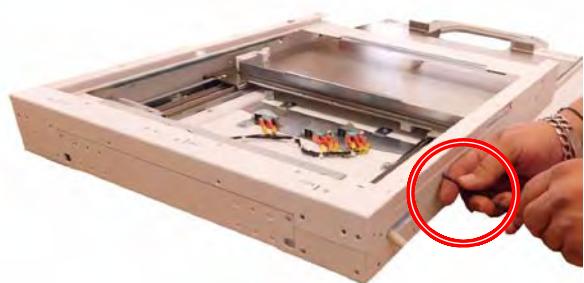
*In case of smaller rooms or two people available to slide back the Table-Top with the frame, gain access to the Receptor Assembly by removing the Tabletop with its frame, refer to JOB CARD 2.9 Replacement of a Table-Top in a Small Room.*

1. Turn the System off.
2. Perform the Job Card 2.17 to gain access to the Detector Assembly.

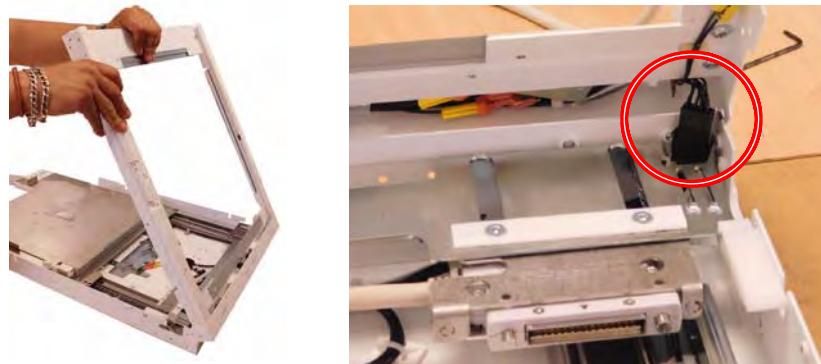
**Note** 

*The illustrations below do not show the Ion Chamber.*

3. Remove the Torx screws around the Detector Assembly.



4. Rise the upper frame of the Receptor assembly and disconnect the Black Connector.



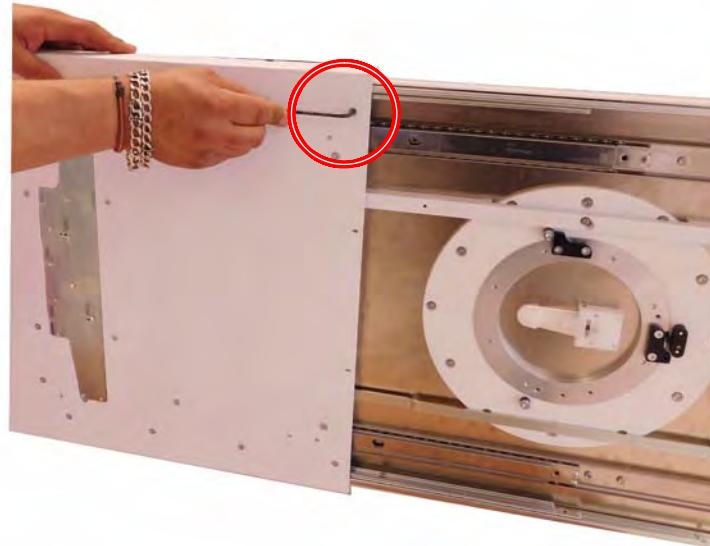
5. Pull the tray and remove the end tray travel screws (only at one side).



6. Remove the Cable clips of the handle cable.
7. Mark the position of the brake handle switch for further reference.



8. Remove the Tray rails fixing screws.



9. Remove the Handle Bar nut.



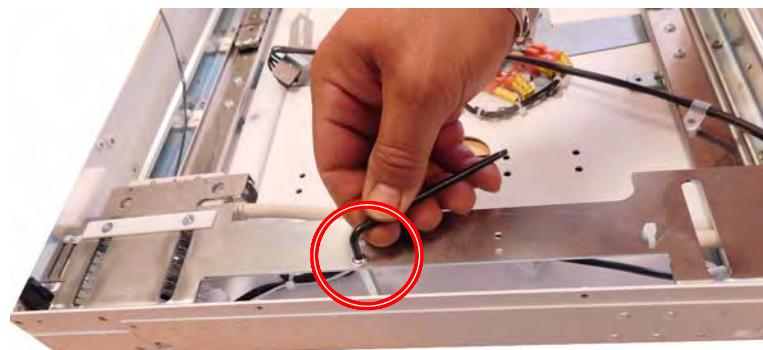
10. Remove the handle fixing screws (2+2).



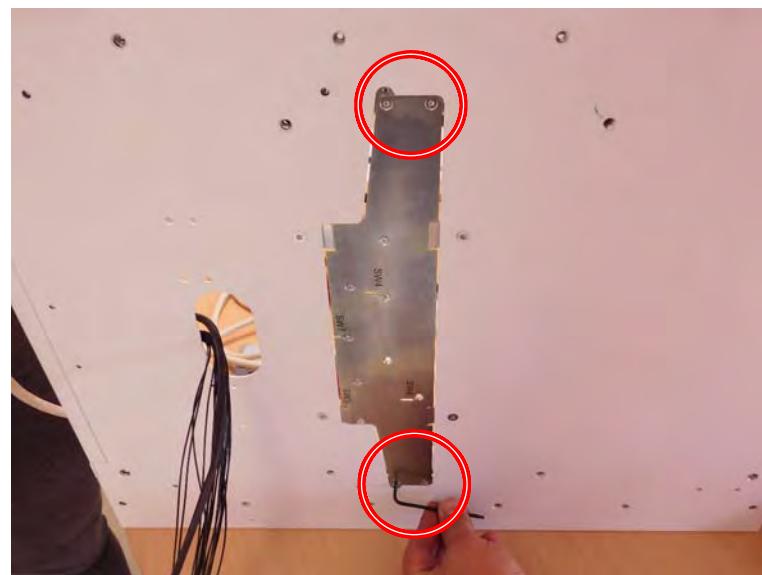
11. Remove the Handle Assembly.



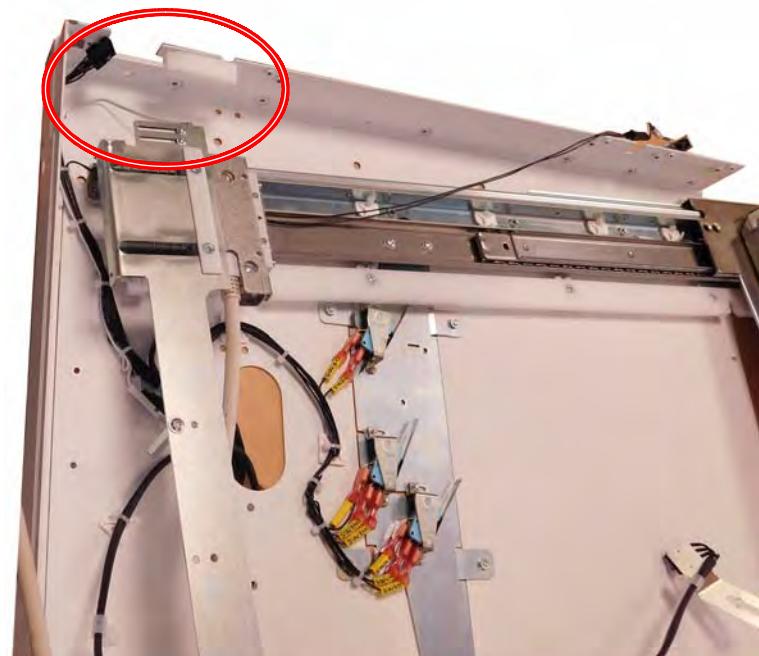
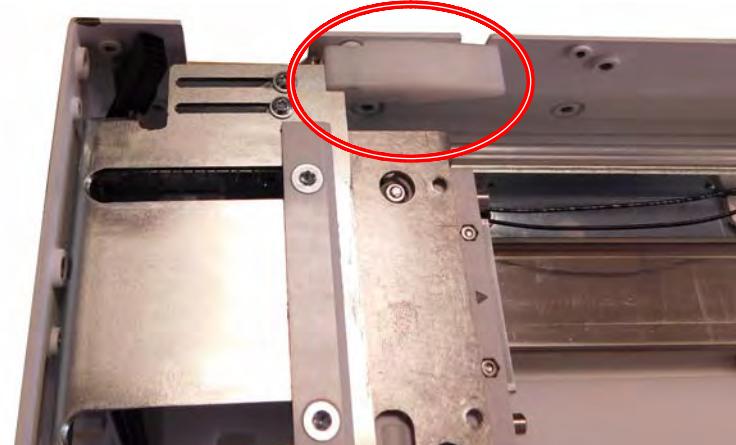
12. If the unit includes Detector charging bridge, go on with this step, otherwise go to step 14. Hold the Hex spacer with an open Wrench 7 mm. and remove the fixing screw of the Bridge Hex spacer.



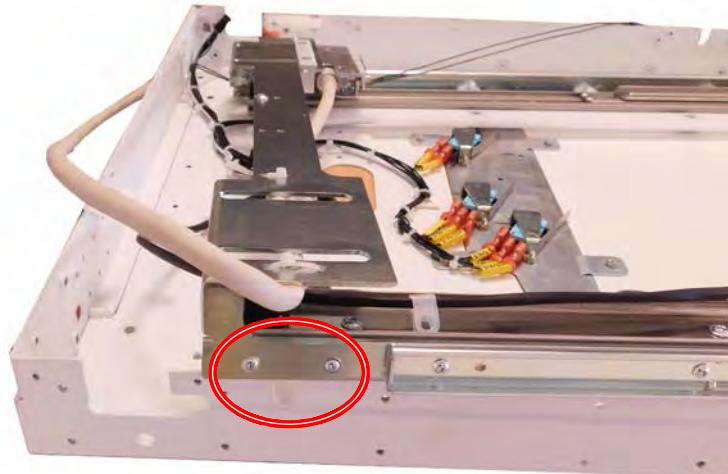
13. Remove both screws at the base of the assembly (see image below).



14. Take out the bridge from the nylon wedge slot located at the right side of the corner of the bridge by slightly turning the Bridge and pulling the tray and bridge assembly.



15. Dismount the Bridge including its connector and its cable, 2+2 screws.



16. Remove the old tray.
17. Assemble the Handle in the new Tray.
18. Install the whole assembly in reverse order.

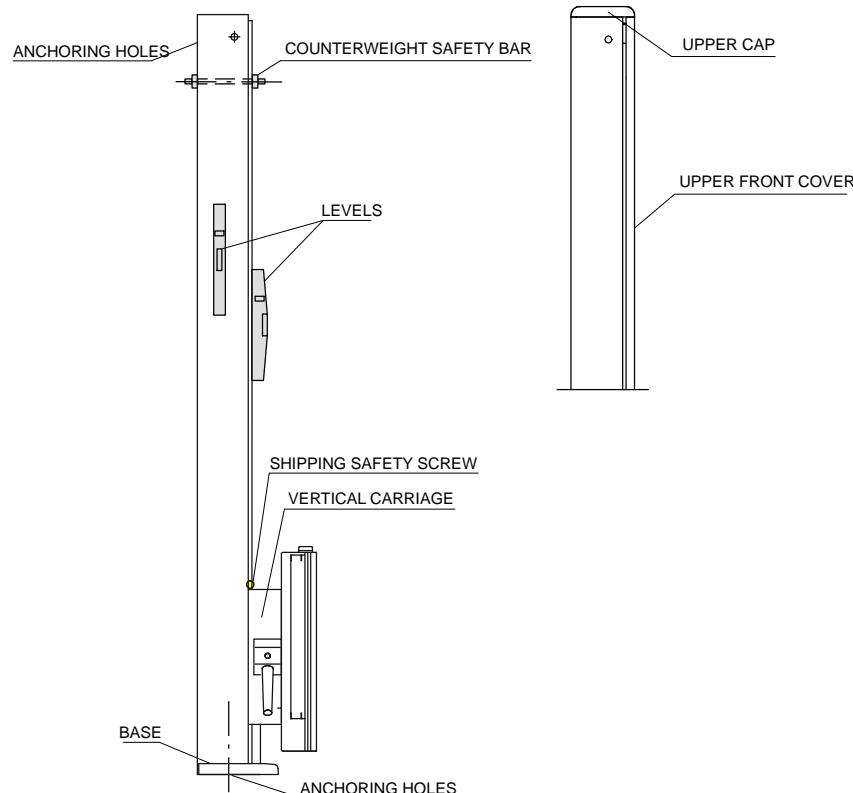
**JOB CARD 2.18 : REPLACEMENT OF THE COLUMN STEEL CABLES  
- WALL STAND****SUBASSEMBLY :** Tube Stand Column**TOOLS :** Standard tool kit.**PERSONNEL :** 2 Service Engineers**PROCEDURE**

1. Turn the System off.



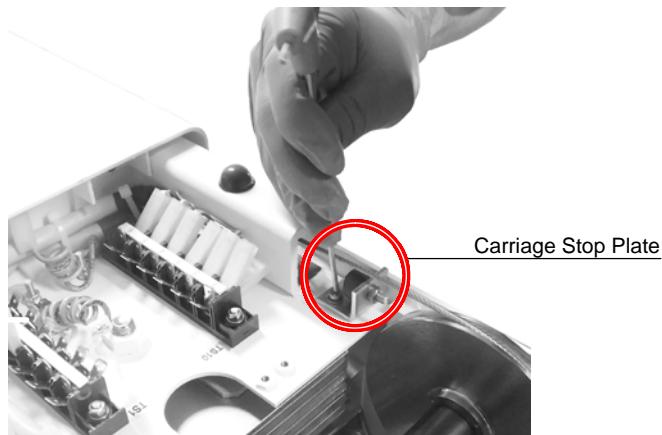
***When working around suspended mass (ex. Wall stand, collimator, etc.), extreme caution is to be taken prior to performing work.***

2. Lower the Receptor Assembly to the bottom of the Column and install the Shipping Safety Screws in the lower holes.
3. Also install the Counterweight Safety Bar.



4. Remove the upper cap of the Column.

5. Place the Wall Stand Column on the floor. Before the Column body is on the floor, place the Wooden Block below.
6. Remove the Shipping Safety Screws and the Counterweight Safety Bar.
7. cable retainer.



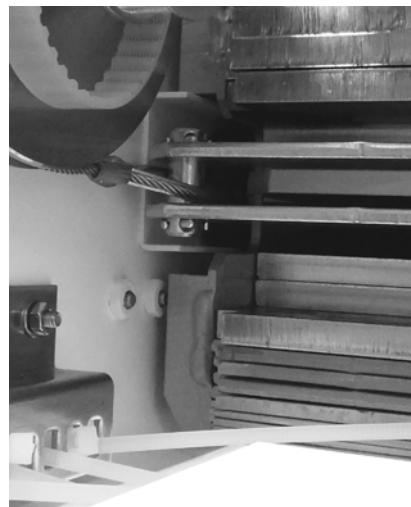
Remove the Carriage stop plates to allow the carriage go to the end and access to the steel

8. Push the Arm Carriage to the top of the Column.
9. Remove Steel Cable Retainer Screw.



10. Access the other end of the steel cable from the top back of the column.

11. Dismount the Steel Cable end from the shaft by opening the clips.



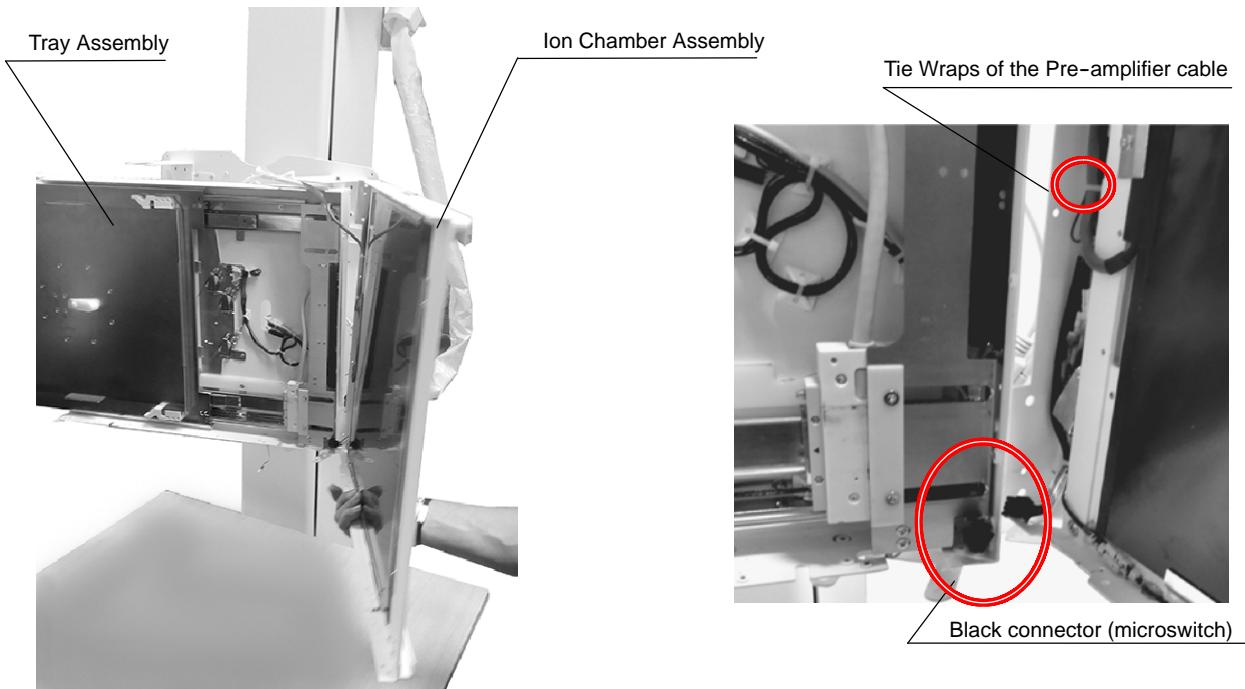
12. Replace the Steel Cable and proceed in reverse order.



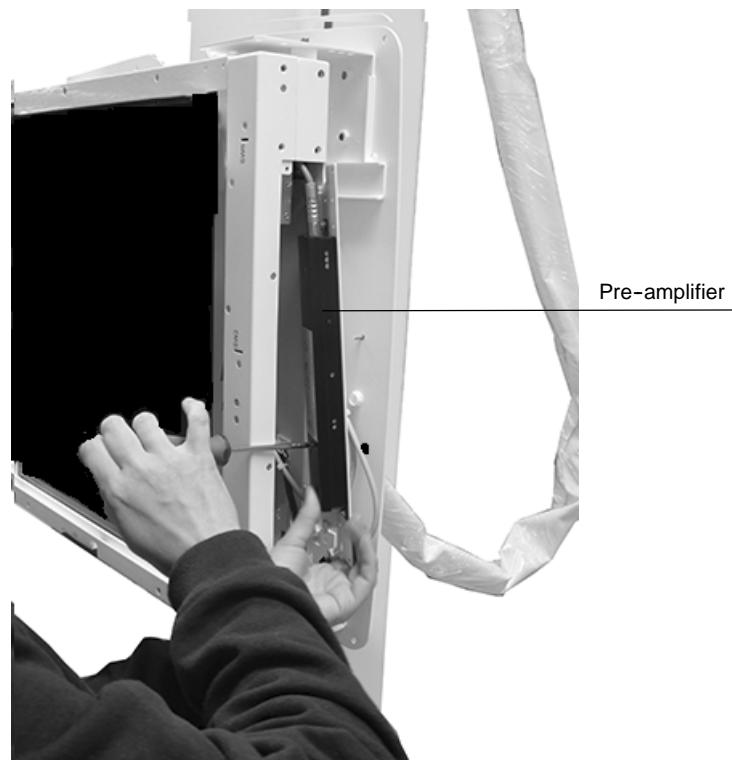
*Make sure that the steel cables are properly routed around the pulleys before standing the Column up.*

**JOB CARD 2.19 : REPLACEMENT OF THE WALL STAND ION CHAMBER****SUBASSEMBLY :** Wall Stand Receptor Assembly**TOOLS :** Standard tool kit.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

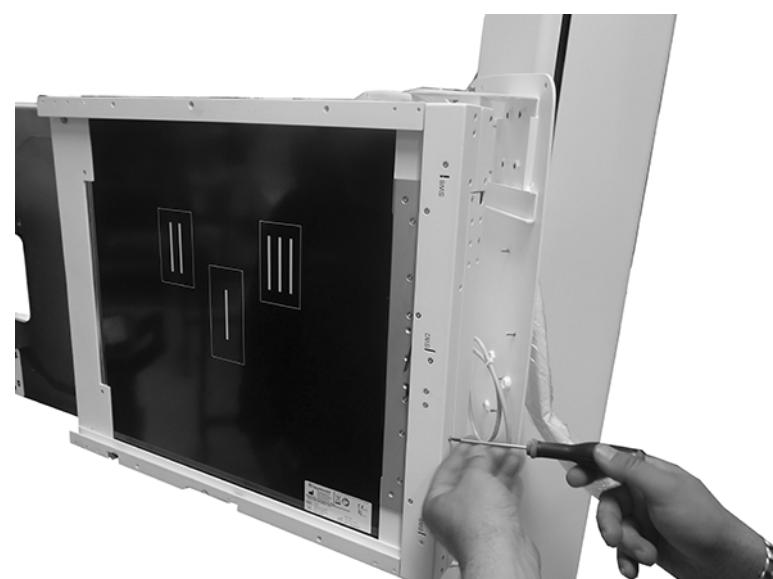
1. Access inside the Receptor Assembly as described in JOB CARD 2.20.
2. Unscrew the ground screw.
3. Remove the top block (the one in the Ion Chamber).
4. Carefully split the Ion Chamber Assembly, once opened, remove the tie wraps that guide the preamplifier cable and disconnect the black connector (microswitch).



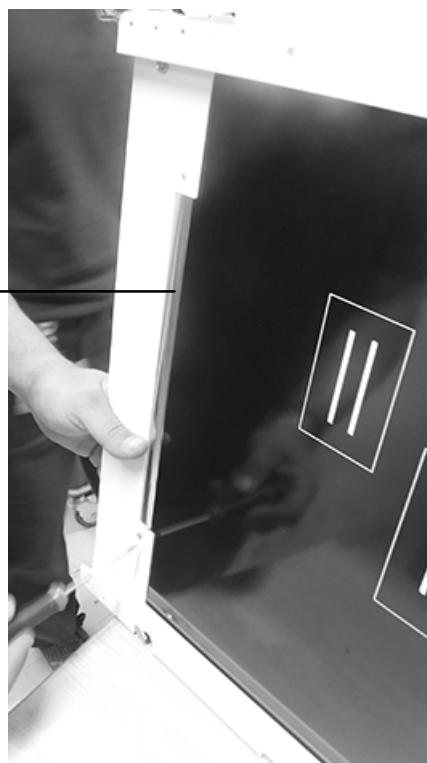
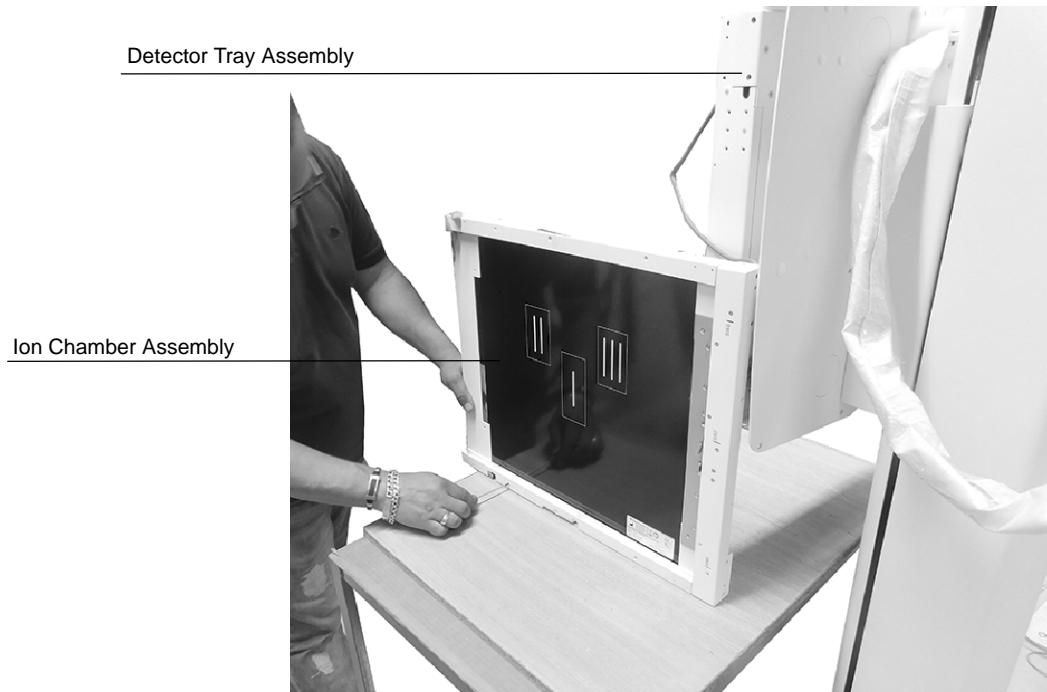
5. Disassembly the Pre-amplifier and remove it with its cable.



6. Remove screws that secure the Ion Chamber assembly to the Detector Tray Assembly frame.



7. Place aside the Ion Chamber Assembly and unscrew the Ion Chamber from its support plates.



8. Proceed to slide it out.



9. Carefully re-install the new Ion chamber with its plates in its frame. Prevent bulging when reinstalling the Ion Chamber.



10. Install the new pre-amplifier in the Tray Assembly and guide the preamplifier cable with tie wraps.
11. Plug the Ion Chamber connector and the black connector (microswitch) back in.

12. Re-assemble and tighten the Ion Chamber Assembly in the Detector Tray Assembly, carefully reseating the Ion Chamber to prevent bulging.



13. Reinstall the cover by first inserting the detector handle with its eight (8) screws.



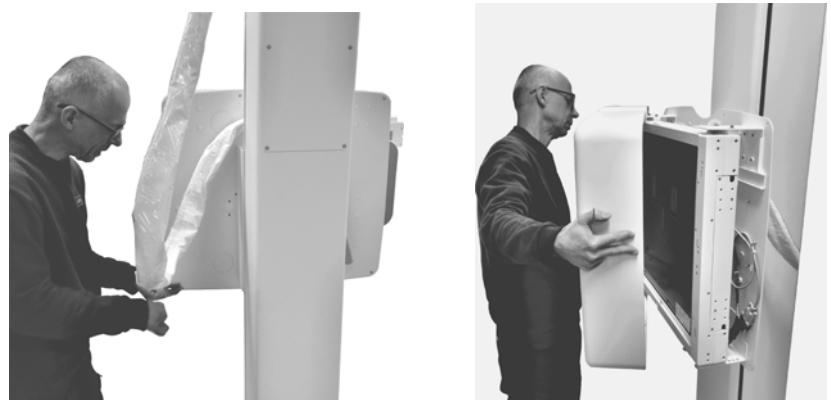
14. Turn the Unit ON.

15. Test system operation and recalibrate the AEC Chamber as needed.

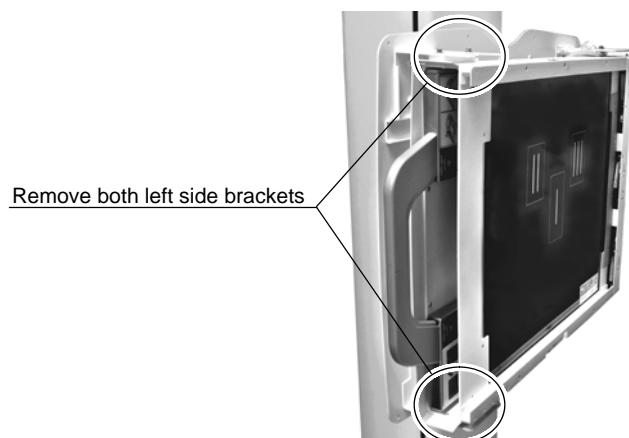
**JOB CARD 2.20 : GAINING ACCESS TO THE WALL STAND RECEPTOR ASSEMBLY****SUBASSEMBLY :** Wall Stand Receptor Assembly**TOOLS :** Standard Service Tool Kit**PERSONNEL :** 1 Service Engineer**PROCEDURE****Note** 

*The following procedures shows a left hand load Wall Stand, for right hand load Wall Stand proceed in the same way adapting processes from the right hand load point of view.*

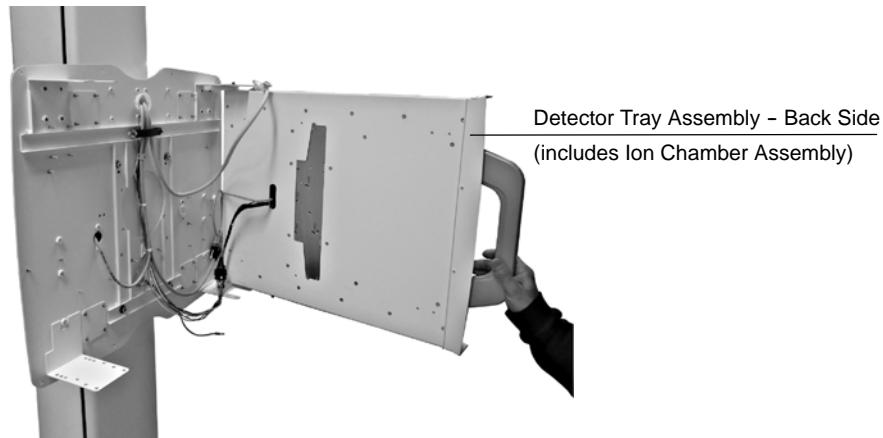
1. Position the Receptor Assembly at a comfortable spot to remove the Receptor Assembly Cover.
2. Disconnect the equipment.
3. Take out the grid.
4. Unscrew the eight (8) screws that attach the Receptor Assembly Cover at the back of the assembly and carefully take out the cover towards the handle of the detector Tray.



5. The Detector Tray Assembly is held on four brackets located at each corner of the Assembly, unscrew the nylon brackets **on the left side** of the Assembly and remove them.

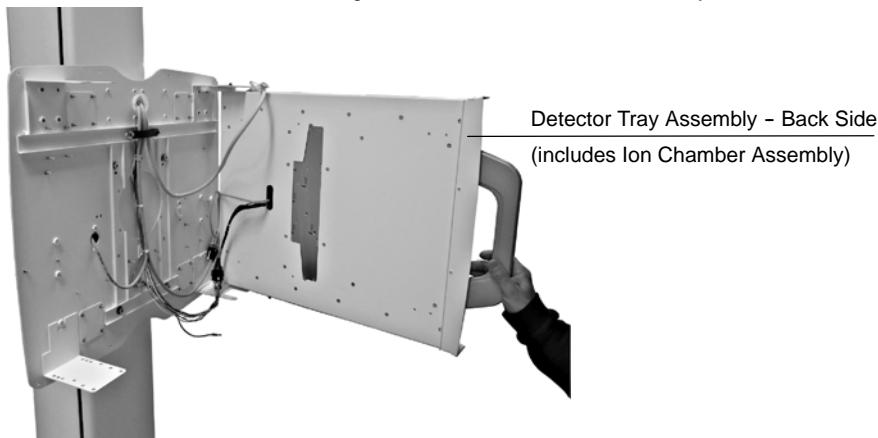


6. Remove one screw from each of the right side back brackets.
7. Open it as a door and gain access to the internal cables.

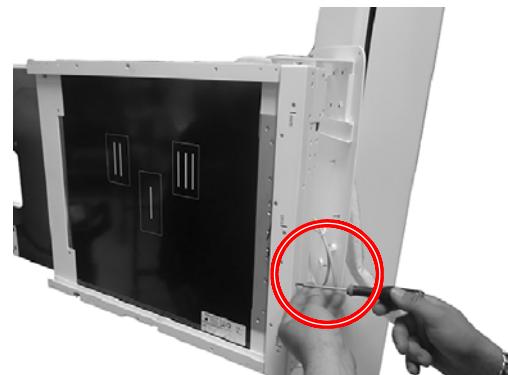
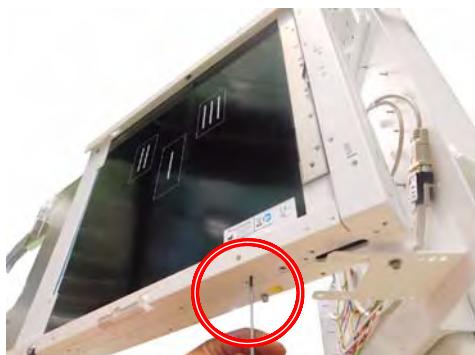


**JOB CARD 2.21 : REPLACEMENT OF THE WALL STAND DETECTOR TRAY****SUBASSEMBLY :** Wall Stand Detector Assembly**TOOLS :** Standard Service Tool Kit with Torx wrench set.**PERSONNEL :** 1 Service Engineer**PROCEDURE**

1. Turn the System off.
2. Perform the JOB CARD 2.20 to gain access to the Detector Assembly.



3. Remove the Torx screws around the Detector Assembly.



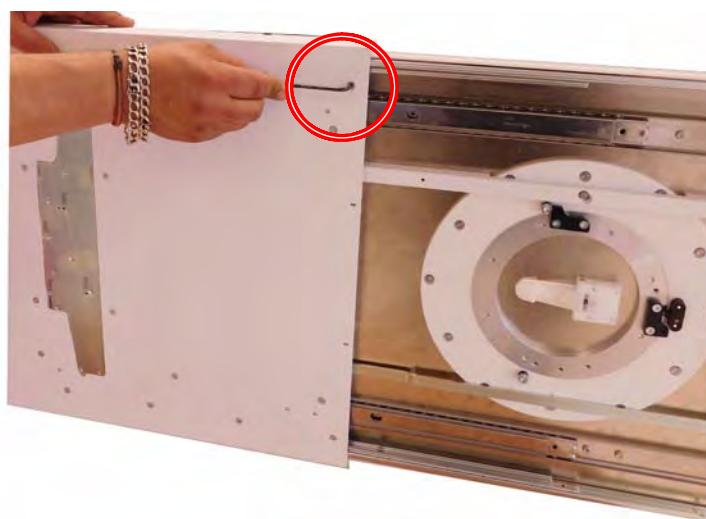
4. Open the frame of the Receptor assembly and disconnect the Black Connector.



5. Pull the Tray and remove the end tray travel screws (only at one side).



6. Remove the Tray rails fixing screws.



7. Remove the Handle Bar nut.



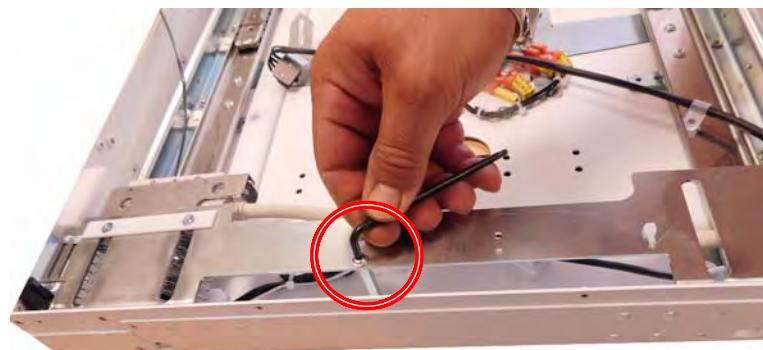
8. Remove the handle fixing screws (2+2).



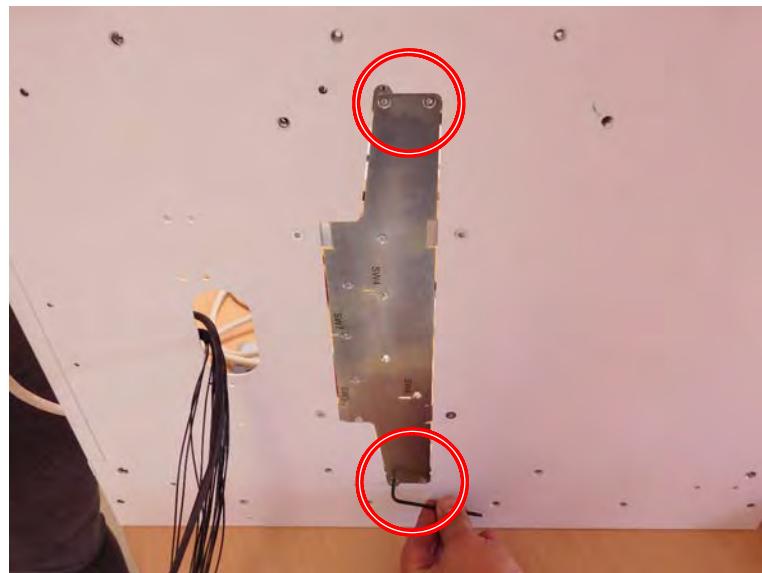
9. Remove the Handle Assembly.



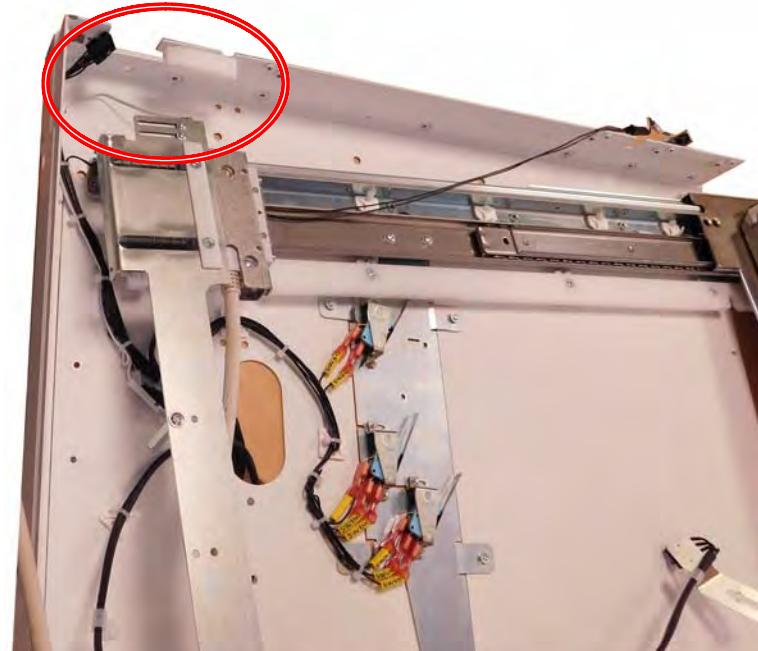
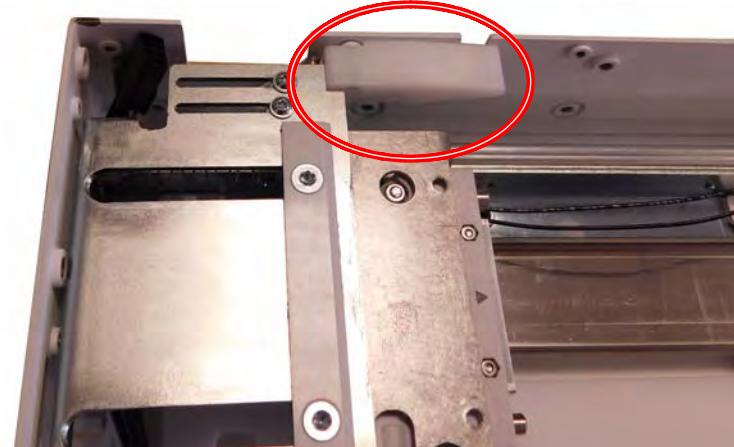
10. If the unit includes Detector charging bridge, go on with this step, otherwise go to step 14. Hold the Hex spacer with an open Wrench 7 mm. and remove the fixing screw of the Bridge Hex spacer.



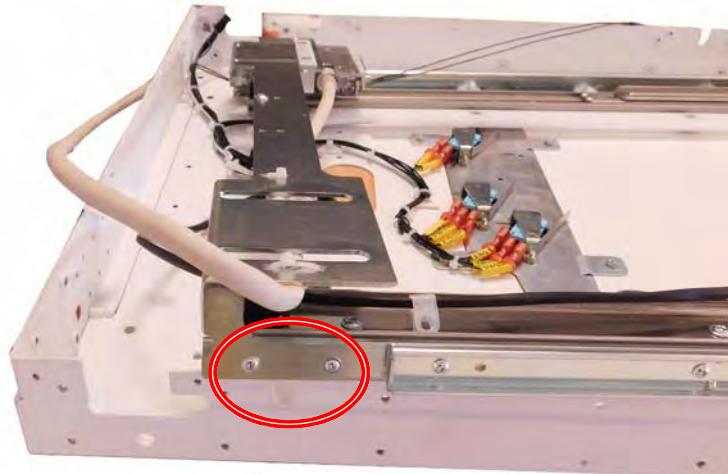
11. Remove both screws at the base of the assembly (see image below).



12. Take out the bridge from the nylon wedge slot located at the right side of the corner of the bridge by slightly turning the Bridge and pulling the tray and bridge assembly.



- 
13. Dismount the Bridge including its connector and its cable, 2+2 screws.



14. Remove the old Tray.
15. Assemble the Handle in the new Tray.
16. Install the whole assembly in reverse order.

## SECTION 11 PERIODIC MAINTENANCE

The first maintenance service is to be performed before the end of six months after installation. The rest of maintenance services will be performed according to the following table.

**Table 11-1**  
**Periodic Maintenance**

	Cleaning	Lubrication	Functional Check	Adjustment and calibration
Tube-Collimator Assembly	Every six months	N / A	Every six months	Yearly
Radiographic Table	Every six months	Yearly	Every six months	Yearly
Floor Mounted Tube Stand	Every six months	Yearly	Every six months	Yearly
Vertical Bucky	Every six months	Yearly	Every six months	Yearly

### 11.1 MAINTENANCE ACTIVITIES DESCRIPTION

**Electrical cables and connections:** Visually check for electrical cables proper isolation and proper connection inside and outside the unit.

**Mechanical cables:** Visually check for possible frayed cable and replace if necessary.

**Brakes, locks and detents:** Perform a functional check of all the locks, brakes and detents of the Room equipment. Adjust or replace as needed.

**Functional Check:** Perform a functional check of all Room equipment, motion of Vertical Bucky, Table-top, Column travel, brakes, keys of consoles, lamps and indicators, Collimator etc.

**Adjustments and calibrations:** Perform adjustments and Calibration of Table, Column and Vertical Bucky as explained in the Adjustments Section of this manual.

**Lubrication:** Lubricate mobile components such as chains, guides, bearings etc as specifies in the Adjustments Section.

**Cleaning:** Clean from dust or moist inner components as Electronic Racks, grids, filters, bearings and rails.

## 11.2 CHECKING THE FLOOR MOUNTED TUBE STAND

1. Turn OFF the system and mains. Check that there is not voltage at Tube-Stand.
2. Disassemble Front covers and check steel cable and brakes.
3. Check anchoring screws, they should be strongly tighten.
4. Turn ON the system and check that the Column and Tube-Collimator Assembly is blocked in all motions.
5. Check motion of Column: horizontal and rotation.
6. Check motion of Tube-Collimator Assembly: vertical, Telescopic Arm motion and rotation. Detents configured should be checked too.
7. Check that the Collimator is properly fixed by pulling and shaking it. Refer to Section 7 if any adjustment is needed. *Please check the applicable Service Manual according to the Collimator version depending on the Flange type (metallic or plastic flange).*
8. Place the Tube at 0° on the Table-Top and check that X-ray indicator lamp and the chassis centering indicator are aligned and they turn off after 30 seconds.
9. Check in the Collimator that light beam is centered with the X-ray beam and the tolerance is not above 1% from focus-film distance.

## 11.3 CHECKING THE RADIOGRAPHIC TABLE

1. Turn OFF the system and mains. Check that there is not voltage at Table.
2. Disassemble Front Table cover.
3. Check anchoring screws of the Table, they should be strongly tighten.
4. Turn On the system and press the mushroom shaped switch. Verify that table is disconnected and the Table travels are blocked.
5. Release the mushroom shaped switch.
6. Connect Table power and check Table-Top brakes and correct motion by pressing the Table Pedal.
7. Assemble the Front Table cover.
8. Release the horizontal Bucky brakes and check correct traveling.
9. Take out the Cassette film tray and check correct functioning.

## 11.4 CHECKING THE WALL STAND

1. Disassemble Front covers of Wall Stand and clean steel cable and brakes.
2. Check anchoring screws, they should be strongly tighten.
3. Check the vertical lock.
4. Loose the carriage lock and verify that vertical motion is released and counterweighted at any point.
5. Take out the Cassette film tray and check correct functioning.

## 11.5 CHECK OFF MAINTENANCE REVISION TABLE

<b>Hospital name:</b>		<b>Date:</b>
System Name:	System Number ID:	
Customer:	Field Engineer Name:	

<b>Floor Mounted Tube Stand</b>		
<b>Maintenance activity</b>		<b>Comments</b>
Electrical cables and connections	<input type="checkbox"/>	
Mechanical cables	<input type="checkbox"/>	
Brakes, locks and detents	<input type="checkbox"/>	
Functional Check	<input type="checkbox"/>	
Adjustment and calibration	<input type="checkbox"/>	
Replacement	<input type="checkbox"/>	
Lubrication	<input type="checkbox"/>	
Cleaning	<input type="checkbox"/>	

<b>Radiographic Table</b>		
<b>Maintenance activity</b>		<b>Comments</b>
Electrical cables and connections	<input type="checkbox"/>	
Brakes, locks and detents	<input type="checkbox"/>	
Functional Check	<input type="checkbox"/>	
Adjustment and calibration	<input type="checkbox"/>	
Replacement	<input type="checkbox"/>	
Lubrication	<input type="checkbox"/>	
Cleaning	<input type="checkbox"/>	

<b>Wall Stand</b>		
<b>Maintenance activity</b>		<b>Comments</b>
Electrical cables and connections	<input type="checkbox"/>	
Mechanical cables	<input type="checkbox"/>	
Brakes, locks and detents	<input type="checkbox"/>	
Functional Check	<input type="checkbox"/>	
Adjustment and calibration	<input type="checkbox"/>	
Replacement	<input type="checkbox"/>	
Lubrication	<input type="checkbox"/>	
Cleaning	<input type="checkbox"/>	

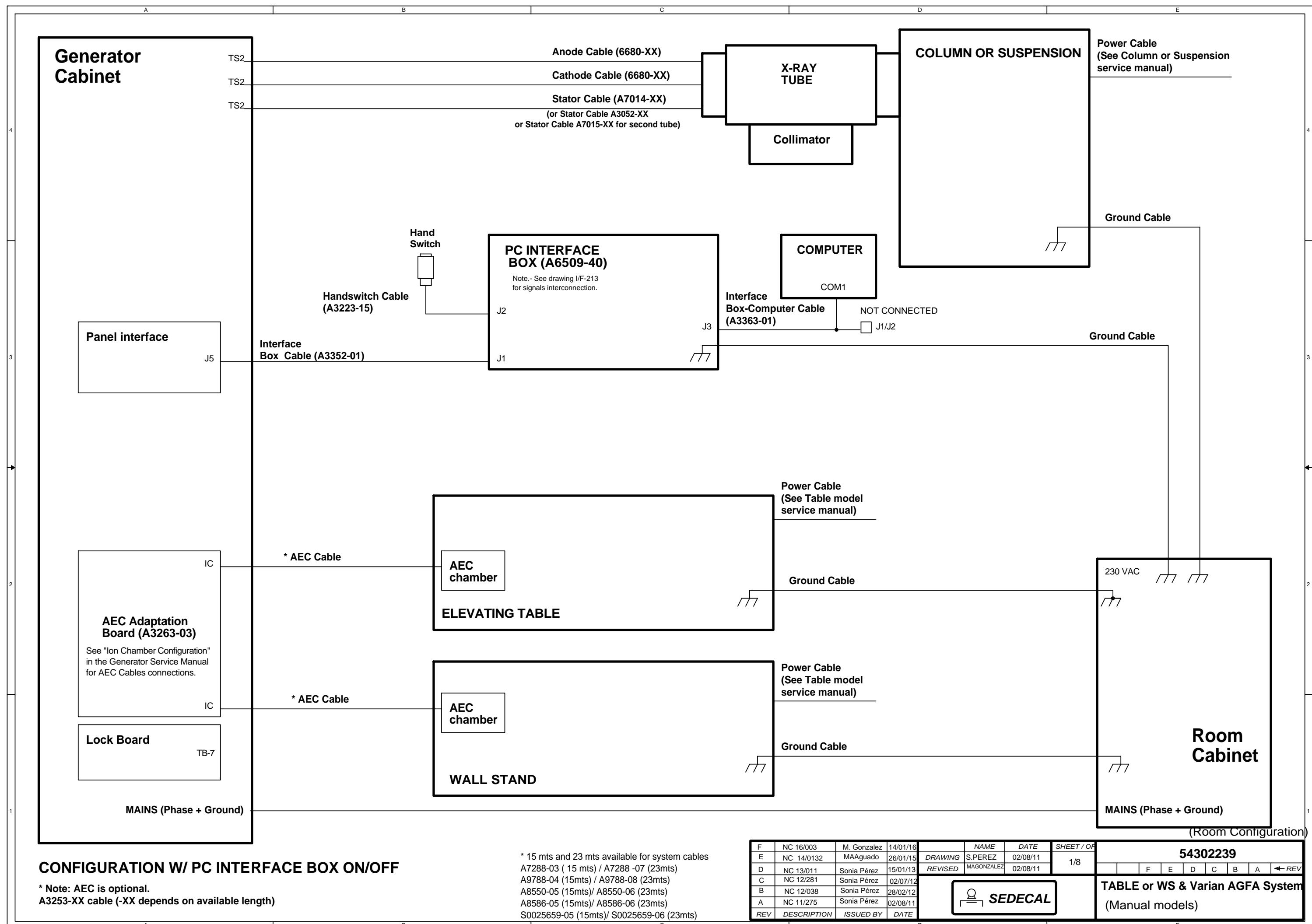
## SECTION 12

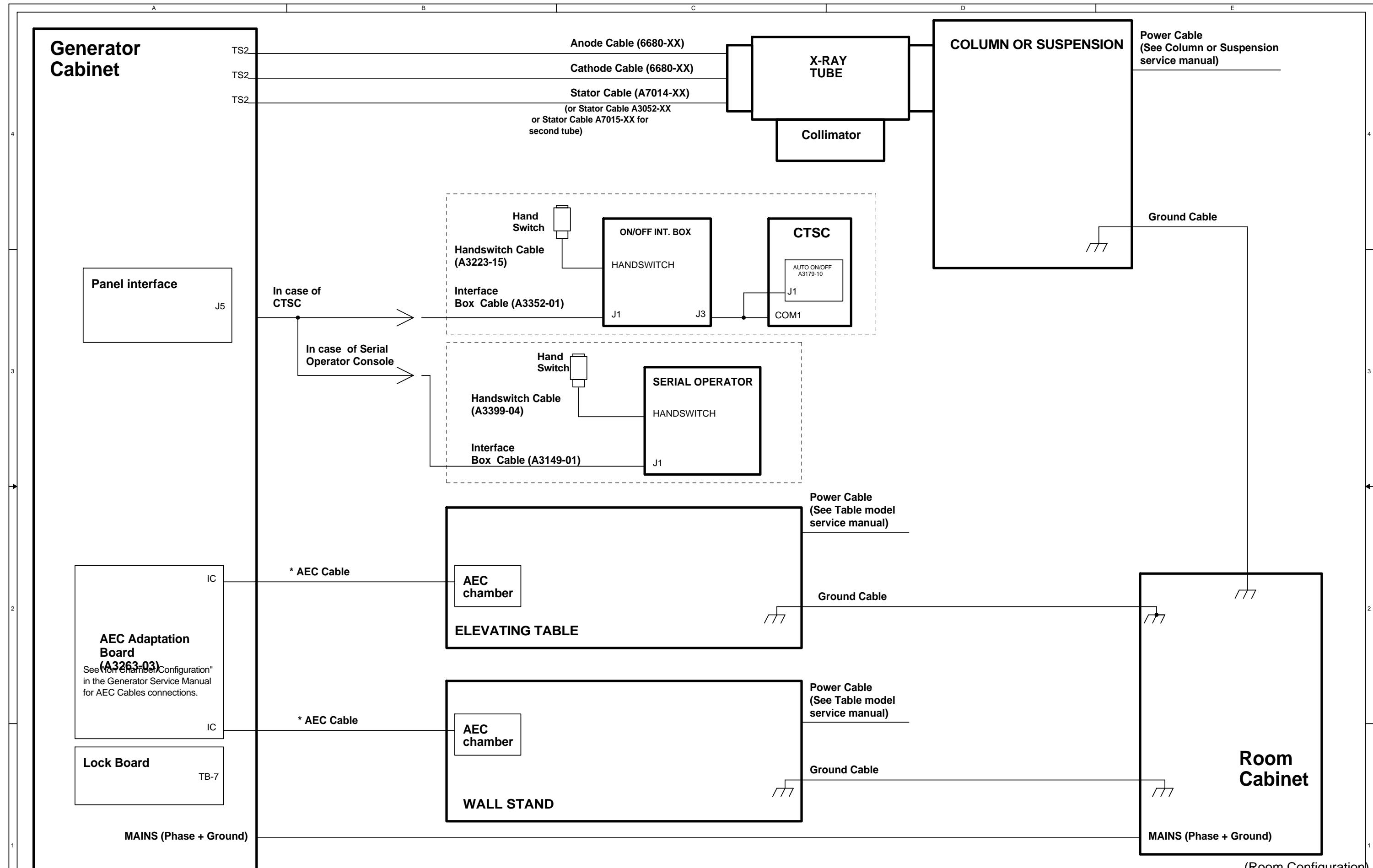
## SYSTEM INTERCONNECTION MAPS

Refer to the following maps for details of the wire connections.

- Interconn. Table/ WS & Varian Dig Detec 54302239
- Interconn. Millennium 54301072  
(Only For Systems with Digital Control Panel)
- Basic Millennium Column Interconnections 54301058  
(Only For Systems with Basic Control Panel)
- Elevating Table RAD Room - Mesa Elevadora 54301061
- Horizontal Table RAD Room - Mesa Horizontal 54301063
- PCB Optima Millennium A3127-02
- Column Control - Control Columna A3507-01
- Basic Mill Control A3510-02S
- Varian Interface A3662-01
- Wall Bucky Stand Interconn - Interconn Bucky Pared 54301068
- Column - Columna 54301075
- Column Arm - Brazo Columna 54301076
- Auto Collimator Interconnections 54303033

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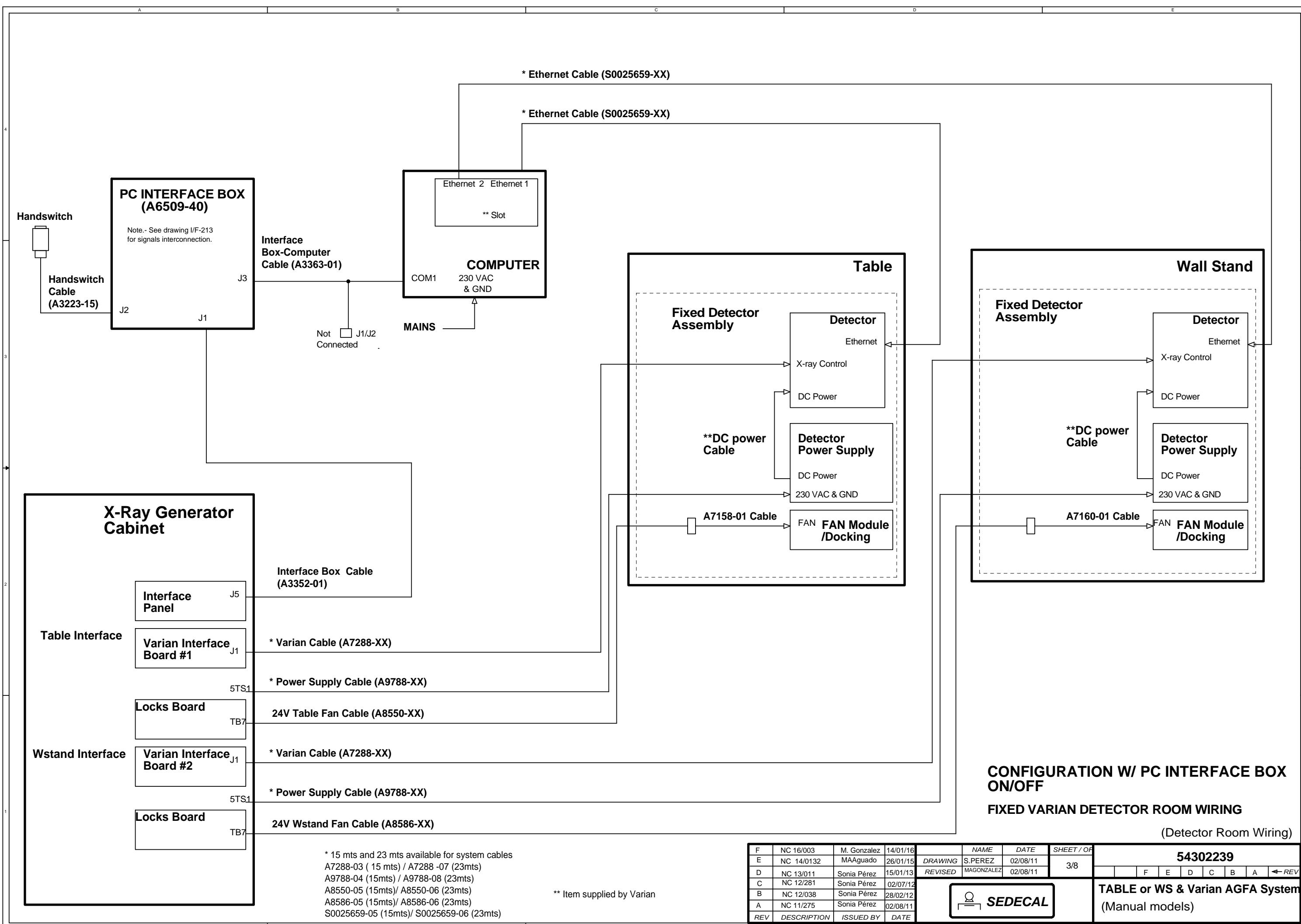


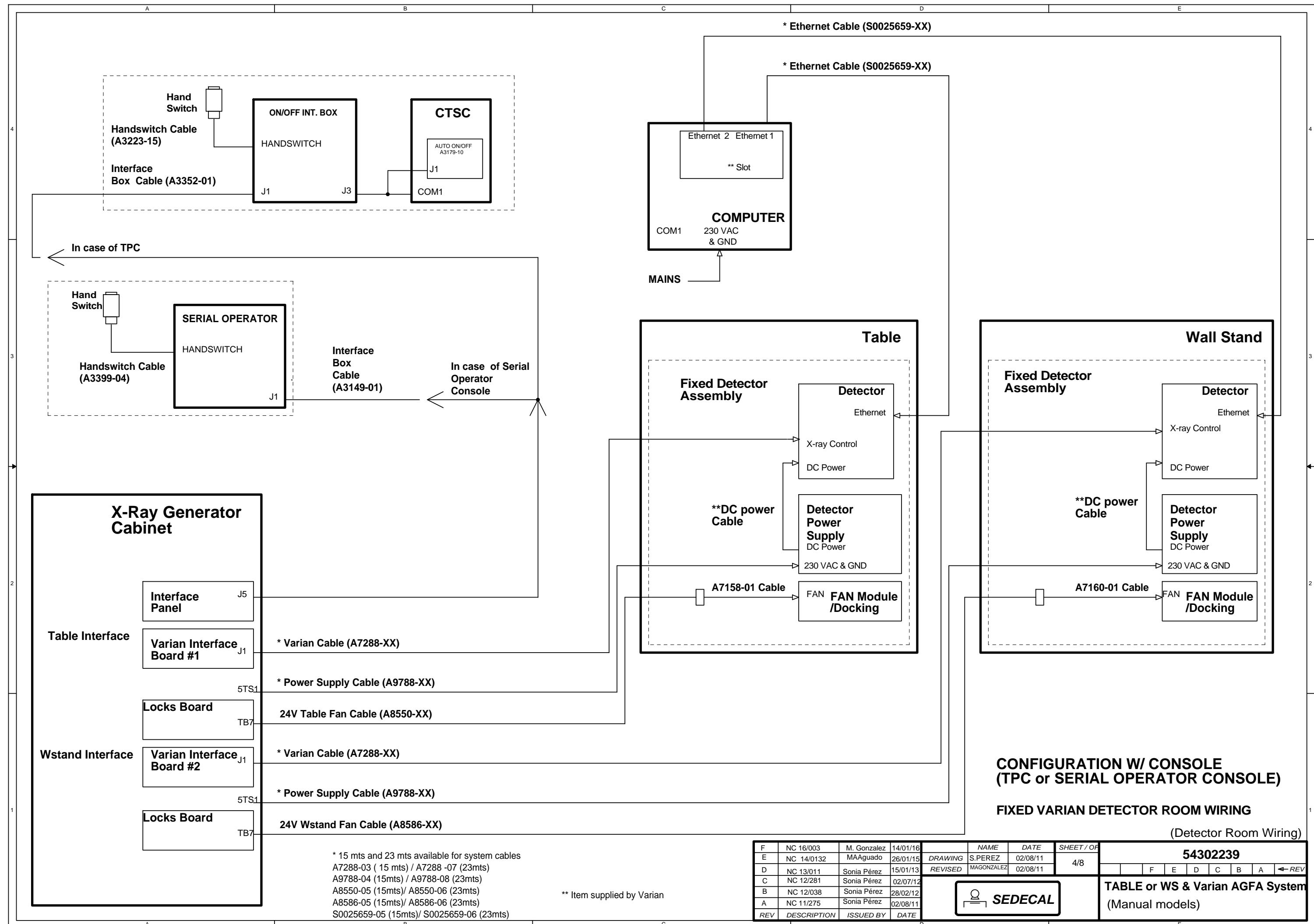
## **CONFIGURATION W/ CONSOLE (TPC or SERIAL OPERATOR CONSOLE)**

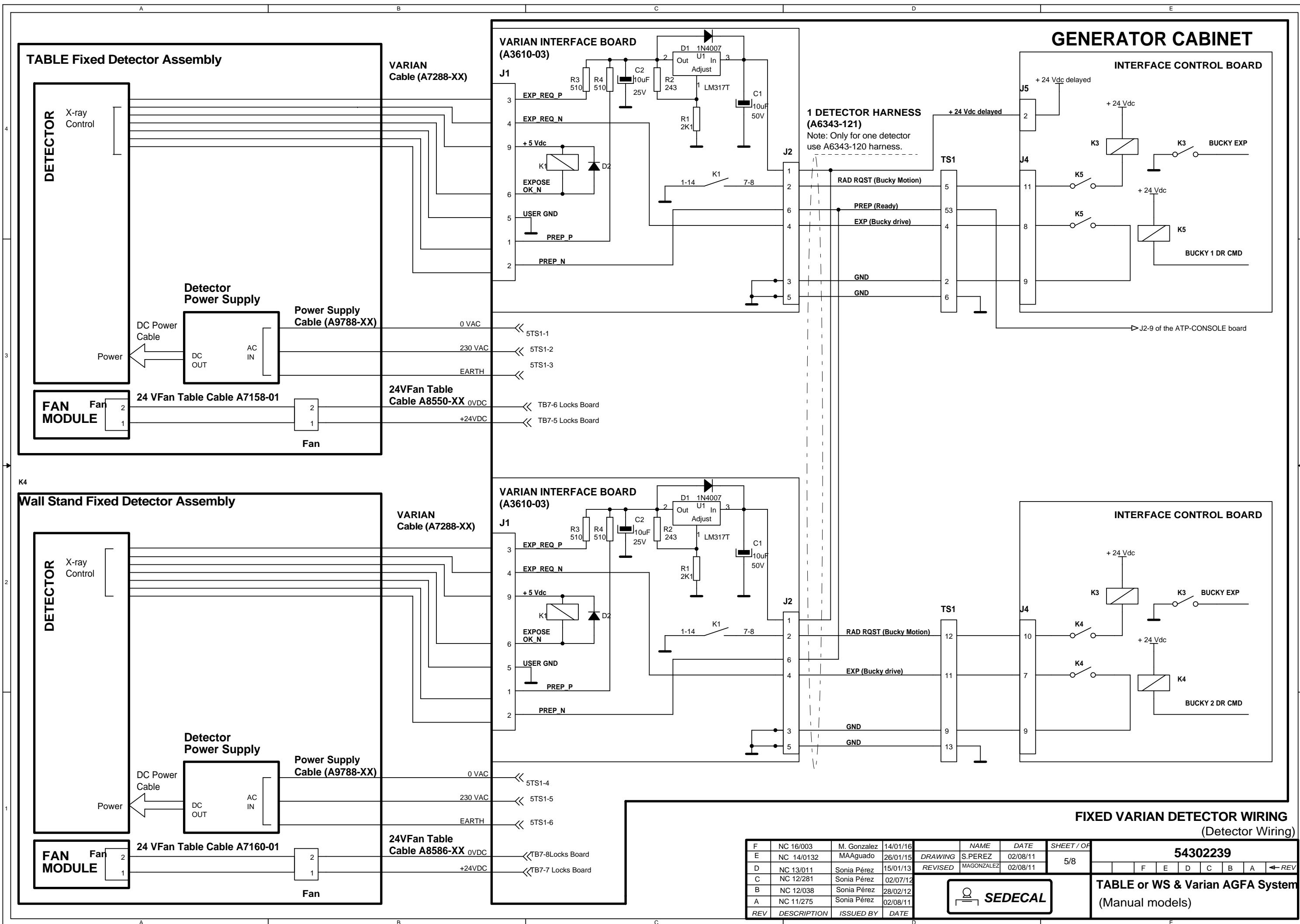
\* Note: AEC is optional.  
A3253-XX cable (-XX depends on available length)

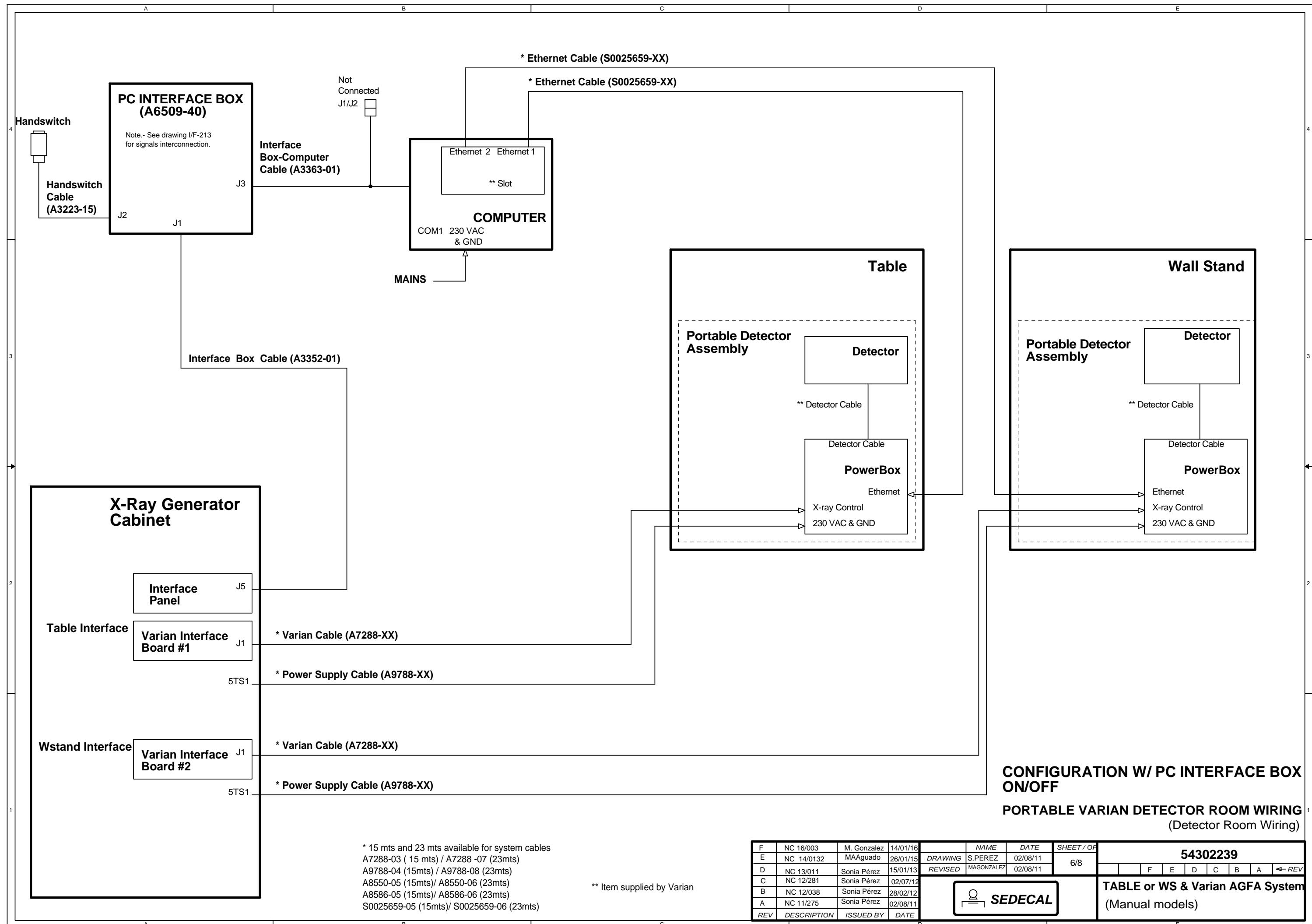
- \* 15 mts and 23 mts available for system cables  
A7288-03 ( 15 mts) / A7288 -07 (23mts)  
A9788-04 (15mts) / A9788-08 (23mts)  
A8550-05 (15mts)/ A8550-06 (23mts)  
A8586-05 (15mts)/ A8586-06 (23mts)  
S0025659-05 (15mts)/ S0025659-06 (23mts)

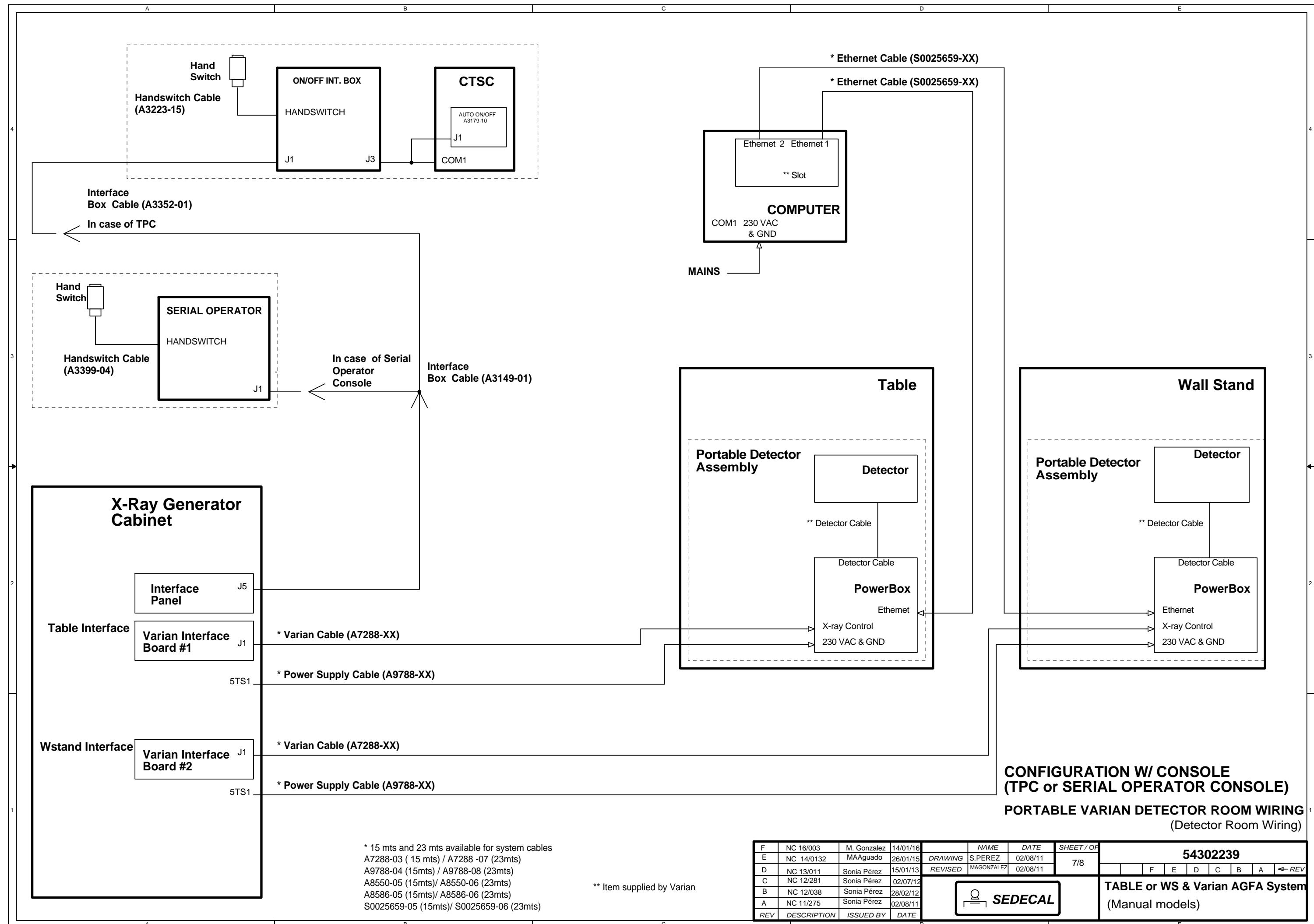
F	NC 16/003	M. Gonzalez	14/01/16		NAME	DATE	SHEET / OF	54302239							
E	NC 14/0132	MAAgudo	26/01/15	DRAWING	S.PEREZ	02/08/11	2/8								
D	NC 13/011	Sonia Pérez	15/01/13	REVISED	MAGONZALEZ	02/08/11									F E D C B A ← REV
C	NC 12/281	Sonia Pérez	02/07/12												
B	NC 12/038	Sonia Pérez	28/02/12												
A	NC 11/275	Sonia Pérez	02/08/11												
REV	DESCRIPTION	ISSUED BY	DATE									TABLE or WS & Varian AGFA System (Manual models)			









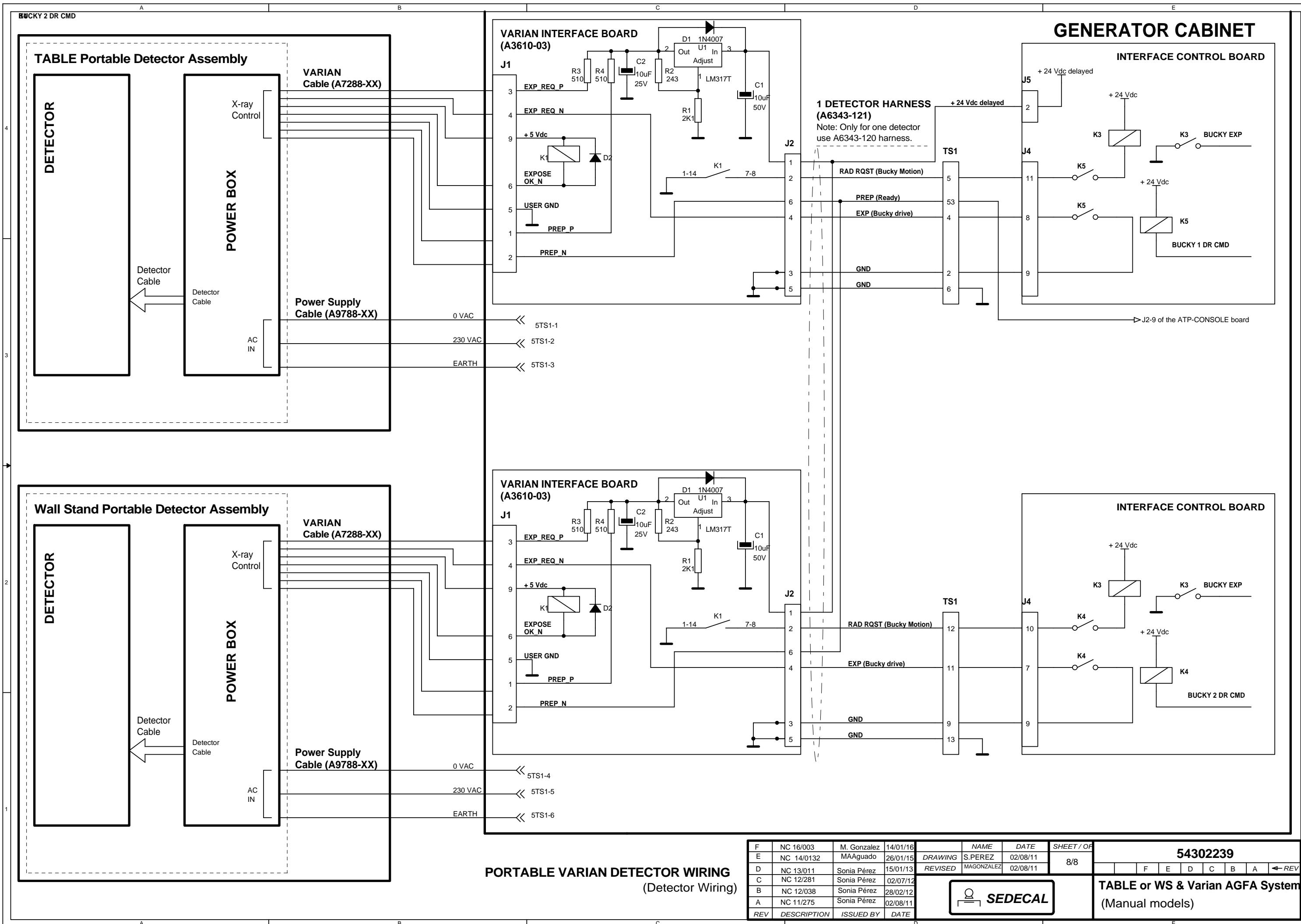


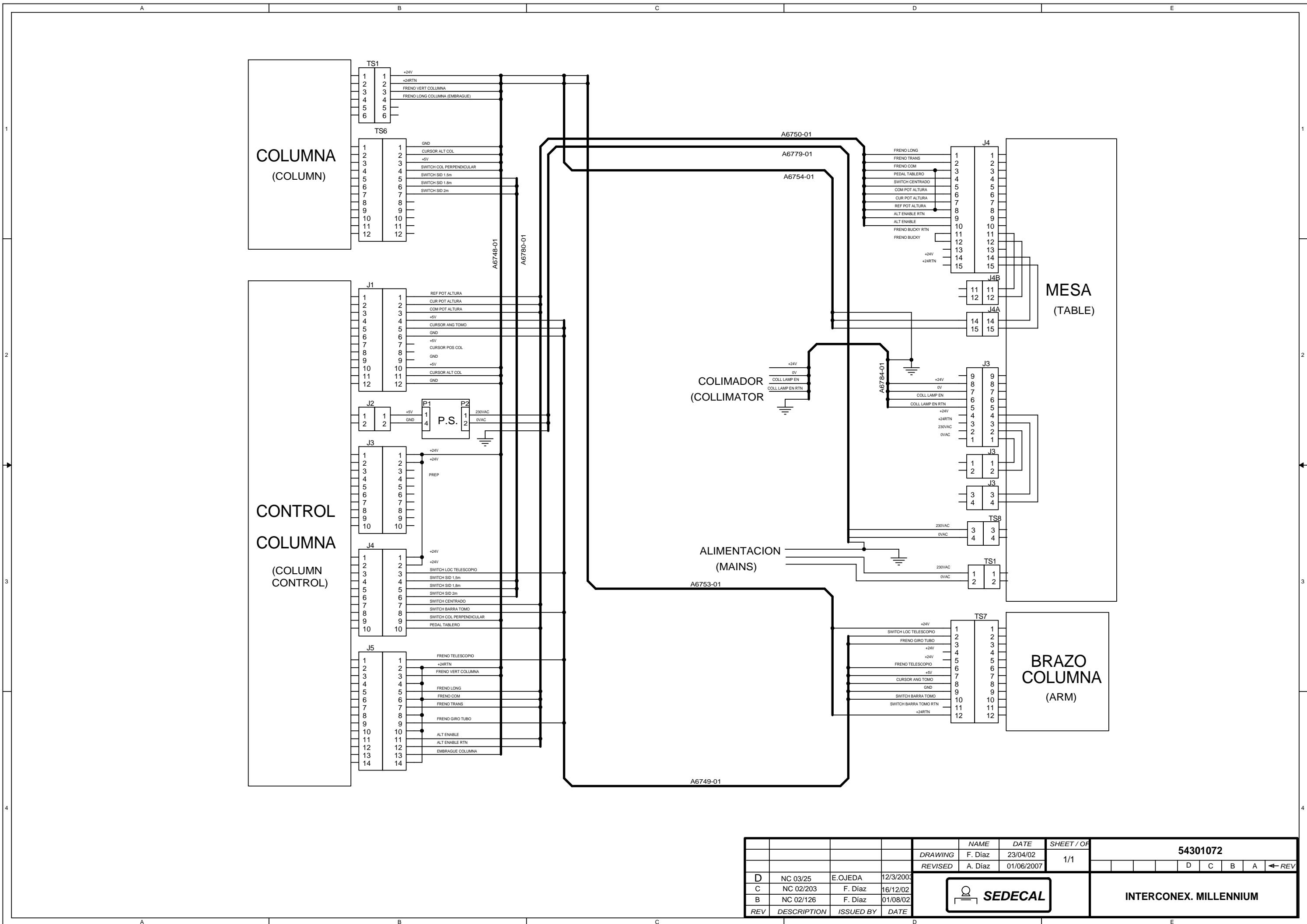
\* 15 mts and 23 mts available for system cables  
 A7288-03 (15 mts) / A7288 -07 (23mts)  
 A9788-04 (15mts) / A9788-08 (23mts)  
 A8550-05 (15mts)/ A8550-06 (23mts)  
 A8586-05 (15mts)/ A8586-06 (23mts)  
 S0025659-05 (15mts)/ S0025659-06 (23mts)

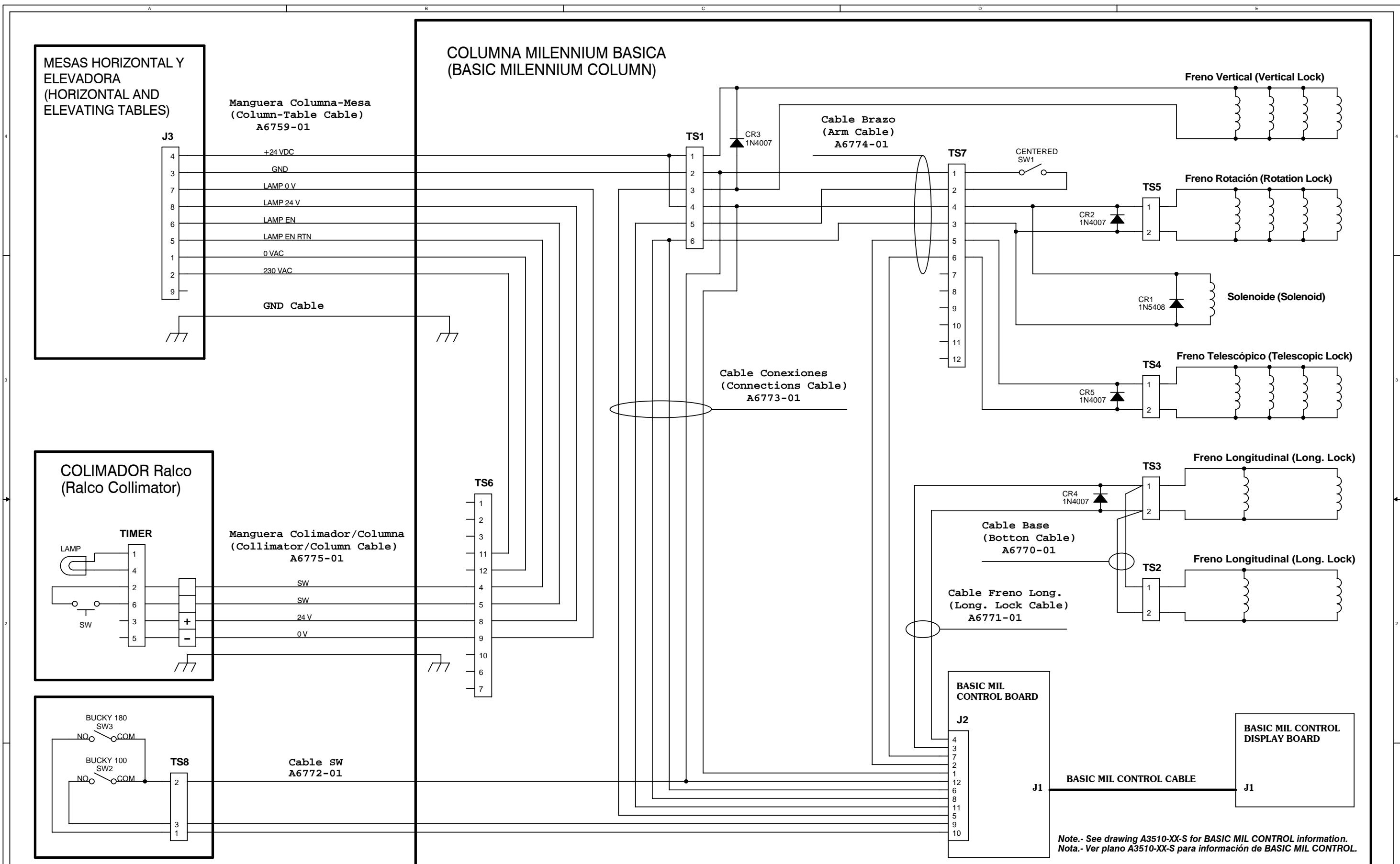
\*\* Item supplied by Varian

F	NC 16/003	M. Gonzalez	14/01/16		NAME	DATE	SHEET / OF	54302239
E	NC 14/0132	MAAgudo	26/01/15	DRAWING	S.PEREZ	02/08/11	7/8	F E D C B A ← REV
D	NC 13/011	Sonia Pérez	15/01/13	REVISED	MAGONZALEZ	02/08/11		
C	NC 12/281	Sonia Pérez	02/07/12	SEDECAL				
B	NC 12/038	Sonia Pérez	28/02/12	SEDECAL				
A	NC 11/275	Sonia Pérez	02/08/11	SEDECAL				
REV	DESCRIPTION	ISSUED BY	DATE					

**TABLE or WS & Varian AGFA System**  
(Manual models)





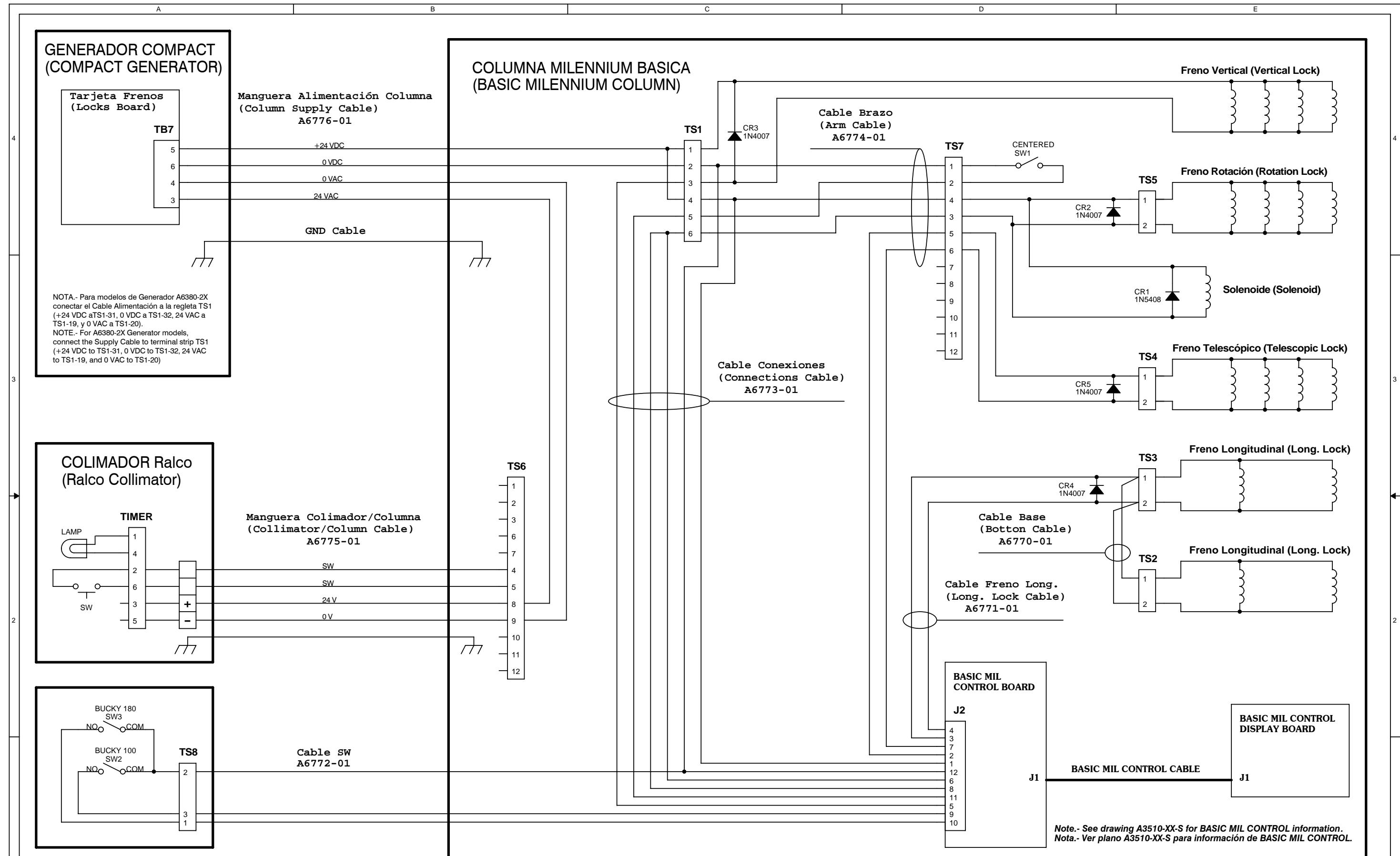


ESTA HOJA SE APLICA SOLO CUANDO LA COLUMNA VA ASOCIADA A UNA MESA HORIZONTAL O ELEVADORA  
(THIS SHEET ONLY APPLIES WHEN THE COLUMN IS ASSOCIATED WITH A HORIZONTAL OR ELEVATING TABLE)

A	New Interface	F. Garcia	05/05/02	NAME	DATE	SHEET / OF	54301058
REV	DESCRIPTION	ISSUED BY	DATE	DRAWING	F.GARCIA	11/11/01	
				REVISED	A.DIAZ	11/11/01	

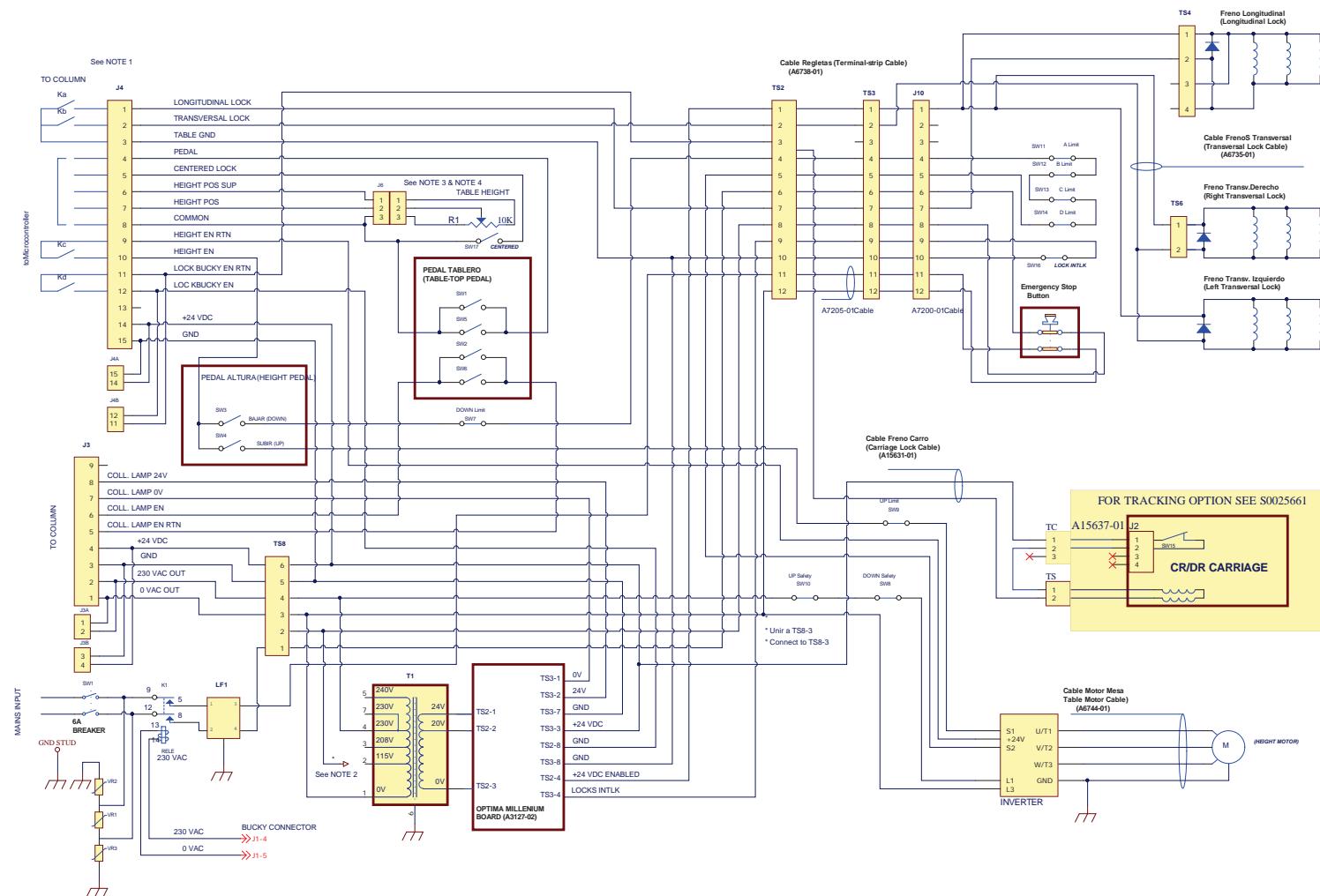
**SEDECAL**

INTERCONEXIONES COLUMNA Basica Millennium  
(Basic Millennium COLUMN INTERCONNECTIONS)



**ESTA HOJA SE APLICA CUANDO LA COLUMNA NO VA ASOCIADA A UNA MESA HORIZONTAL O ELEVADORA  
(THIS SHEET APPLIES WHEN THE COLUMN IS NOT ASSOCIATED WITH A HORIZONTAL OR ELEVATING TABLE)**

				NAME	DATE	SHEET / OF	54301058				
				DRAWING	F.GARCIA	11/11/01	2/2				
				REVISED	A.DIAZ	11/11/01					
A	New Interface	F. Garcia	05/05/02	 <b>SEDECAL</b>				INTERCONEXIONES COLUMNA Basica Millennium (Basic Millennium COLUMN INTERCONNECTIONS)			
REV	DESCRIPTION	ISSUED BY	DATE								



SEE PAG 5 IN CASE OF BRAKE BOARD REQUIRED ON SYSTEM (ONLY WITH COLUMN)

NOTA 1.- Para usar la Mesa sin control de microprocesador,enchufar aj4 un conector con puentes de conexion entre los terminales siguientes: 1-4, 4-2, 3-8, 9-10, 11-12.

**NOTE 1:-** If you use the J4000 series connectors, plug the J4000 connector into the J4 connector on the J4000 series connector. If you use the J4000 series connectors, the connection between the J4000 series connectors and the J4 connector will be made by connection jumpers.

NOTA 2.- Conectar el hilo (\*) a la entrada de T1 de acuerdo a la tensión de Línea

Si la tensión de frenos está por debajo de +22 V y la tensión de línea es 240V o 230 V: Conectar el hilo (\*) al terminal de entrada de tensión en T1 inmediatamente por debajo del correspondiente a la tensión de Línea (230 V o 208V).

**NOTE 2.-** Connect wire (\*) to T1 input according to the Line voltage.

If the Locks voltage output is below +22 V and the Line voltage is 240V or 230V: Connect wire (\*) to T1 terminal voltage input the just below to the corresponding Line voltage (230 V or 208V).

NOTA 3.- Las conexiones del potenciómetro mostradas son las normales de la Mesa (ver A10130-02, pot 10K). Dichas conexiones se invierten cuando la Mesa se utiliza con la OTC (ver A10130-01, pot 10K).

NOTE 3 - The potentiometer connections shown are for standard use (see AT0130-02, por 10K). These connections are reversed when the Table is used with oTC Suspension (see AT0130-02, por 10K).

NOTE 4.- En caso de sistema con collimación automática analógica Raico, el potenciómetro será de doble cuerpo (ver cable A8539-0 para OTC o cable A8539-02 para columnas).

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I	INC/01884	RHA	23/01/17	NAME	DATE	SHEET / OF	PBA: 54301061	PCB:					
S	INC/140184	MC	140811	DRWING	MC	140811	T	S	R	O	P	O	REV
R	INC/10421	MC	111125	REVISED	F.DIAZ	140811							
O	INC/10520	MC	101222										
P	INC/10208	S. PEREZ	101124										
O	INC/10358	MC	100902										

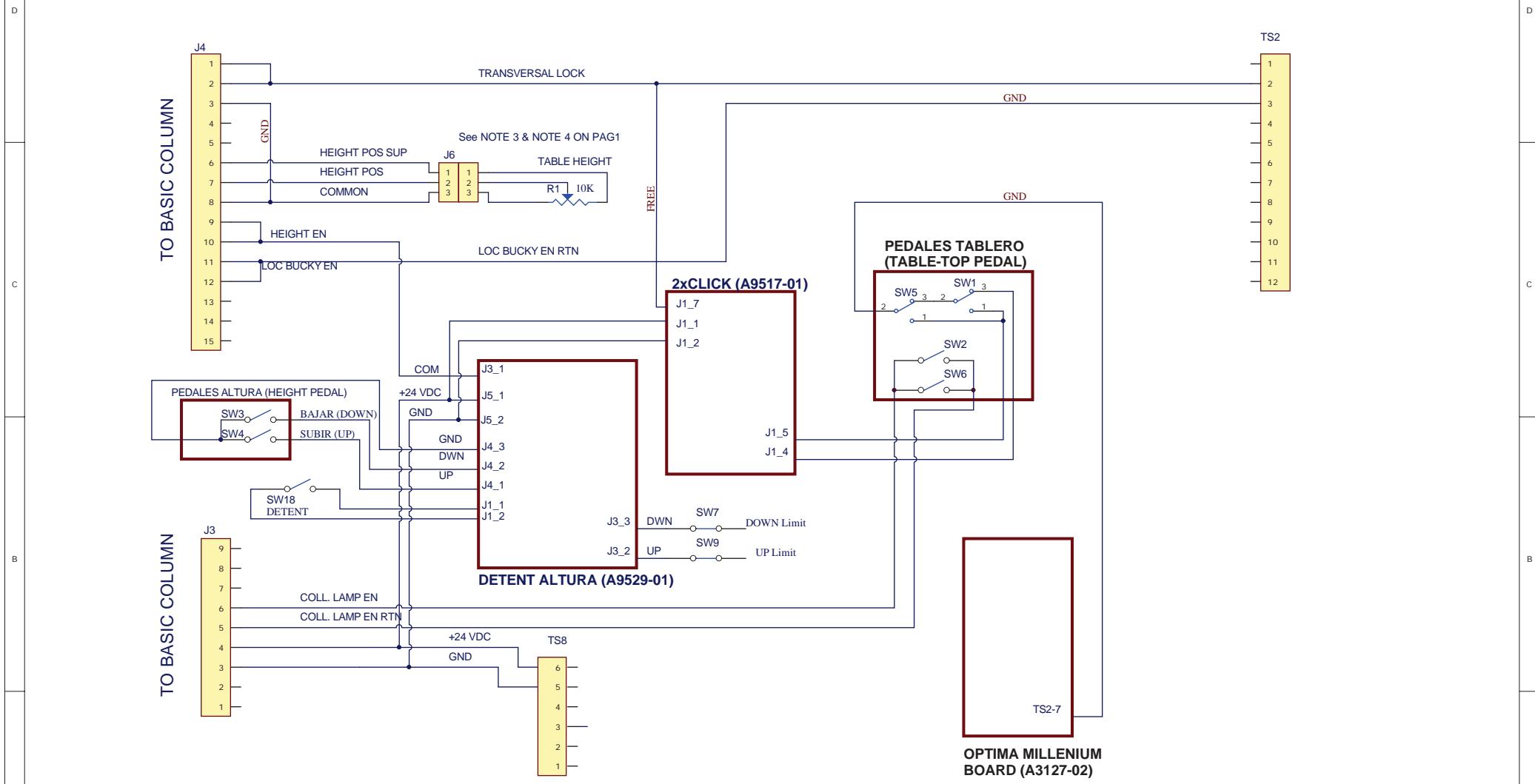
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MESA ELEVADORA MILLENNIUM

## IN CASE OF DOUBLE CLICK PEDAL & DETENT

NOTA.- EN CASO DE SISTEMA CON COLUMNA AVANZADA LA FUNCIONALIDAD DOBLE CLICK Y DETENES ES SOFTWARE

NOTE.- IN CASE OF ADVANCED COLUMN SYSTEM , THE DOUBLE CLICK AND DETENT FUNCTIONALITY IS INCLUDED ON SOFTWARE

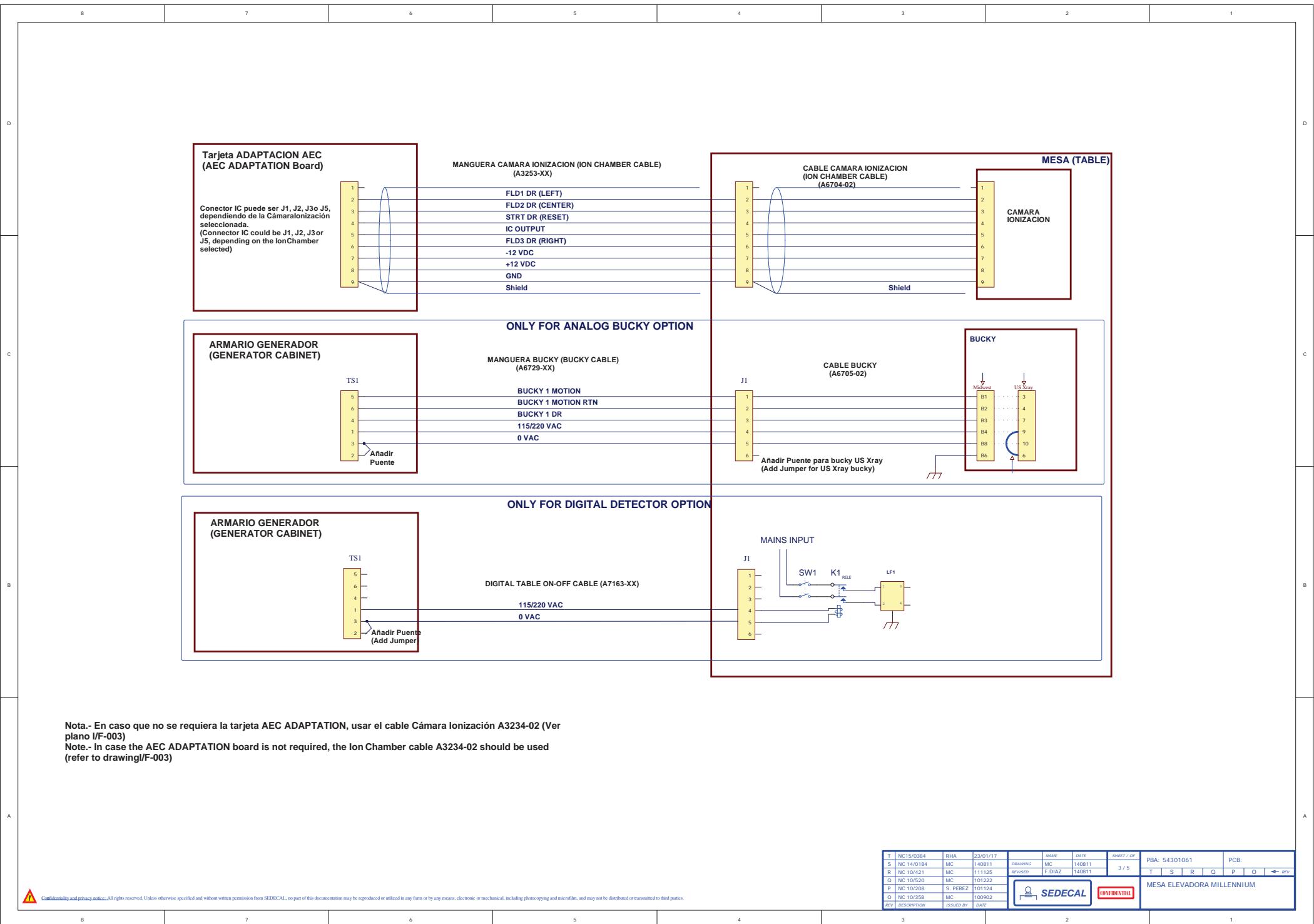


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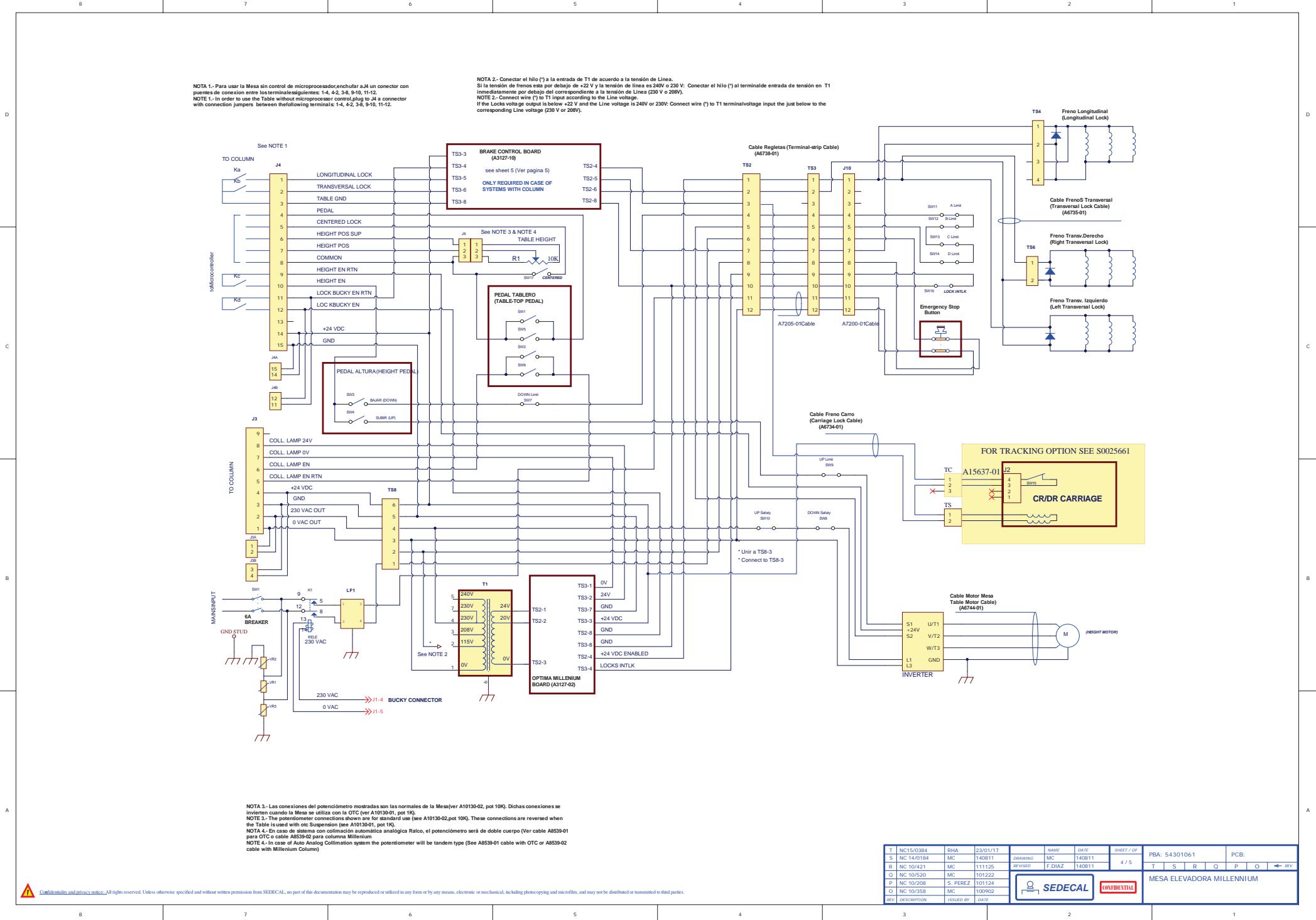
T	NC15/0384	RHA	23/01/17	NAME		DATE	SHEET / OF	PBA: 54301061	PCB:
S	NC 14/0184	MC	140811	DRAWING	MC	140811	2 / 5	F.DIAZ	140811
R	NC 10/421	MC	111125	REVISED					
Q	NC 10/520	MC	101222						
P	NC 10/208	S. PEREZ	101124						
O	NC 10/358	MC	100902						
REV	DESCRIPTION	ISSUED BY	DATE						

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MESA ELEVADORA MILLENNIUM



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**NOTA 5.** Las conexiones de la mesa utilizadas con la OTC (ver A10130-02, pot 10K). Dichas conexiones se invertirán cuando la mesa se utilice con la GTC (ver A10130-01, pot 1K).  
**NOTE 5.** The potentiometer connections shown are for standard use (see A10130-01, pot 1K). These connections are reversed when the Table is used with otc Suspension (see A10130-02, pot 10K).  
**NOTA 6.** En caso de sistema de collimación analógico Ralco, el potenciómetro será de doble cuerpo (Ver cable A8539-01 para OTC o cable A8539-02 para columna Millennium).  
**NOTE 6.** In case of Auto Analog Collimation system the potentiometer will be tandem type (See A8539-01 cable with OTC or A8539-02 cable with Millennium Column)



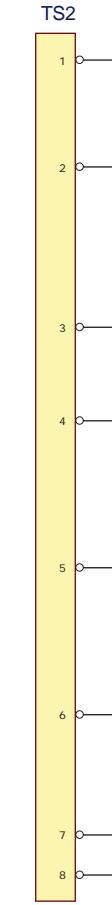
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T	NC15/0384	RHA	23/01/17	NAME	DATE	SHEET / OF
S	NC 14/0164	MC	140811			
R	NC 10/421	MC	111125	REVISED	F. DIAZ	140811
L	NC 10/208	MC	140811			
P	NC 10/208	S. PEREZ	101124			
O	NC 10/258	MC	100902			
REV	DESCRIPTION	ISSUED BY	DATE			

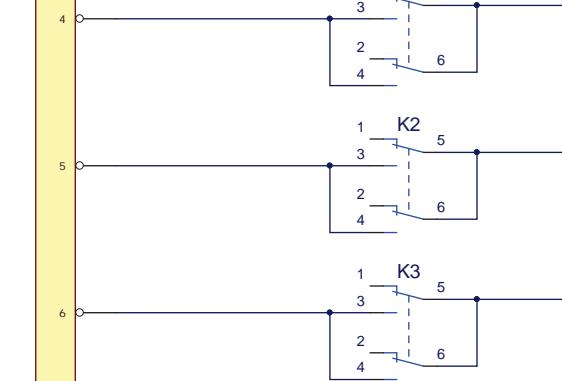
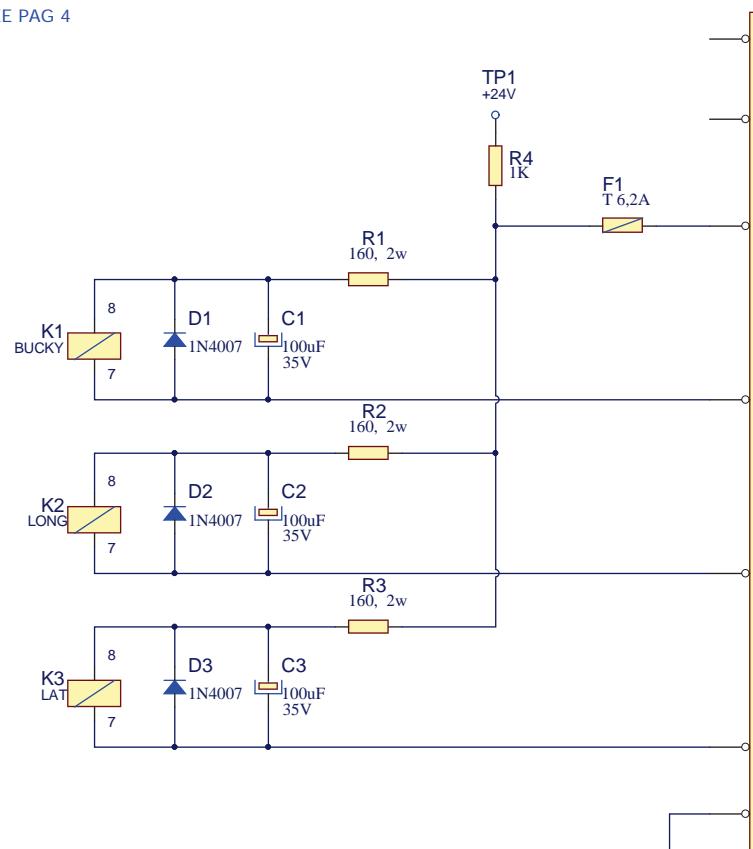
PBA: 54301061 PCB:  
T S R O P O ← REV  
**SEDECAL** CONFIDENTIAL  
MESA ELEVADORA MILLENNIUM

D

D



ONLY REQUIRED IN CASE OF SYSTEMS WITH COLUMN SEE PAG 4  
(Requerido solo en sistemas con columna, ver pag 4)

TP2  
GND

A

A



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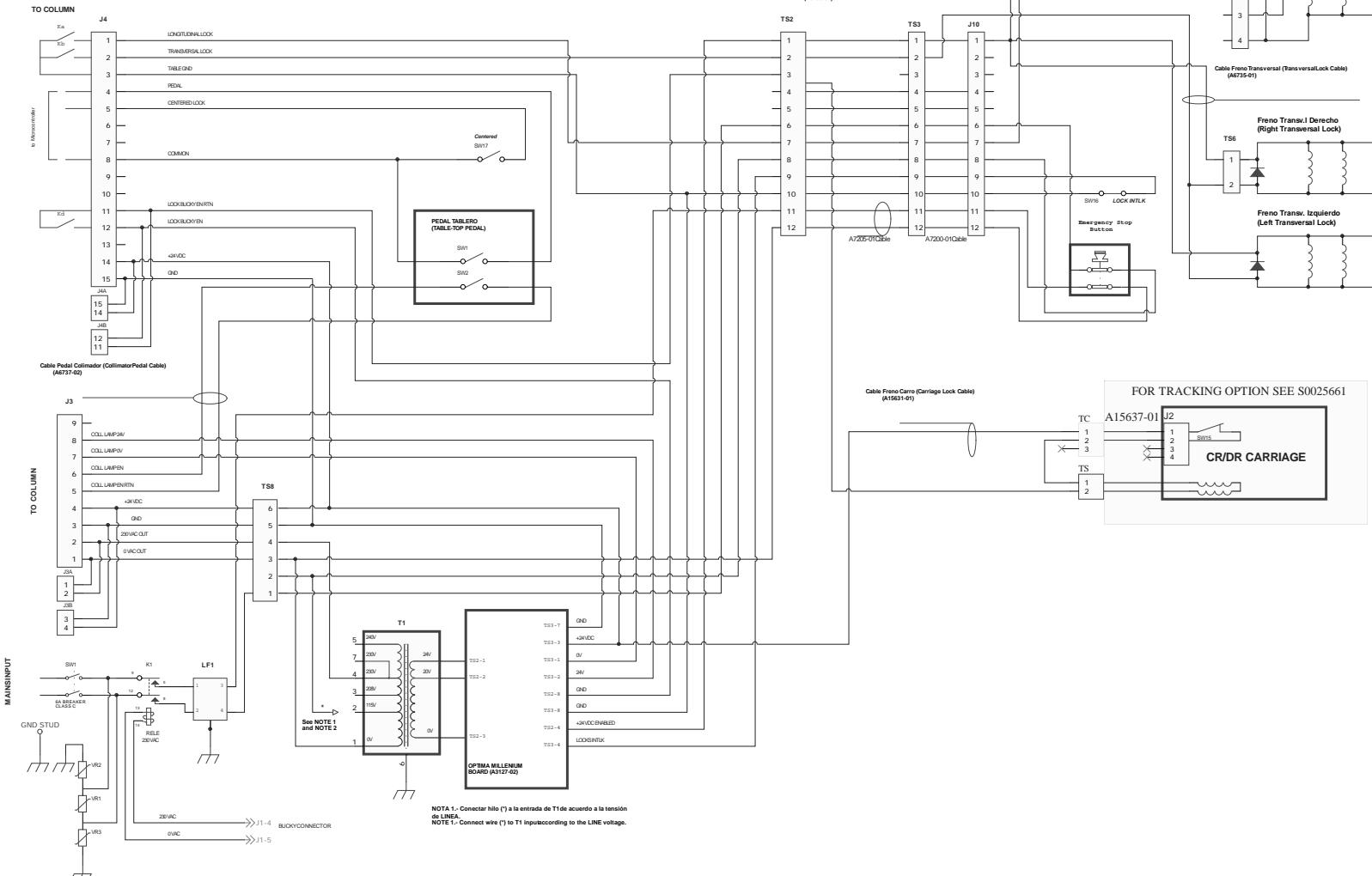
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S	NC 14/0184	MC	140811	DRAWING	MC	140811 <th data-kind="parent" data-rs="2">5 / 5</th> <td data-kind="parent" data-rs="2"></td> <td data-kind="parent" data-rs="2"></td>	5 / 5		
R	NC 10/421	MC	111125	REVISED	F.DIAZ	140811			
O	NC 10/520	MC	101222						
P	NC 10/208	S. PEREZ	101124						
O	NC 10/358	MC	100902						
REV	DESCRIPTION	ISSUED BY	DATE						

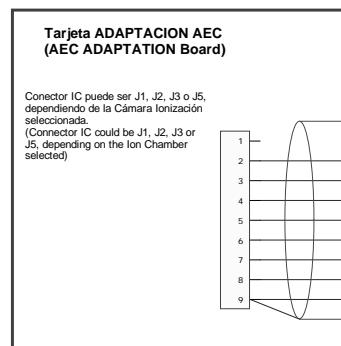
**SEDECAL** CONFIDENTIAL

MESA ELEVADORA MILLENNIUM

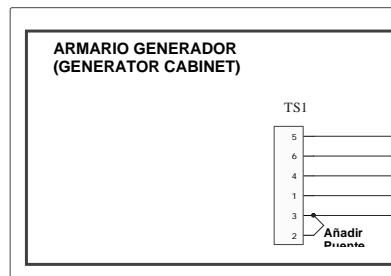
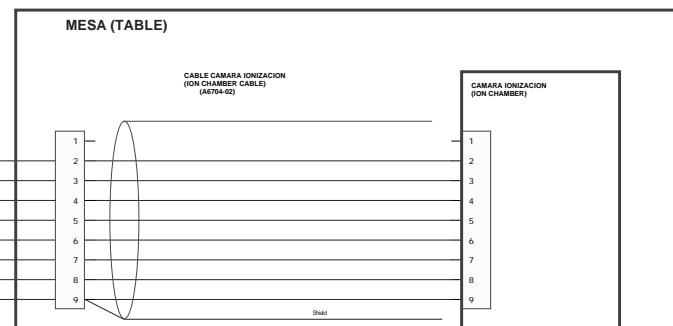
NOTA: Para usar la Mesa sin control de microprocesador anular a J4 un conector con puentes de conexión entre los terminales siguientes: 1-4, 4-2, 8-11-12.  
NOTE: In order to use the Table without microprocessor control plug to J4 a connector with connection jumps between the following terminals: 1-4, 4-2, 8-11-12.

NOTA 2: Tensión de frenos por debajo de +22V.  
Conectar el hilo (\*) a la entrada de tensión T1 inmediatamente por debajo de la correspondiente a la tensión de Linea.  
NOTE 2: Locks voltage output below +22 V.  
Connect wire (\*) to T1 voltage input the rest below the corresponding to the Line Input.





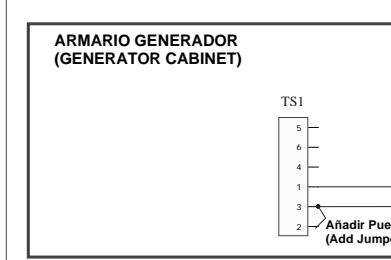
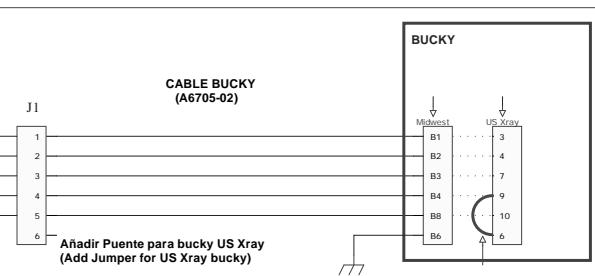
MANGUERA CAMARA IONIZACION (ION CHAMBER CABLE)  
(A3253-XX)



ONLY FOR ANALOG BUCKY OPTION

MANGUERA BUCKY (BUCKY CABLE)  
(A6729-XX)

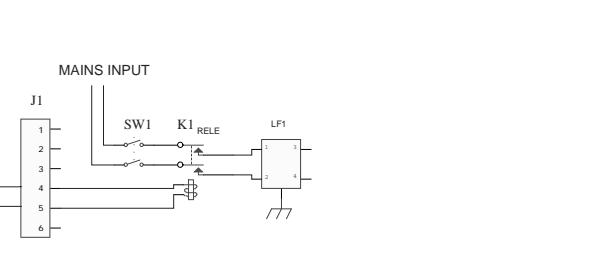
BUCKY 1 MOTION  
BUCKY 1 MOTION RTN  
BUCKY 1 DR  
115/220 VAC  
0 VAC



ONLY FOR DIGITAL DETECTOR OPTION

DIGITAL TABLE ON-OFF CABLE (A7163-XX)

115/220 VAC  
0 VAC



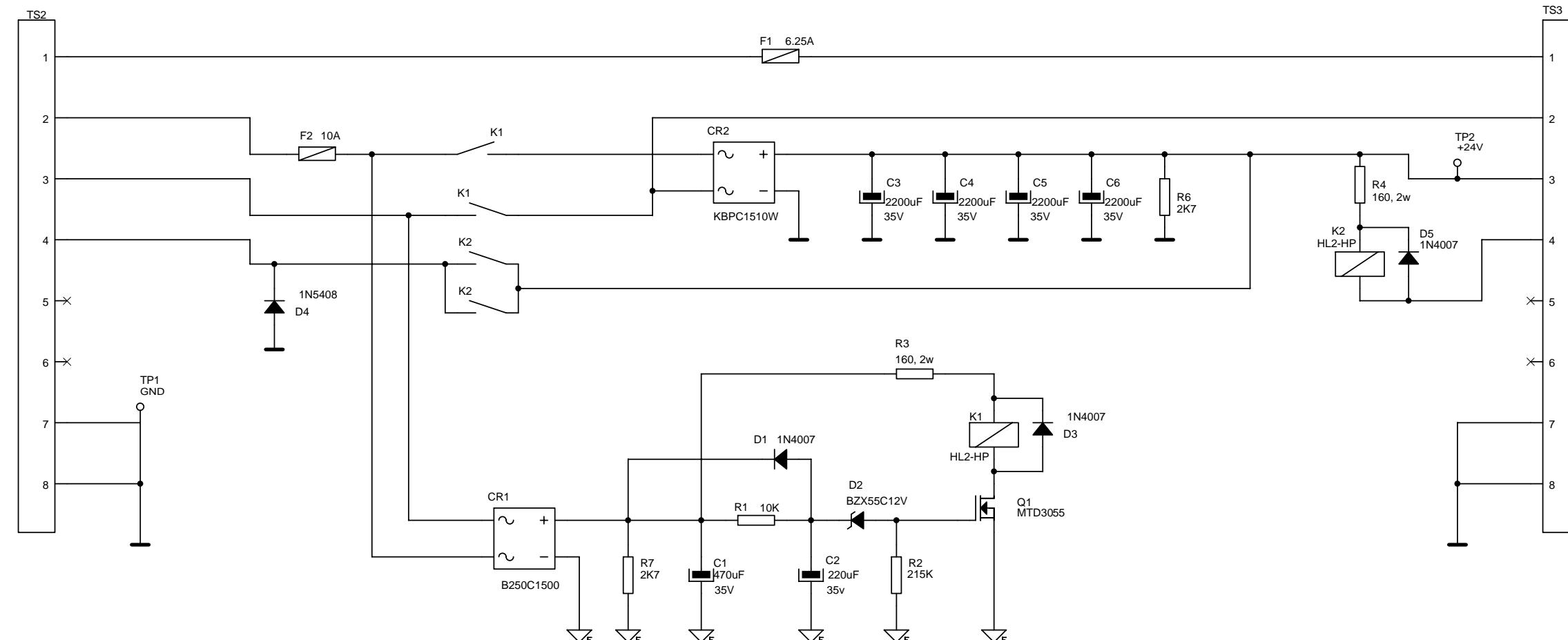
N	NC15/0384	RHA	23/01/17	NAME	DATE	SHEET / OF	PBA: 54301063	PCB:
M	NC114/21	MC	25/11/11	DRAWING	F. Garcia	03/03/02		2 / 2
L	Note 2 added	F. Garcia	24/07/08	REVISED	A. Diaz	03/03/02		
REV	DESCRIPTION	ISSUED BY	DATE					

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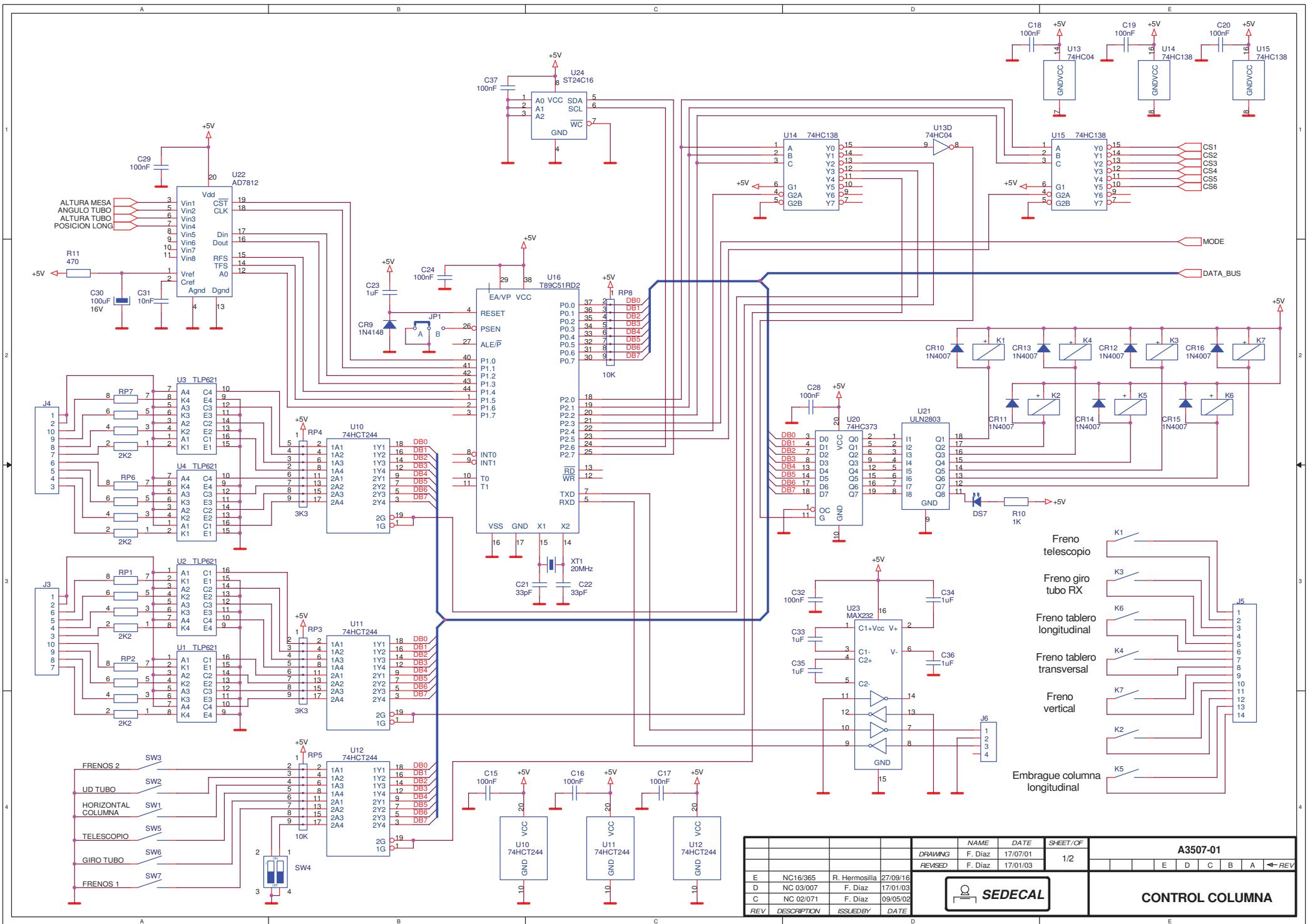
MESA HORIZONTAL MILLENNIUM

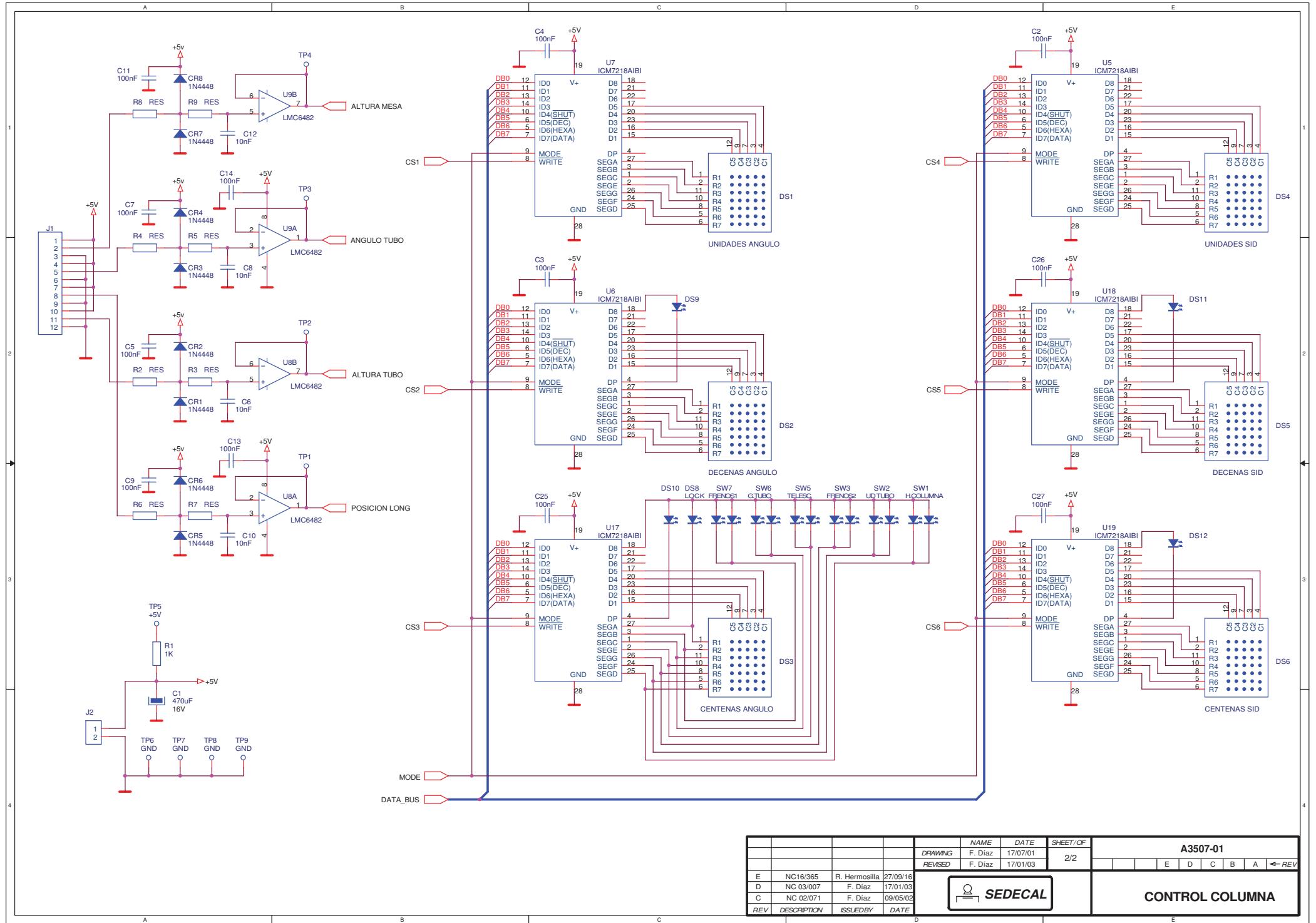


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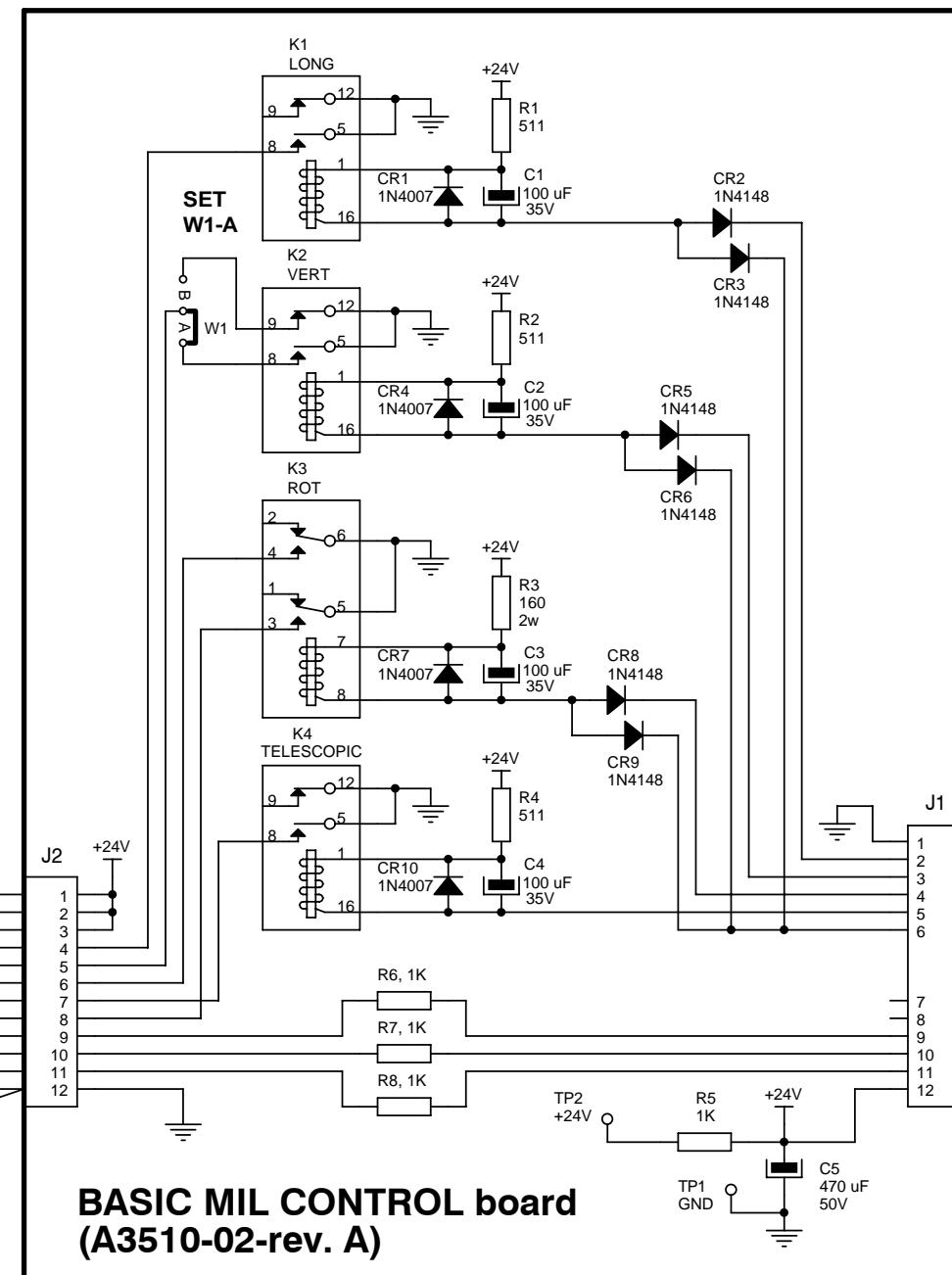
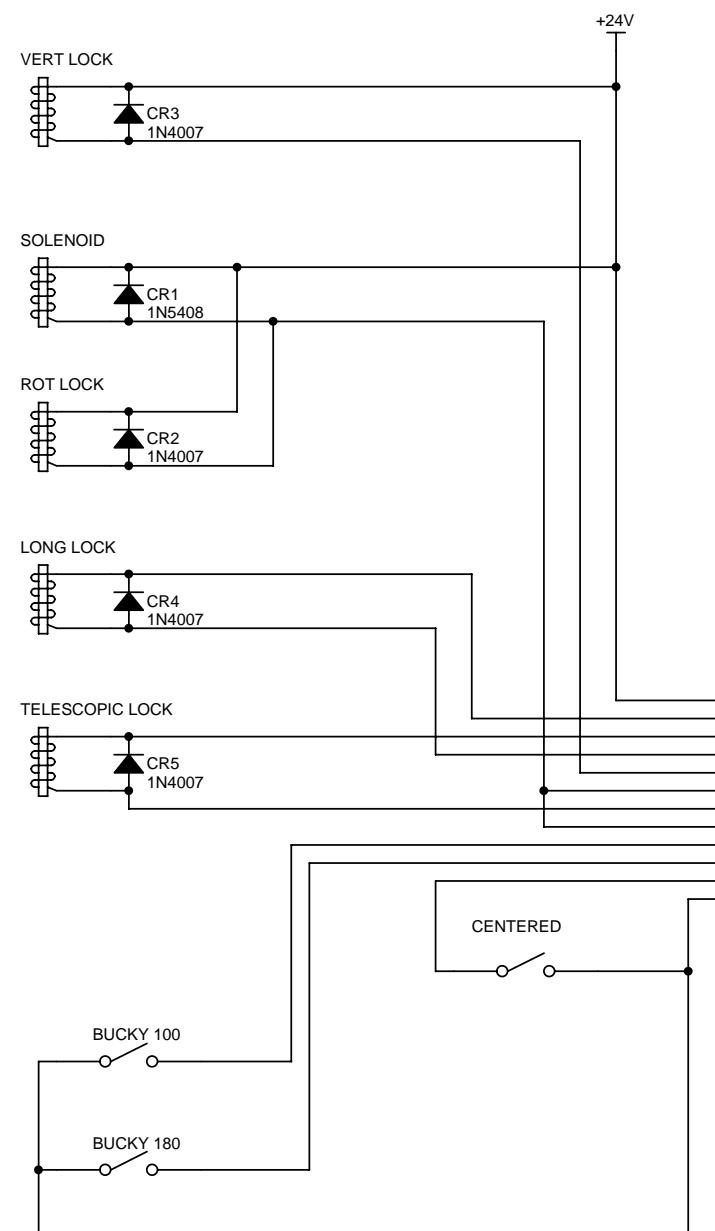


				NAME	DATE	SHEET / OF	A3127-02				
				DRAWING	EOJEDA	11/03/03	1/1				
				REVISED	EOJEDA	11/03/03					
				 <b>SEDECAL</b>							
A	NC 03/045	E. OJEDA	11/03/03					PCB OPTIMA MILLENIUM			
REV	DESCRIPTION	ISSUED BY	DATE								





## COLUMN

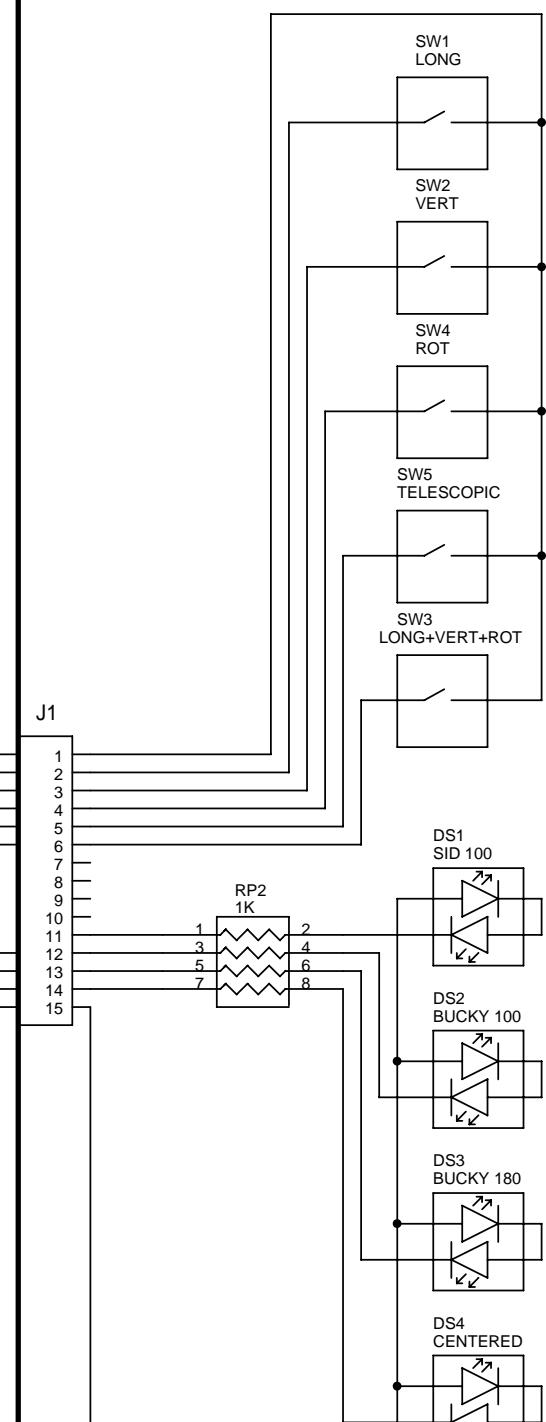


Basic Mil Control  
Cable (A6724-01)

BUTTON COMMON  
LONG  
VERT  
ROT  
TELESCOPIC  
LONG+VERT+ROT

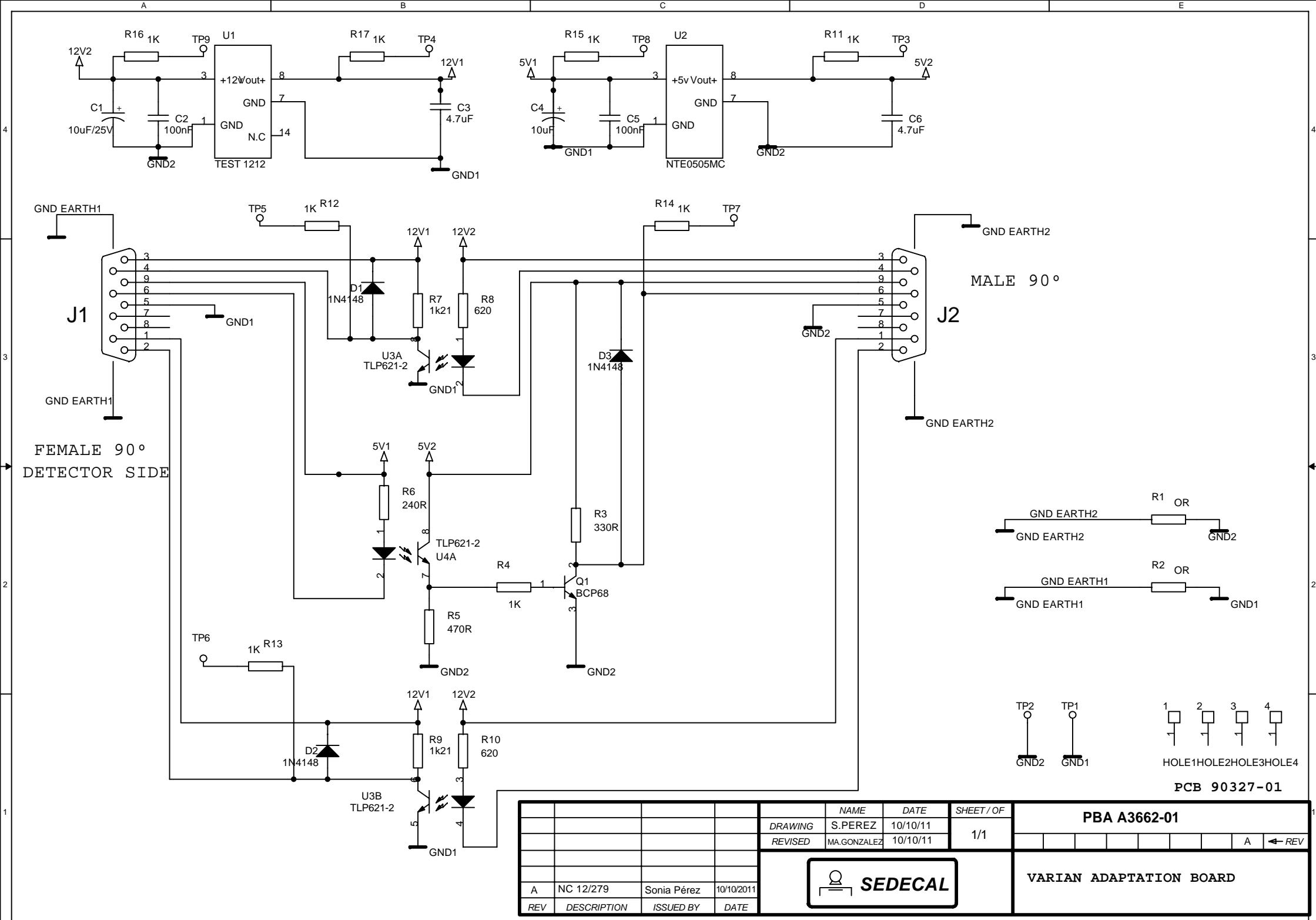
BUCKY 100 LAMP  
BUCKY 180 LAMP  
CENTERED LAMP  
LAMP COMMON

**BASIC MIL CONTROL**  
**DISPLAY Board (A3195-01)**



A	CN 04/051	F. Garcia	22/09/05	NAME	DATE	SHEET / OF
REV	DESCRIPTION	ISSUED BY	DATE	DRAWING	REvised	1/1
A						A ← REV
				SEDECAL		

**BASIC MIL CONTROL**



1 2 3 4 5 6

Wall Stand standard configuration  
Configuración estándar del Soporte de Pared

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

WALL BUCKY CABLE

Generator Connection For SHF : A6703-XX For SHFR : A15155-XX

For SHF: See schematics IF-002 / IF-006 / IF-045.

For SHFR: See schematics 6010000

ION CHAMBER CABLE

Generator Connection For SHF or SHFR : A3253-XX OR A9779-XX

For SHF: See schematics IF-003 / IM-015 / IM-014 / IM-018 / IM-019 / IM-081.

For SHFR: See schematics 6011002

WALL STAND POWER SUPPLY CABLE	SHF	SHFR W/O MULTIRAD TELESCOPIC COLUMN	SHFR WITH MULTIRAD TELESCOPIC COLUMN
MULTIRAD ROOM W/O TRACKING OPTION or MILLENNIUM ROOM	A6707-XX	A15512-XX	A6707-XX
MULTIRAD ROOM W TRACKING OPTION	A7294-XX	A15513-XX	A7294-XX

+24 VDC LOCKS  
0 VDC LOCKS  
0 VDC LOCKS

For Generator with MULTIRAD Room, see schematics connection :

TELESCOPIC		NO TELESCOPIC	
MULTIRAD	NET	MULTIRAD	NET
SHF 54303142	54303144	54303143	54303145
SHFR 6005017	6005018	6005015	6005016

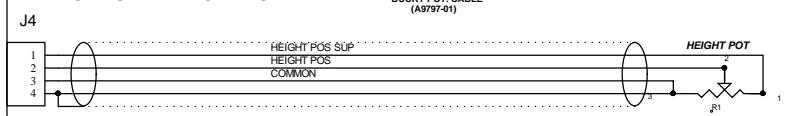
For Generator with MILLENNIUM Room, connect the WS Power Supply Cable to:

SHF	TB7-5/7 (+24 VDC) and TB7-6/8 (0 VDC) of the Generator Locks Board. * When Millennium RAD Table is present, connect the cable to TS8-6 (+24 VDC) and TS8-5 (0 VDC) in case of SHF Battery Generator or to turn ON the Wall Stand when the Table is turned ON.
SHFR	TS3-1/2 (+24 VDC) and TS3-7/8 (0 VDC) of the Generator. * When Millennium RAD Table is present, connect the cable to TS8-6 (+24 VDC) and TS8-5 (0 VDC) to turn ON the Wall Stand when the Table is turned ON.

WALL STAND

OPTIONAL HEIGHT POT

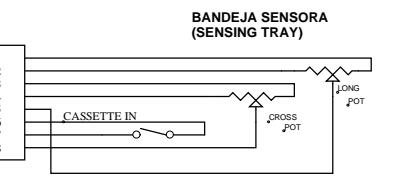
BUCKY POT. CABLE  
(A9797-01)



OPTIONAL SENSING TRAY

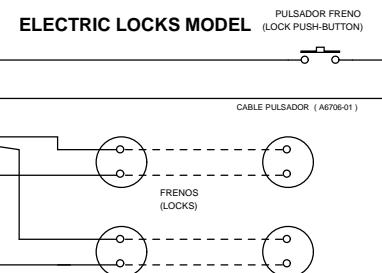
J3

LONG POT. (0 VDC)  
LONG POT. (5 VDC)  
CROSS POT. (5 VDC)  
CROSS POT. (0 VDC)  
CROSS POT. (SLIDER)  
BUCKY RIGHT  
COMMON  
LONG POT. (SLIDER)  
SHIELD



OPTIONAL BUCKY

OPTIONAL ION CHAMBER



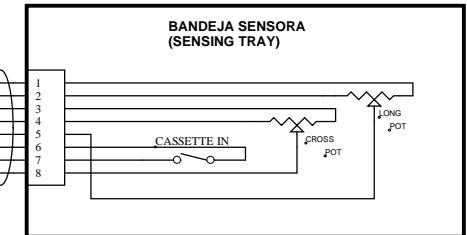
NAME	DATE	SHEET / OF	54301068				
F.GARCIA	09/09/02	1/4					
REVISED	REvised	DATE	H	G	F	REV	
H	NC_15/421	MAAquado	08/02/16				
G	NC 15/106	M.Gonzalez	23/03/15				
F	NC 13/291	S.Perez	17/09/13				
REV	DESCRIPTION	ISSUED BY	DATE	SEDECAL	WALL STAND INTERCONNECTION		

### INTERNAL WALL SUPPORT WIRING

#### OPTIONAL SENSING TRAY

J3

Cable Adapt. Sensor Cassette  
(Cassette Sensing Adapt. Cable)  
(A7652-02)



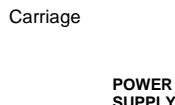
ROOM CABINET

GND

GND CABLE

GND

CEILING SUSPENSION



Power Supply Cable  
(S0021066)

I2C Cable  
(S0013940)

I2C Cable  
(A8542-01)

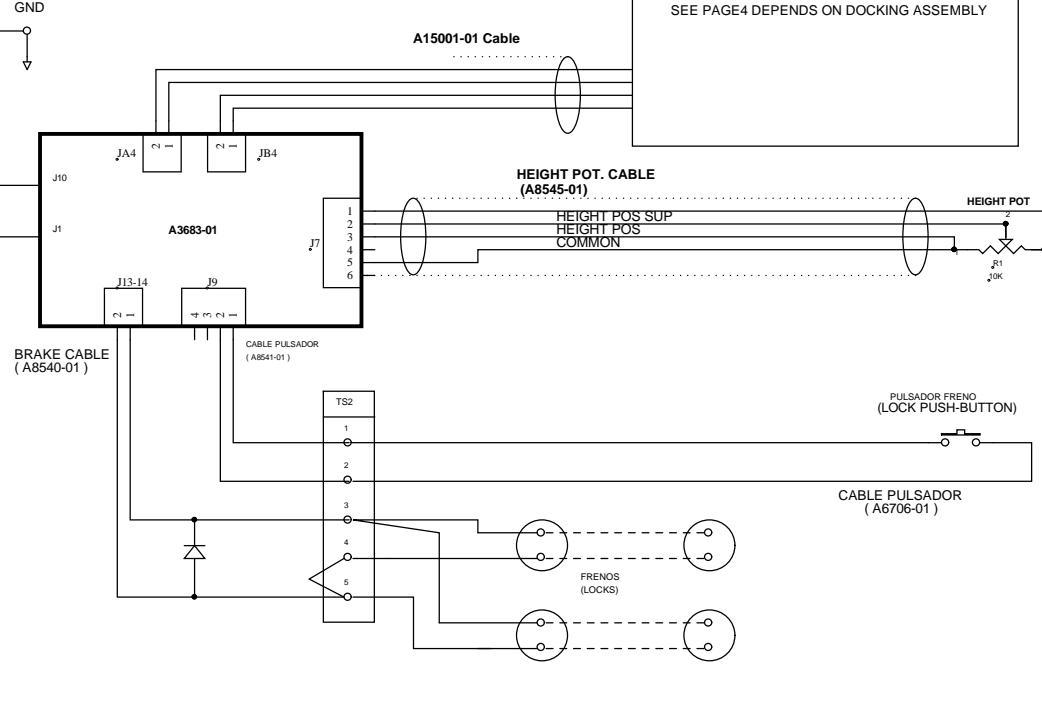
J18

Power Supply Cable  
(S0020989)

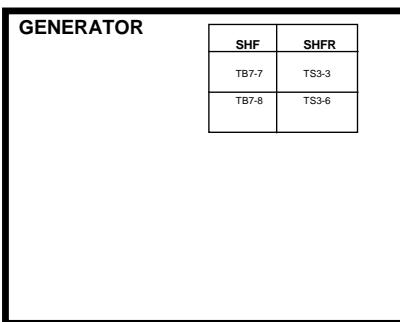
If single panel room  
if not single

IF ELEVATING TABLE  
(NET4000)

JP7  
Power Supply Cable  
(S0002176)



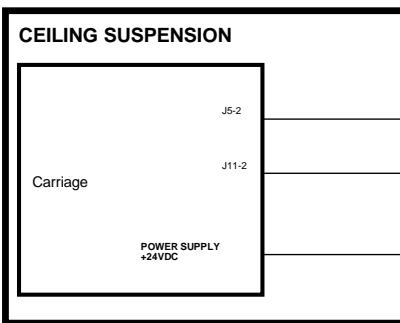
Conexion Wall Stand con configuracion I2C  
Internal Wall STAND with I2C configuration



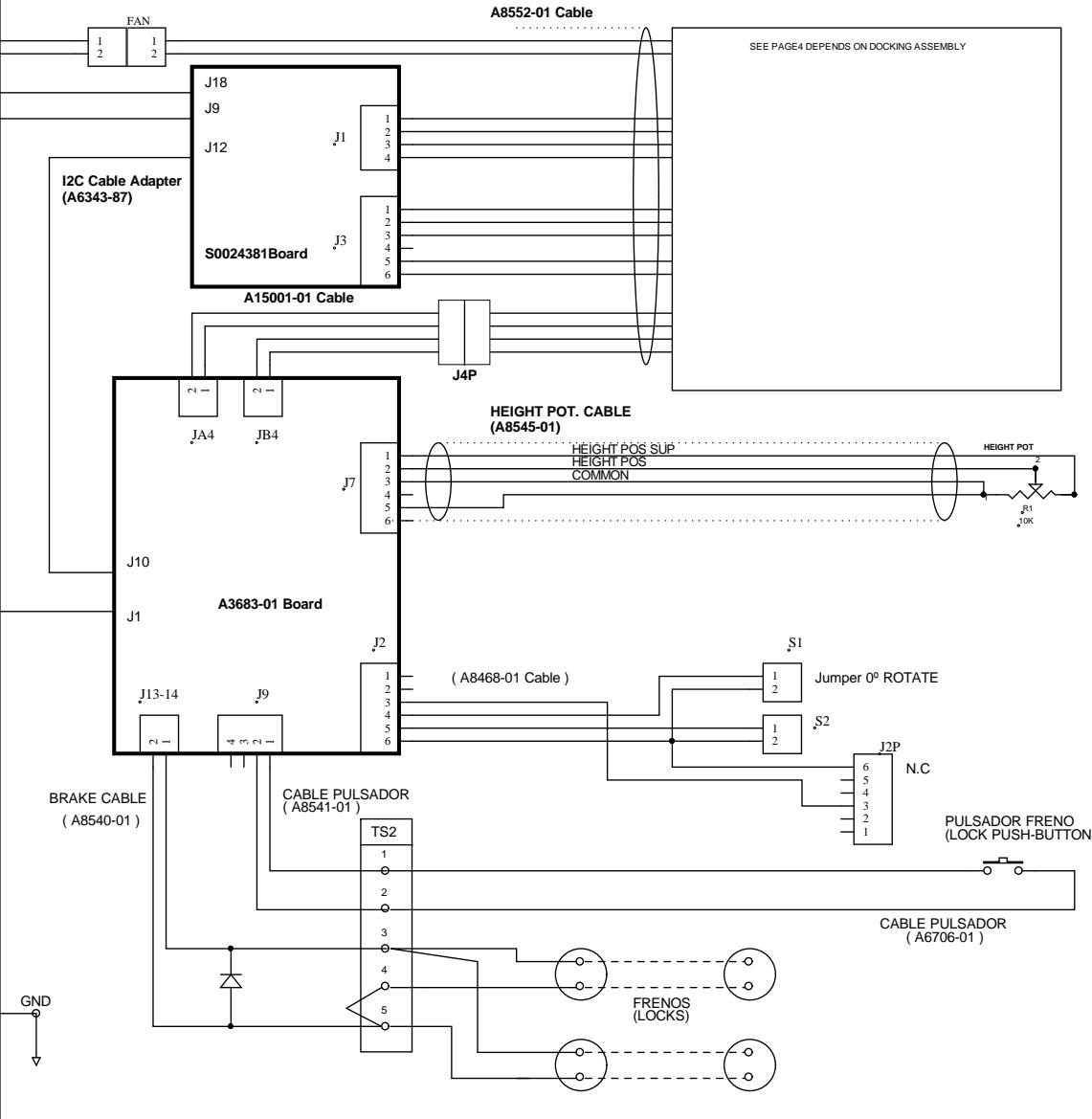
SHF  
A8586-XX Fan Cable (IF REQUIRED)  
SHFR  
A15516-XX WS FAN POWER SUPPLY CABLE SHFR (IF REQUIRED)

+24VDC

0VDC



### INTERNAL WIRING (I2C+DOCKING SW CONFIGURATION)



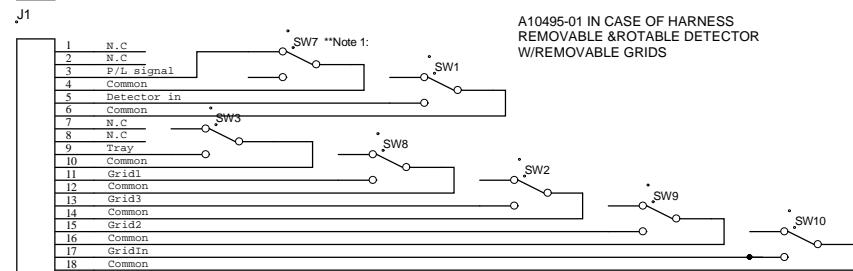
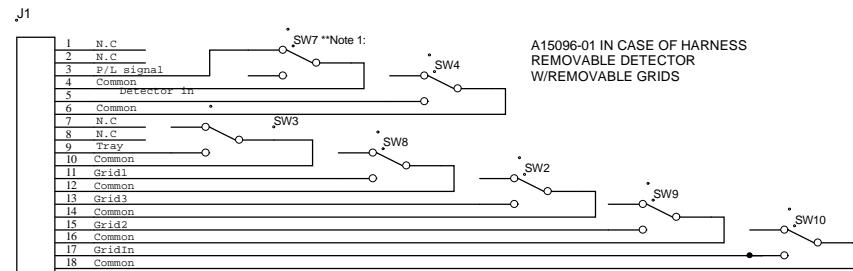
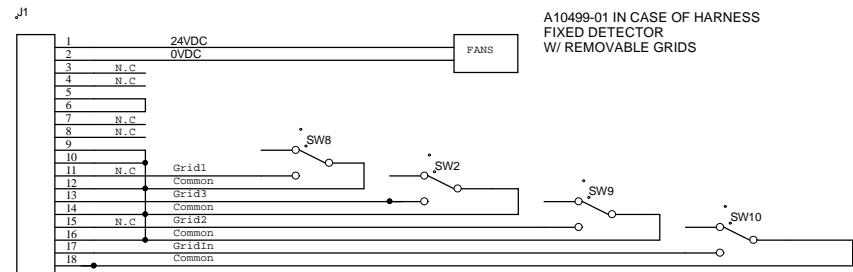
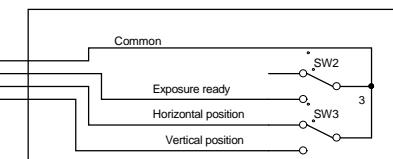
Interconexión interna con configuración I2C + cajón de detector  
Internal Wall Support with I2C configuration+ SW DOCKING DETECTOR

			NAME	DATE	SHEET OF	54301068		
H	NC_15/421	MAAguado	08/02/16	3/4				
G	NC 15/106	M.Gonzalez	23/03/15					
F	NC 13/291	S.Perez	17/09/13					
REV	DESCRIPTION	ISSUED BY	DATE					

SEDECAL

WALL STAND INTERCONNECTION

## INTERNAL DOCKING WIRING IN CASE OF DETECTOR

A8544-01 IN CASE OF RADAX  
(MANUAL TILTING BUCKY W/ I2C CONFIG)

See Pag 2 or Pag 3

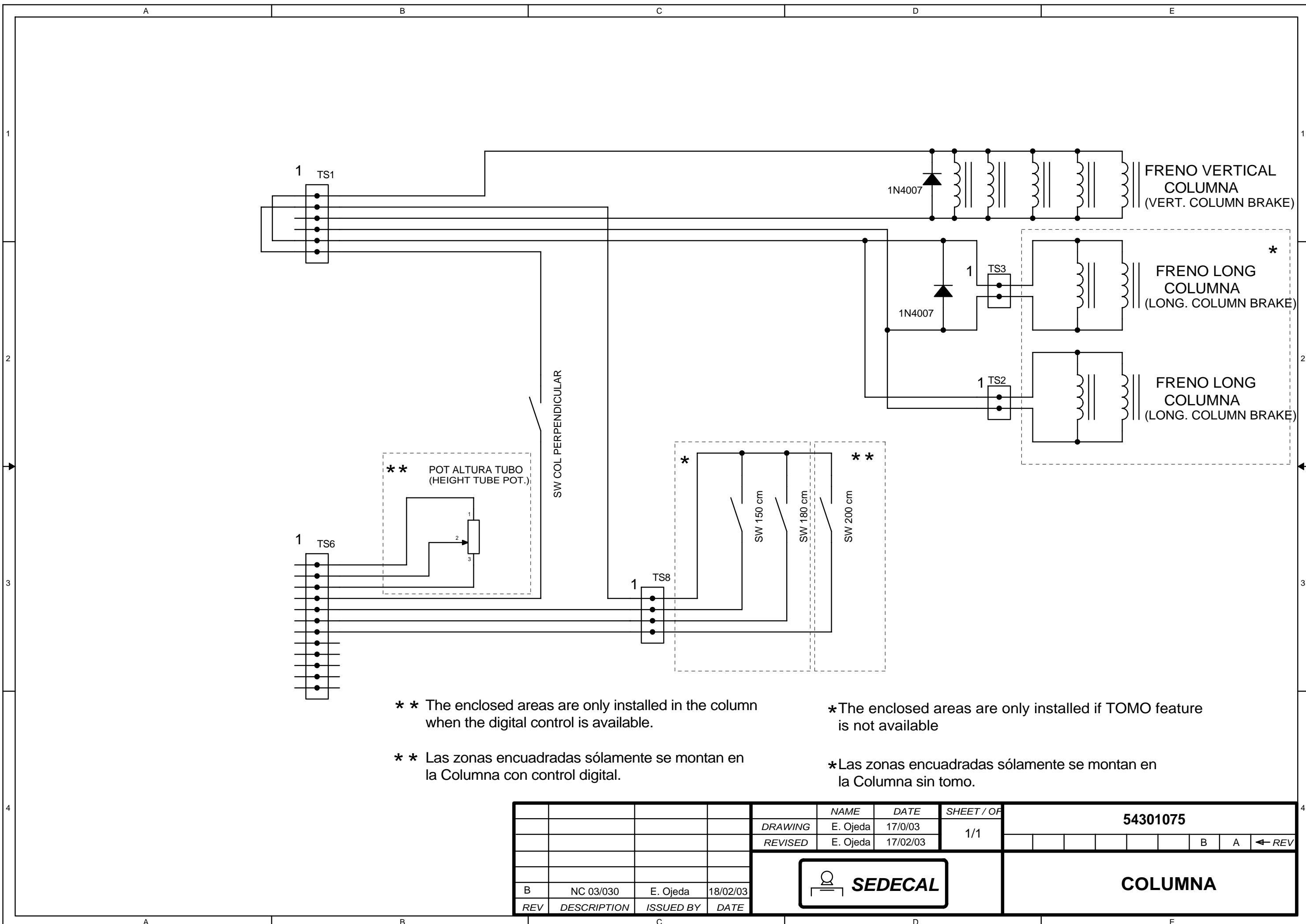
\*\*Note 1:

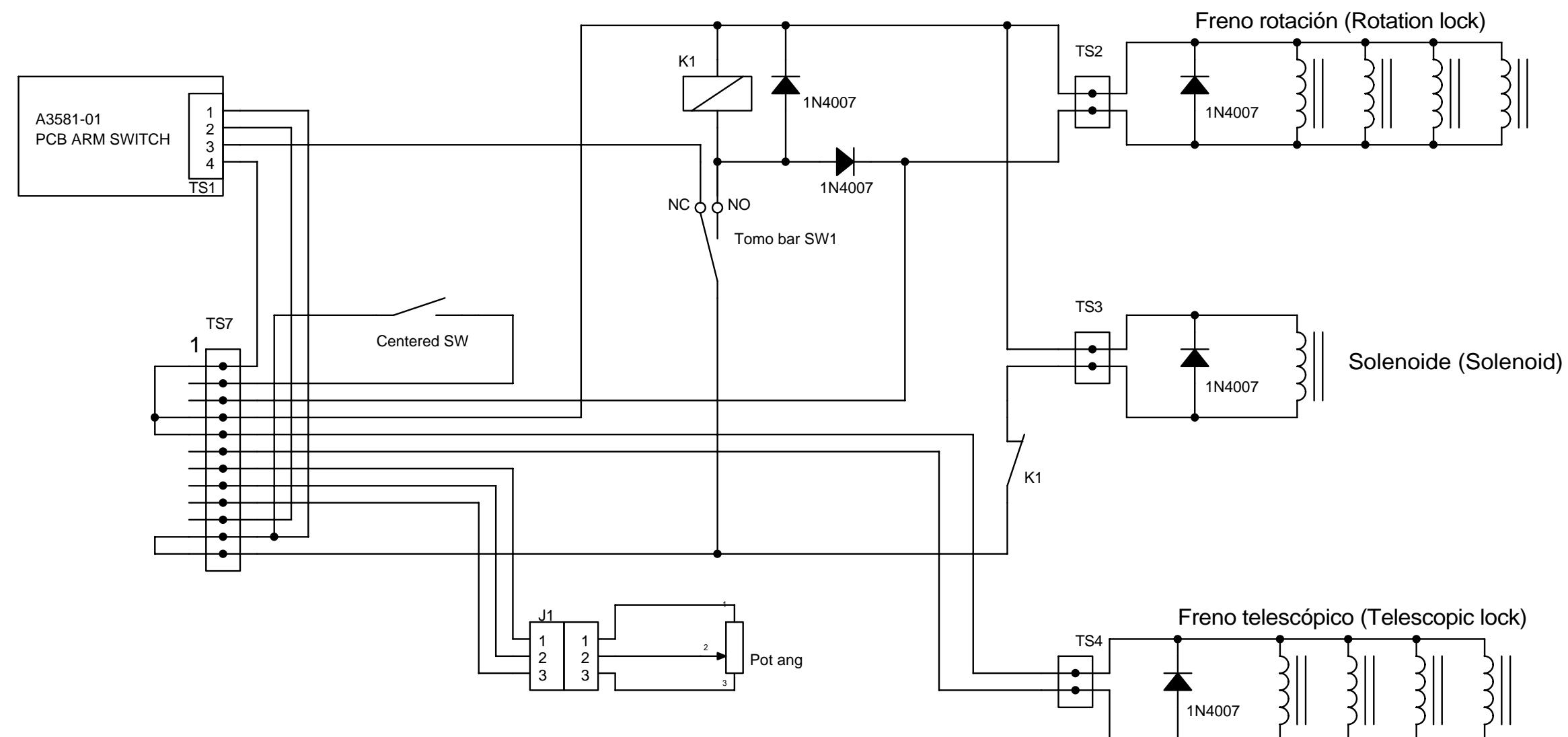
DETECTOR POSITION	SW7	P/L SIGNAL
PORTRAIT POSITION (vertical)	PRESSED	OPEN
LANDSCAPE POSITION (horizontal)	NOT PRESSED	CLOSED

H	NC 15/421	MAAguado	08/02/16	NAME F.GARCIA	DATE 09-09-02	SHEET / OF 4/4	54301068
G	NC 15/106	M.Gonzalez	23/03/15	REVISED A.DIAZ	09-09-02		
F	NC 13/291	S.Perez	17/09/13				
REV	DESCRIPTION	ISSUED BY	DATE				

SEDECAL

WALL STAND INTERCONNECTION





				NAME	DATE	SHEET / OF	54301076							
				DRAWING	F. Díaz	23/04/02	1/1					B	A	← REV
				REVISED	F. Díaz	08/07/02								
B	NC 04/011	E. OJEDA	30/01/04	 <b>SEDECAL</b>				BRAZO COLUMNNA						
REV	DESCRIPTION	ISSUED BY	DATE											









**Manufacturer: Agfa NV, Septestraat 27,  
B-2640 Mortsel - Belgium**

*Published by Agfa N.V., B-2640  
Mortsel-Belgium*



# **Appendix**

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***Technical Publication***

**AP-0058R1**

**DX-D 400  
with Short Columns  
and Transport Locks**



## **REVISION HISTORY**

<b>REVISION</b>	<b>DATE</b>	<b>REASON FOR CHANGE</b>
0	MAY 06, 2013	First edition.
1	SEP 25, 2013	Ammended Configuration C06.

This Document is the English original version, edited and supplied by the manufacturer.

The Revision state of this Document is indicated in the code number shown at the bottom of this page.

## **ADVISORY SYMBOLS**

The following advisory symbols will be used throughout this manual. Their application and meaning are described below.



**DANGERS ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEeded OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.**



**ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEeded OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY, OR CATASTROPHIC DAMAGE OF EQUIPMENT OR DATA.**



***Advise of conditions or situations that if not heeded or avoided could cause personal injury or damage to equipment or data.***

**Note**

*Alert readers to pertinent facts and conditions. Notes represent information that is important to know but which do not necessarily relate to possible injury or damage to equipment.*

## SAFETY SYMBOLS

The following safety symbols may appear in the equipment.

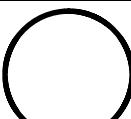
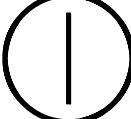
Their meaning are described below.

	<b>Caution. Consult accompanying documents.</b>
	<b>General Symbol. Follow operating instructions.</b> <i>(Only applies to IEC 60601-1 Standard - Third edition)</i>
	<b>Safety Symbol. Follow instructions for use, especially those instructions identified with Advisory Symbols to avoid any risk for the Patient or Operator.</b> <i>(Only applies to IEC 60601-1 Standard - Third edition)</i>
	<b>General Mandatory action.</b>
	<b>Type B applied part.</b>
<b>IPX0</b>	<b>Protection against harmful ingress of water or particulate matter.</b> IP Classification: Ordinary.
	<b>Ionizing radiation.</b>
	<b>Non-ionizing electromagnetic radiation.</b>
	<b>Radiation of Laser apparatus.</b> Do not stare into beam. <i>(Only applicable to equipment with Laser Pointer)</i>

## DX-D 400 with Short Columns and Transport Locks

### Appendix

	Dangerous voltage.
	General warning, caution, risk of danger.
	Warning: Ionizing radiation.
	Warning: Non-ionizing radiation.
	Warning: Laser beam.
	Warning: Dangerous voltage.
	Warning: Do not place fingers between mobile and fixed parts of the equipment, it may cause serious injuries to patient or operator. As well, make sure the patient extremities are correctly positioned into limit areas during operation, movement of parts may cause serious damages to patient.
	Electrostatic sensitive devices.
	No pushing.

	No sitting.
	No stepping on surface.
	Stop (of action).
	Emergency stop.
	"ON" power.
	"OFF" power.
	<b>"ON" / "OFF" (push-push).</b> <i>Each position, "ON" or "OFF", is a stable position.</i>
	Alternating current.
	Three-phase alternating current.
	Three-phase alternating current with neutral conductor.

## DX-D 400 with Short Columns and Transport Locks

### Appendix

<b>N</b>	Connection point for the neutral conductor on Permanently Installed equipment.
— — —	Direct current.
~	Both direct and alternating current.
⊕	Protective Earth (Ground).
⊥	Earth (Ground).
	This symbol according to the European Directive indicates that the Waste of Electrical and Electronic Equipment (WEEE) must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.
 Li/Pb/Cd/Hg	This separate collection symbol is affixed to a battery or its packing, to advise that the battery must be recycled or disposed of in accordance with local or country laws. The letters below the symbol indicate whether certain elements (Li=Lithium, PB=Lead, CD=Cadmium, Hg=Mercury) are contained in the battery. All batteries removed from the equipment must be properly recycled or disposed. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.
	Pollution Control. (Only applicable to People's Republic of China (PRC)). This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese Standards. It must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.

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3.3 Example of Configuration and Calibration Data .....	18
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**DX-D 400 with Short Columns and Transport Locks**

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*Appendix*

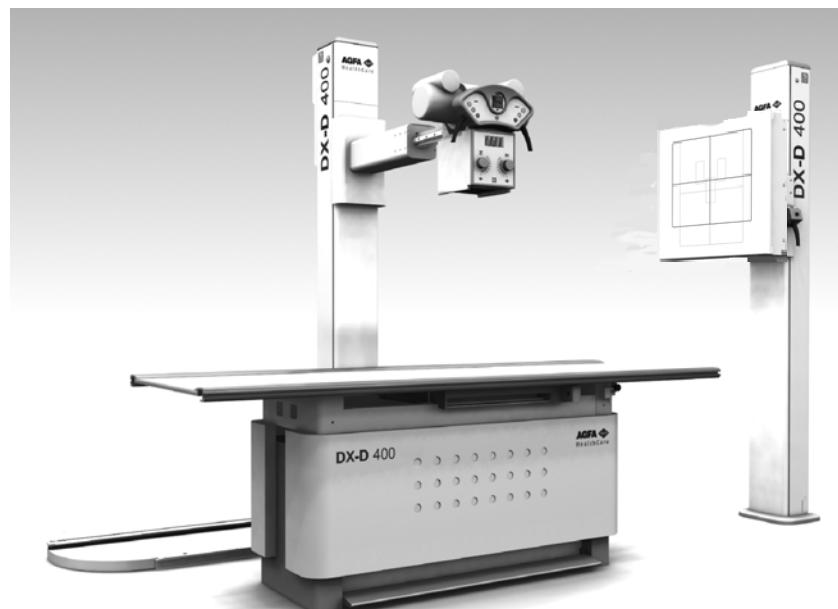
## SECTION 1 INTRODUCTION

This Appendix describes the special features of the DX-D400 with short Columns installed in a non steady Rad Room (a.e. ships, trucks or trains).

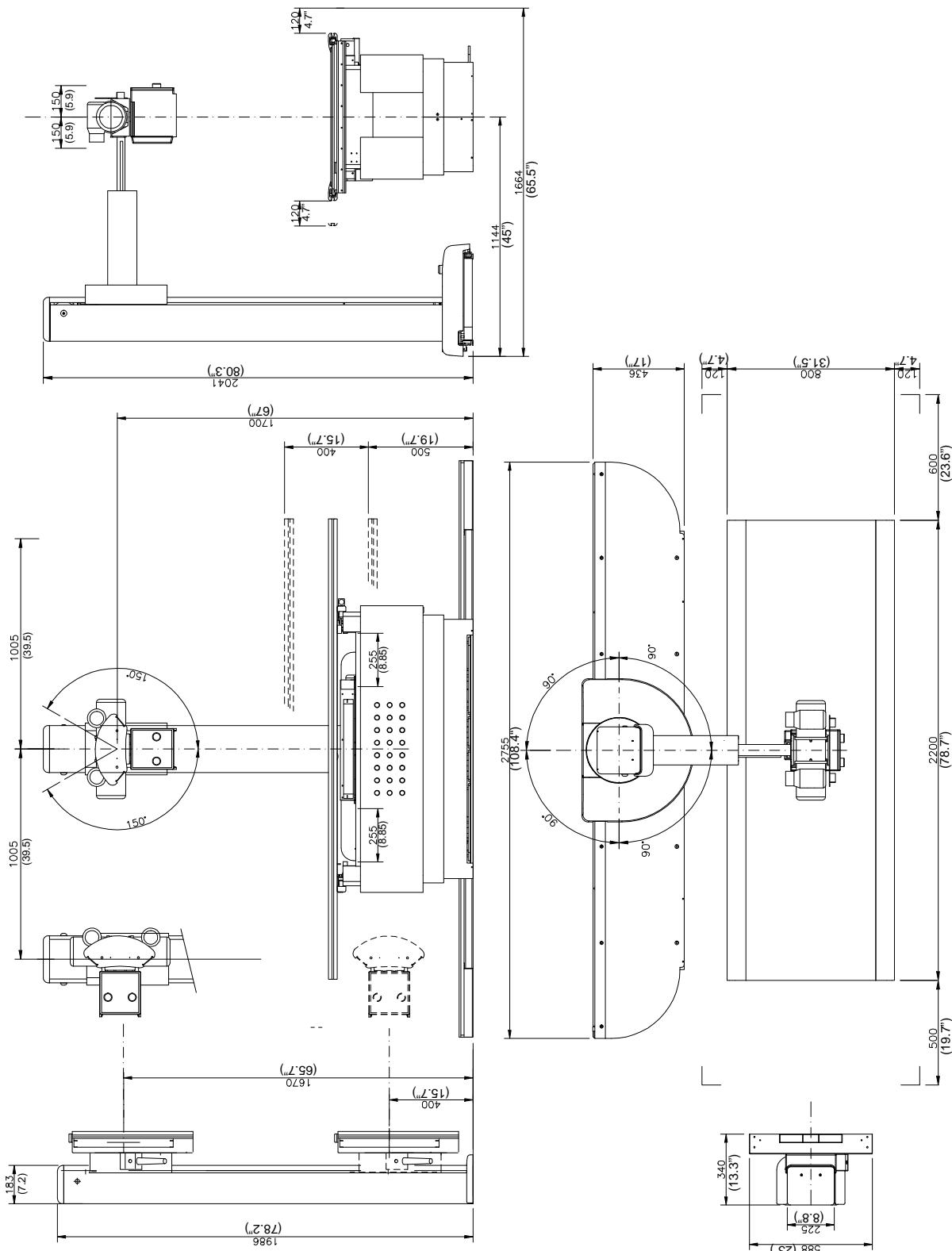
This special DX-D400 integrates the following features:

- Lower height of the Tube Stand and the Wall Stand.
- Parking Safety Kit for X-Ray Tube: Tube Supports, Pad and Lock Knobs.
- Transport Locks in every moving part of the Room: Tube Stand Counterweights, Tube Stand Arm Carriage, Tube Stand Column, Table Receptor Carriage, Wall Stand Column Counterweights and Wall Stand Receptor Carriage.
- Negative Brakes (this feature avoids undesired motion of moving parts). When the Unit is off, the brakes are engaged.
- The Configuration Data of the Room have to be modified as the Maximum Height of the Tube Stand - Wall Stand differs from the Standard Room and the option Negative / Positive Brakes has been added.

**Illustration 1-1**  
**DX-D 400 Positioners**



## 1.1 EXAMPLE OF DIMENSIONS OF DX-D 400 POSITIONERS (SHORT COLUMNS)

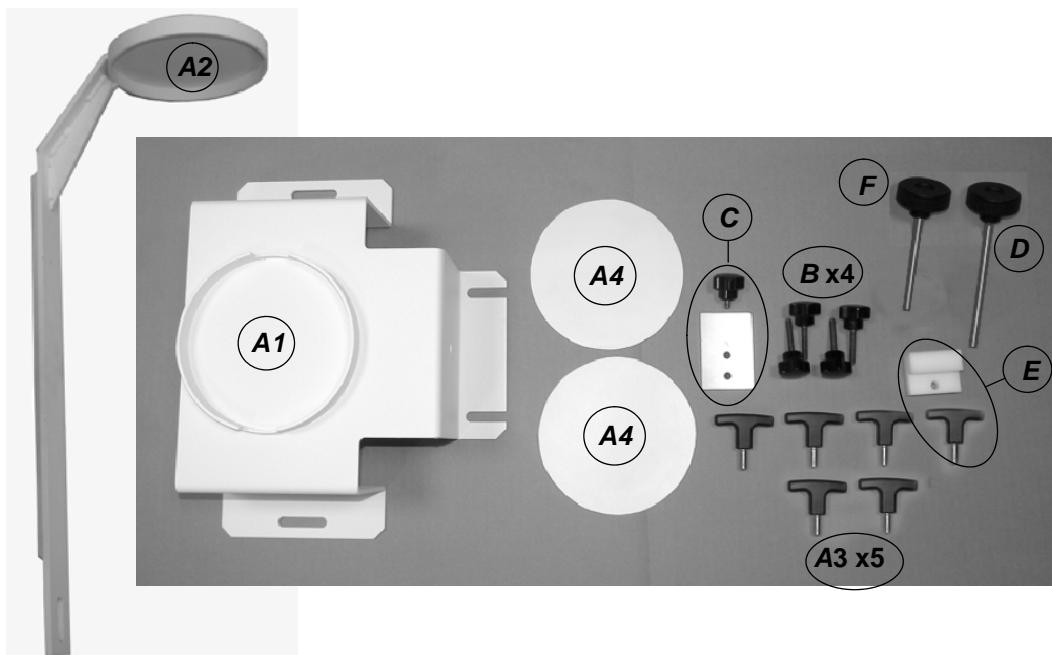


## SECTION 2 TRANSPORT LOCKS INSTALLATION

### 2.1 COMPONENTS

The positioners include a series of threaded holes to fit the Parking Safety Kit for the X-Ray Tube (A) and Transport Locks (B-C-D-E-F) for every moving part of the Room.

**Illustration 2-1**  
Components



**A1: Tube Support (Base)**

**A2: Tube Support (Upper side)**

**A3: Knobs for Tube Support (Base)**

**A4: Pad for Tube**

**B: Column Carriage Side Knobs (Tube Stand and Wall Stand)**

**C: Tube Stand Column Lock (Base)**

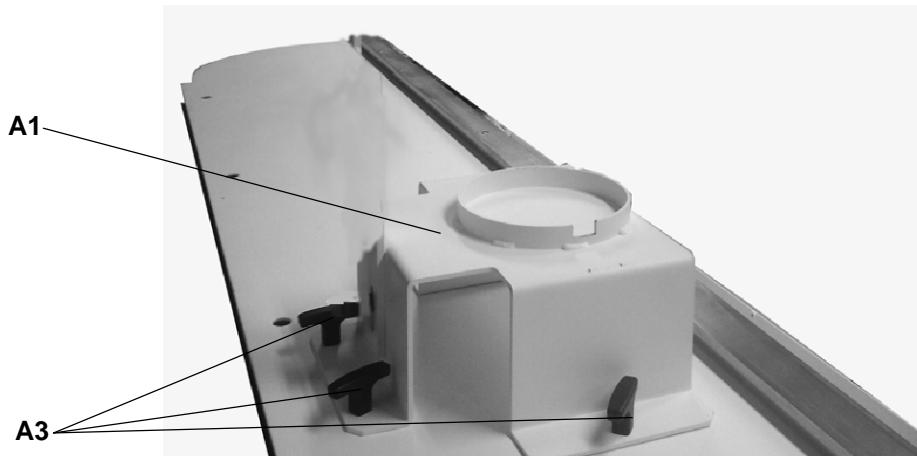
**D: Tube Stand Counterweights Lock Knob**

**E: Table Receptor Carriage Lock**

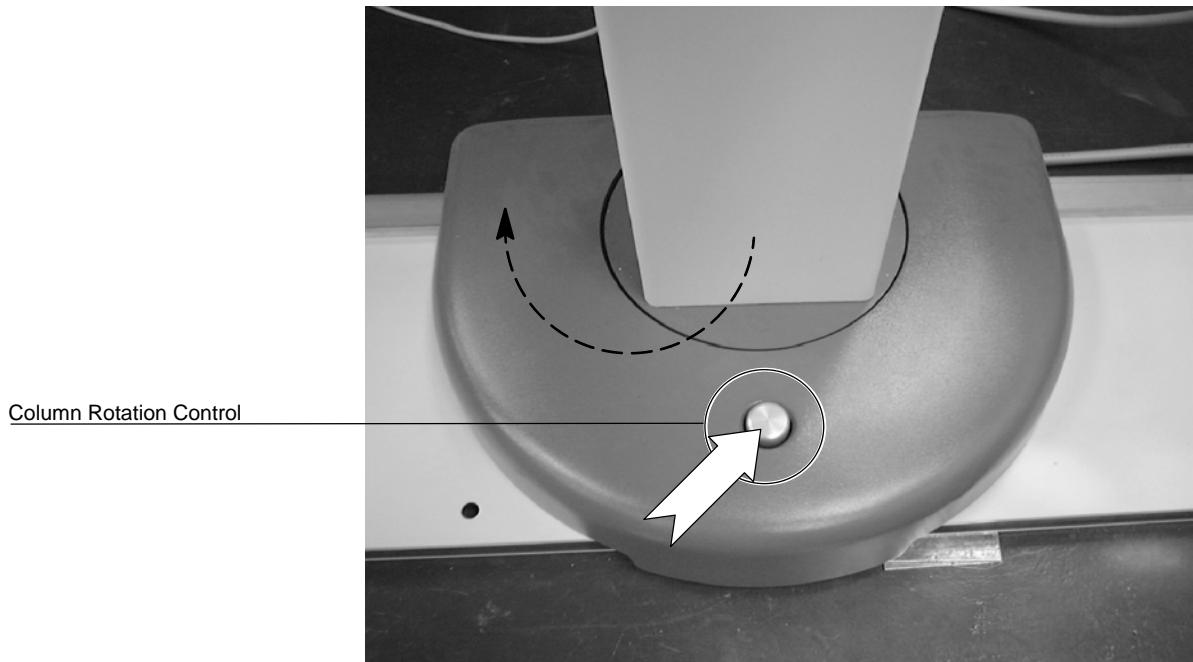
**F: Wall Stand Counterweights Lock Knob**

### **2.1.1 INSTALLATION**

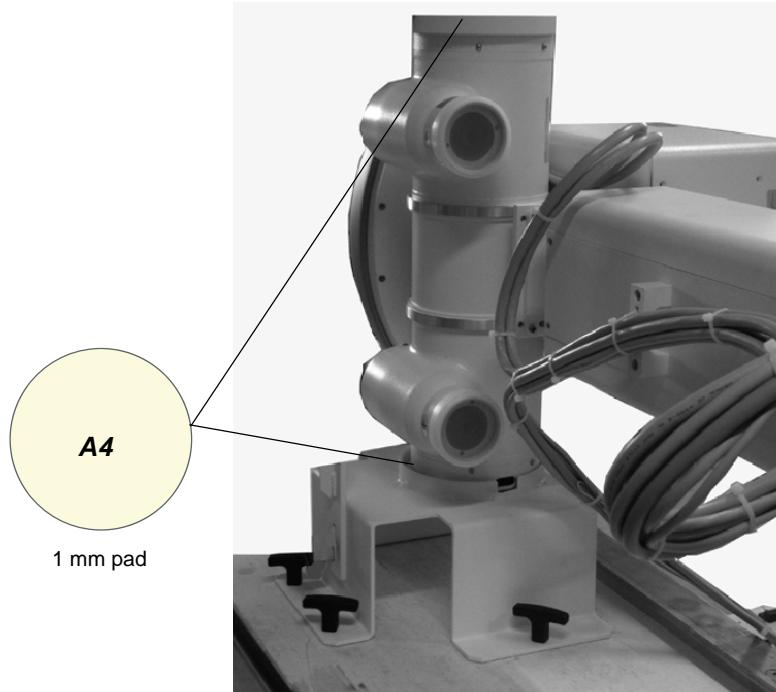
1. Install the **(A1) Tube Support** on the Base of the Tube Stand. Use **(A3 x4)**. There is one extra Knob left for later use.



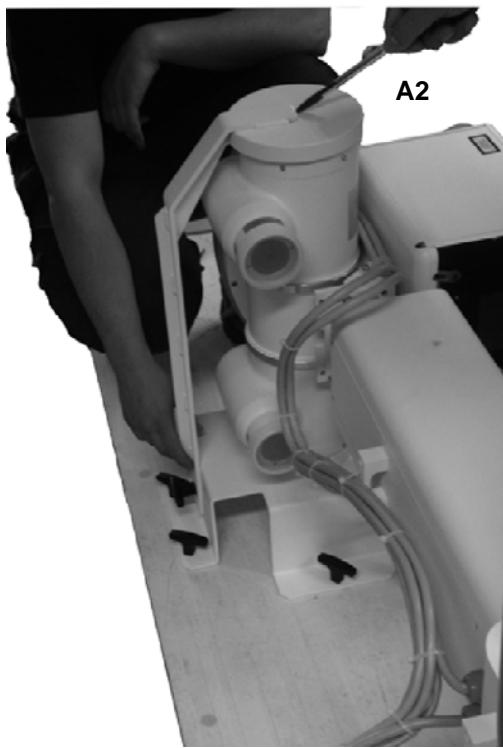
2. Turn ON the System on and push the Tube Stand Column to the right end of the travel.
3. Turn the Tube-Collimator Assembly  $90^{\circ}$  clockwise.
4. Step on the Column Rotation Control and turn the Column Arm  $90^{\circ}$  Degrees clockwise.



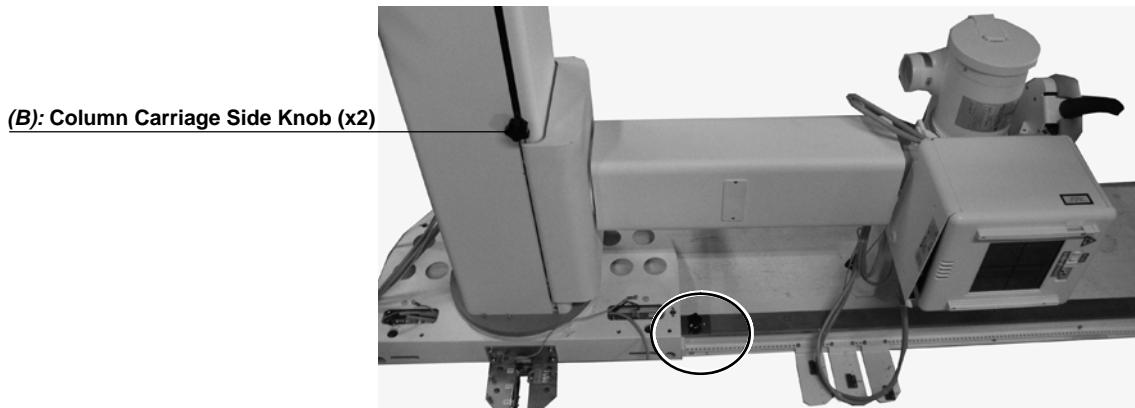
5. Place the first (**A4**) Pad for Tube on the Tube Support and lower the Tube Arm until it rests on the (**A1**) Tube Support (Base).



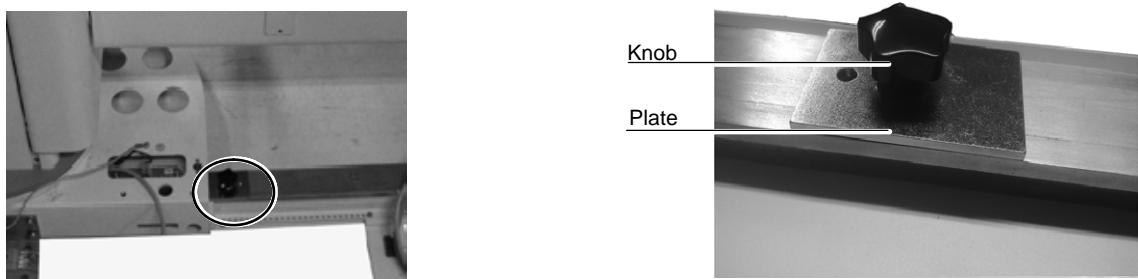
6. Place the second (**A4**) Pad for Tube on the Tube side and install the (**A2**) Tube Support (upper side) with the extra Knob (**A3**).



7. Install **(B): Column Carriage Side Knobs** at both sides of the Column.

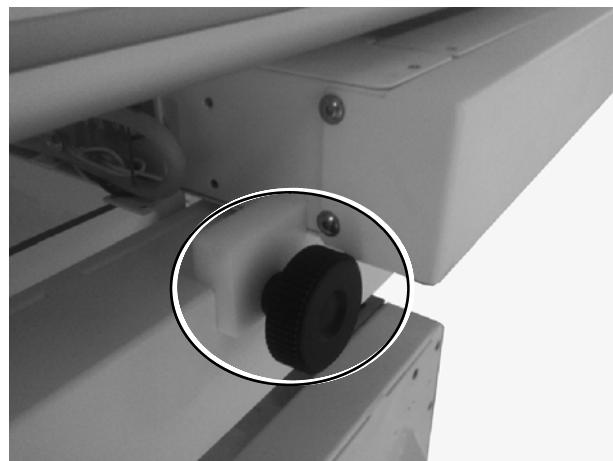


8. Install **(C): Tube Stand Column Lock**. This part is composed of a plate and a Knob. Place the Plate on the back guide of the Base and screw the Knob.

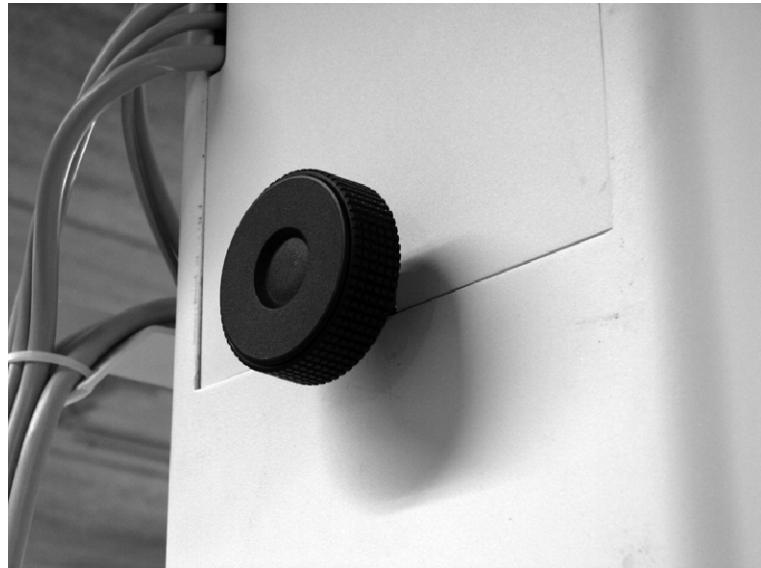


**(C): Tube Stand Column Lock**

9. Move the Table Receptor to the left end and Install the **(E): Table Receptor Lock** at the back of the Table Receptor Travel.



10. Install **(D): Tube Stand Counterweights Lock Knob** at the upper back of the Tube Stand Column. Do not use the shorter Lock Knob that belongs to the Wall Stand Counterweights Lock (F).



11. Lower the Wall Stand Receptor to the minimum height and install **(B): Column Carriage Side Knobs** at both sides of the Wall Stand.
12. Install **(F): Wall Stand Counterweights Lock Knob** at the upper back of the Wall Stand. Do not use the Longer Lock Knob that belongs to the Tube Stand Counterweights Lock (D).



**(B): Column Carriage Side Knobs (x2)**

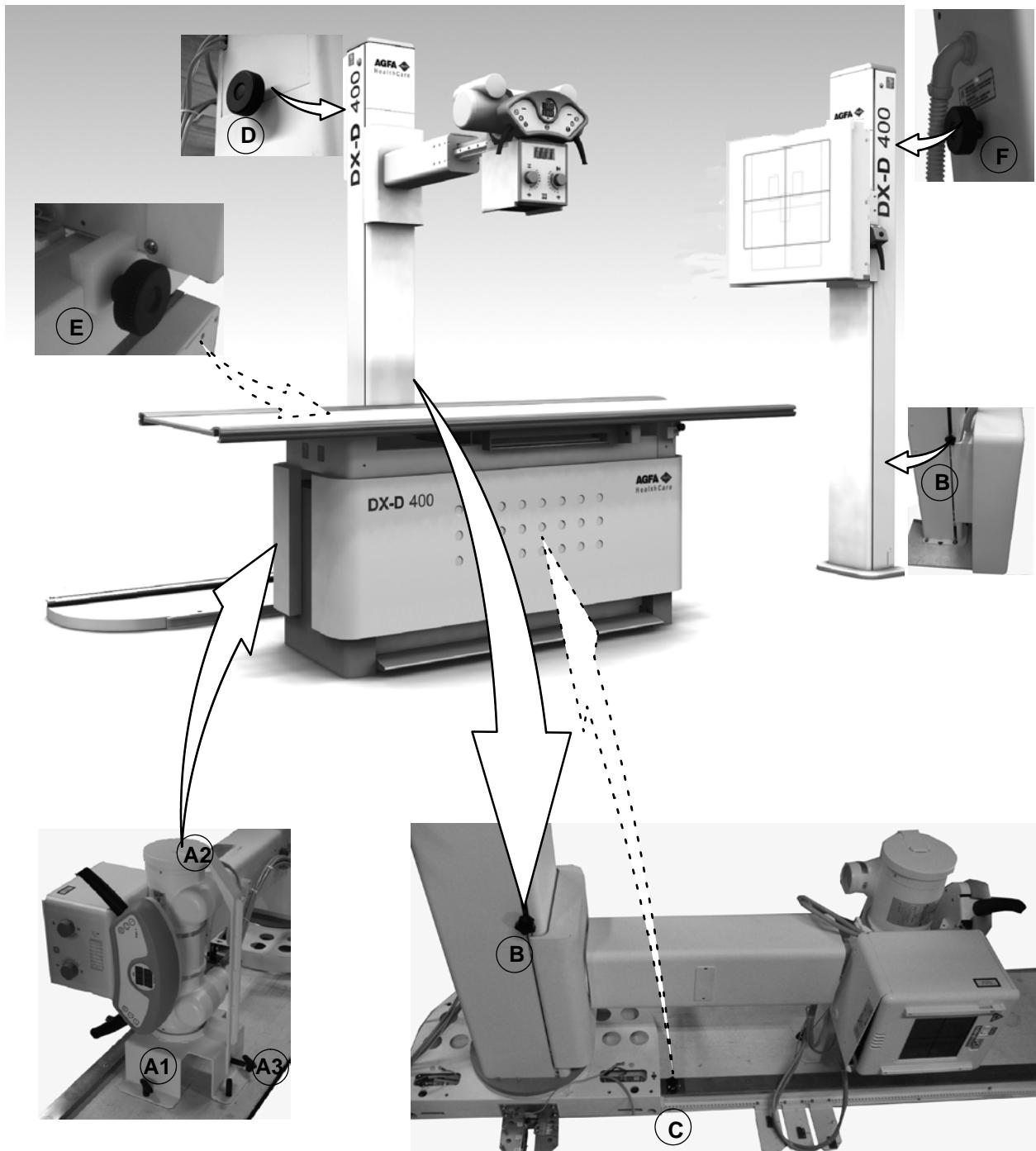


**(F): Wall Stand Counterweights Tube Stand Column Lock**

## DX-D 400 with Short Columns and Transport Locks

### Appendix

**Illustration 2-2**  
**Summary illustration**

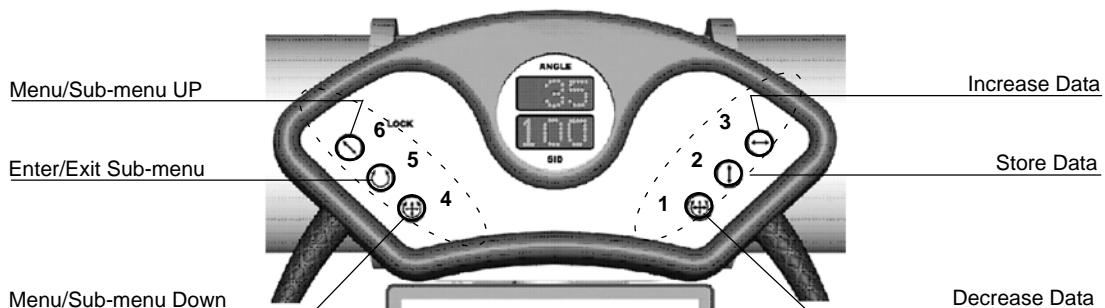


**SECTION 3****CONFIGURATION AND CALIBRATION DATA****Note** *This Section applies only to DX-D 400 with Digital Control Panel.*

The following is the complete Configuration and Calibration process, the same explained in the DX-D 400 Service Manual with the exception of the Tube maximum height data and the addition of C06 for negative / positive brakes.

**Note** 

*Perform the Configuration and Calibration Process as described in this Section. As every installation has its own features, all Configuration and Calibration points must be checked.*

**3.1 CONFIGURATION OF TUBE STAND**

1. With the System OFF, press and hold button "1" while turning On the System until "CAL" appears on the "Angle Display", which means that the Unit is Service Mode.
2. Press simultaneously buttons "4 + 5 + 6" to enter in Configuration Main Menu until "CON" appears on the "Angle Display". After releasing these buttons "C01" appears on the "Angle Display" (and nothing in "SID Display").

**Note** 

*After selecting a Sub-menu, its indication is shown in the "Angle Display" and the variable value is shown in the "SID Display".*

3. Follow the configuration steps described in the Table 3-1. Write down the configurated values in the right column of the Table 3-1.

**Table 3-1**  
**Configuration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CONFIGURED	OPTIONS	PRESET VALUE	STORED VALUE
C01	C1.1	Type of Table. (Fixed Height Table / Elevating Height Table).  STEP 1: Press 5 to select C1.1.  STEP 2: Press 1 or 3 to select "1" Fixed Height Table or "2" Elevating Height Table.  STEP 3: Press 2 to store the value.	1/2	1	
		SID measure unit. (Centimeters / Inches).			
		Step 1: Press 6 to select C1.2.  Step 2: Press 1 or 3 to select CM or INC.  Step 3: Press 2 to store the value			
		Type of Column. Without Tomography ( <b>MSW</b> ) or with Tomography ( <b>POT</b> ).  Step 1: Press 6 to select C1.3.  Step 2: Press 1 or 3 to select MSW or POT.  Step 3: Press 2 to store the value.		MSW / POT	MSW
	C1.4	Height of Fixed Table. <i>C1.4 is only for Fixed Height Table, if it is not needed, skip this point and go to C1.5.</i> (if not done before) Measure from the floor to the Tabletop surface and discount 85 mm of Tabletop-Film distance.  (Enter this data also in C2.1 and C2.2.).	Measured at site	70 cm	
		Step 1: Press 6 to select C1.4.  Step 2: Press 1 or 3 to select the value measured.  Step 3: Press 2 to store the value.			
		Detent for Elevating Table. <i>C1.5 is only for Elevating Table, if it is not needed, skip this point and go to C1.6.</i> This detent will stop the travel of the Elevating Table at the height specified by user and does not require calibration.  Step 1: Press 6 to select C1.5.  Step 2: Press 1 or 3 to adjust the desired value.  Step 3: Press 2 to store the value.		Measured at site	70 cm
		Press 5 to exit from Sub-menu level C1.5.			

**Table 3-1 (cont.)**  
**Configuration Parameters**

MENU	SUBMENU	PARAMETER TO BE CONFIGURED	OPTIONS	PRESET VALUE	STORED VALUE		
C02	<b>Press 6 to select Menu C02</b>						
	C2.1	<b>Minimum height of Elevating Table.</b> (if not done before) Position Table at minimum height and measure from floor to Tabletop surface. Discount 85 mm of Tabletop–Film distance.	Measured at site	50 cm			
		<b>Step 1:</b> Press 5 to select C2.1.					
		<b>Step 2:</b> Press 1 or 3 to display the value measured.					
		<b>Step 3:</b> Press 2 to store the value.					
	C2.2	<b>Maximum height of Elevating Table.</b> (if not done before) Position Table at maximum height and measure from floor to Tabletop surface. Discount 85 mm of Tabletop–Film distance.	Measured at site	90 cm			
		<b>Step 1:</b> Press 6 to select C2.2.					
		<b>Step 2:</b> Press 1 or 3 to display the value measured.					
		<b>Step 3:</b> Press 2 to store the value.					
	<b>Press 5 to exit from Sub-menu level C2.2</b>						
C03	<b>Press 6 to select Menu C03</b>						
	C3.1	<b>Minimum height of Tube.</b> (if not done before) Position Tube at minimum height and measure with the Collimator Metric Tape to the floor.	Measured at site	40 cm			
		<b>Step 1:</b> Press 5 to select C3.1.					
		<b>Step 2:</b> Press 1 or 3 to display the value measured.					
		<b>Step 3:</b> Press 2 to store the value.					
	C3.2	<b>Maximum height of Tube.</b> (if not done before) Position Tube at maximum height and measure with the Collimator Metric Tape to the floor.	Measured at site	167 cm			
		<b>Step 1:</b> Press 6 to select C3.2.					
		<b>Step 2:</b> Press 1 or 3 to display the value measured.					
		<b>Step 3:</b> Press 2 to store the value.					
	<b>Press 5 to exit from Sub-menu level C3.2</b>						

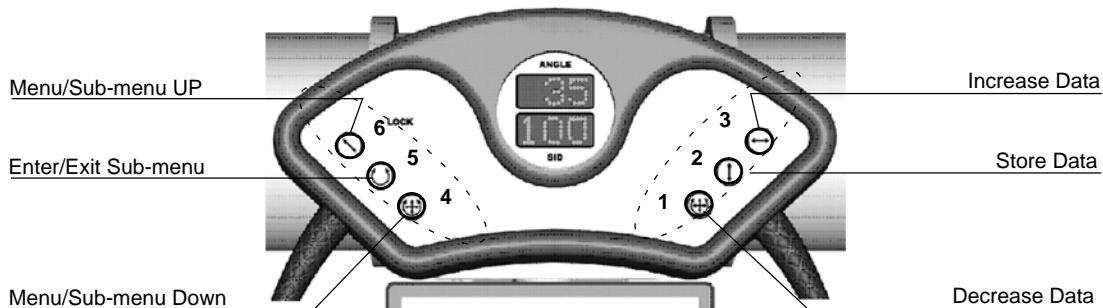
**Table 3-1 (cont.)**  
**Configuration Parameters**

MENU	SUBMENU	PARAMETER TO BE CONFIGURED	OPTIONS	PRESET VALUE	STORED VALUE		
C04	<b>Press 6 to select Menu C04</b>						
	<b>Wall Stand SID reference points.</b>						
	These values are set during installation by Service Engineer depending on the SID distances from the Wall Stand.						
	For Systems without Tomography, the microswitches should be placed at distances specified in site. The distances should correspond to the configuration and calibration points: SW2 for first distance, SW3 for second distance and SW4 for third distance.						
	C4.1 C4.2 C4.3	Step 1: Press 5 to select C4.1.	Wall Stand at right side: 110-150-180	110 (C4.1)			
		Step 2: Press 1 or 3 to select the corresponding data.		150 (C4.2)			
		Step 3: Press 2 to store the value.		180 (C4.3)			
		Step 4: Press 6 to select C4.2, then repeat steps 2 - 3					
		Step 5: Press 6 to select C4.3, then repeat steps 2 - 3					
	<b>Press 5 to exit from Sub-menu level C4.3</b>						
C05	<b>Press 6 to select Menu C05</b>						
	<b>Tube Angle.</b>						
	<i>C05 is factory set.</i>						
	<i>Do not modify values for C5.1, C5.2 and C5.3.</i>						
	<i>Skip this menu and go to C06 by pressing 5.</i>						
	C5.1 C5.2 C5.3	Step 1: Press 5 to select C5.1.	Do not change	-90° (C5.1)			
		Step 2: Press 1 or 3 to select the corresponding data for C5.1 (-90°)		0° (C5.2)			
		Step 3: Press 2 to store the value.		+90° (C5.3)			
		Step 4: Press 5 to select C5.2.					
		Step 5: Press 1 or 3 to select the corresponding data for C5.2 (0°)					
		Step 6: Press 2 to store the value.					
		Step 7: Press 5 to select C5.3.					
		Step 8: Press 1 or 3 to select the corresponding data for C5.3 (+90°)					
		Step 9: Press 2 to store the value.					
	<b>Press 5 to exit from Sub-menu level C5.3</b>						
C06	<b>Press 6 to select Menu C06</b>						
	C6.1	Type of Braking: Negative / Positive (Negative Brakes are used in ships)	NEG POS	NEG			
		Step 1: Press 5 to select C6.1.					
		Step 2: Press 1 or 3 to select NEG or POS.					
		Step 3: Press 2 to store the value.					
	<b>Press 5 to exit from Sub-menu level C6.1</b>						

4. Press simultaneously buttons “1 + 2 + 3” to exit from Configuration Main Menu. “Angle” and “SID” display the normal operation values.
5. To follow with calibration process go directly to Section 3.2.

In case that calibration process is not needed, exit from Service Mode by turning OFF the System.

### 3.2 CALIBRATION OF THE TUBE STAND



1. If the Configuration process have just been set (the System is ON), press simultaneously buttons “1 + 2 + 3” to enter in Calibration Main Menu until “CAL” appears on the “Angle Display”. After releasing these buttons, “P01” appears on the “Angle Display” (and nothing in “SID Display”).

If the System is OFF, press and hold button “1” while turning On the System until “CAL” appears on the “Angle Display”, which means that the Unit is Service Mode. Press simultaneously buttons “1 + 2 + 3” to enter in Calibration Main Menu until “CAL” appears on the “Angle Display”. After releasing these buttons, “P01” appears on the “Angle Display” (and nothing in “SID Display”).

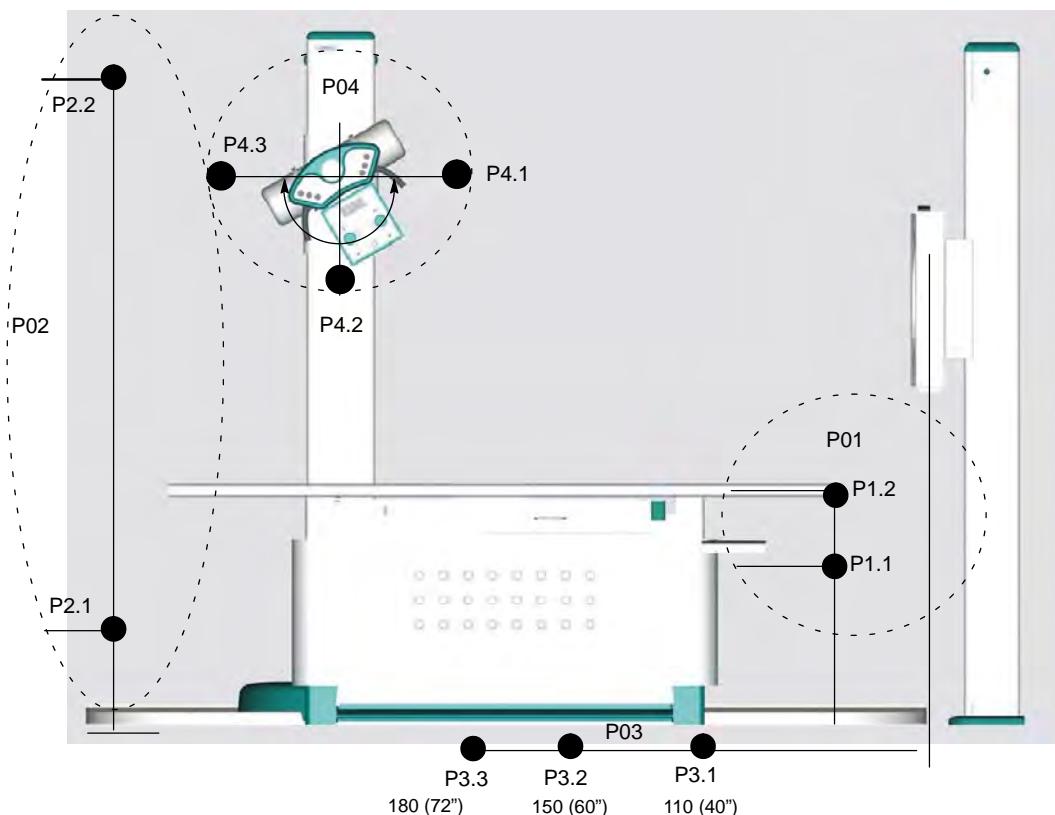
**Note**

After selecting a Sub-menu, its indication is shown in the “Angle Display” and the stored Configuration value is shown in the “SID Display”.

Once a calibration point is memorized, “OK” is shown in the “SID Display” and the potentiometer readout is shown in the “Angle Display” for two seconds. If the readouts are the same in different Calibration points of the same Menu, check the corresponding potentiometer.

2. The following illustration shows the calibration points to be set during the calibration process.

**Illustration 3-1**  
**Calibration Points**



3. Follow the calibration steps described in the Table 3-2 in the order specified. Write down the potentiometer readouts in the right column of the Table 3-2.

**Table 3-2**  
**Calibration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE	
P01	P1.1	<b>Minimum height of Table.</b> <i>P1.1 is only for Elevating Table, if it is not needed, skip this point and go to P2.1.</i> <b>STEP 1:</b> Press 5 to select P1.1. P1.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press the Table down pedal and position the Table at the minimum height (value configured in C2.1) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	50 cm		
	P1.2	<b>Maximum height of Table.</b> <i>P1.2 is only for Elevating Table, if it is not needed, skip this point and go to P2.1.</i> <b>STEP 1:</b> Press 6 to select P1.2. P1.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press the Table up pedal and position the Table at the maximum height (value configured in C2.2) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	90 cm		
	<b>Press 5 to exit from Sub-menu level P1.2</b>				
P02	<b>Press 6 to select Menu P02</b>				
	P2.1	<b>Minimum height of Tube.</b> <b>STEP 1:</b> Press 5 to select P2.1. P2.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press 1 and with the Tube at 0°, position the Tube at the minimum height (value configured in C3.1) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	40 cm		
	P2.2	<b>Maximum height of Tube.</b> <b>STEP 1:</b> Press 6 to select P2.2. P2.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display". <b>STEP 2:</b> Press 1 and with the Tube at 0°, position the Tube at the maximum height (value configured in C3.2) <b>STEP 3:</b> Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".	167 cm		
	<b>Press 5 to exit from Sub-menu level P2.2</b>				

**Table 3-2 (cont.)**  
**Calibration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE	
P03		Press 6 to select Menu P03			
			<b>Wall Stand SID reference Points.</b>  These values are set during installation by Service Engineer depending on the SID distances from the Wall Stand. For Systems without Tomography, the microswitches should be placed at distances specified in site. The distances should correspond to the configuration and calibration points: SW2 for first distance, SW3 for second distance and SW4 for third distance.  Turn the Tube respect to the Wall Stand; position the Column at configured distances from the Wall Stand. Measure SID with the Collimator Metric Tape (keep in mind the Tabletop-Receptor distance). Once these points have been calibrated, the Column will stop the motion when arriving to each point. Standard distances have been factory set but they can be modified.		
	P3.1	<b>STEP 1:</b> Press 5 to select P3.1. P3.1 is shown in the “Angle Display” and the stored Configuration value is shown in the “SID Display”.		Wall Stand at right side: 110 cm  Wall Stand at left side: 180 cm	
		<b>STEP 2:</b> With the Tube facing the Wall Stand, press 1 and position the Tube at the required SID to set the first point (value configured in C4.1)			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the “Angle Display” shows the potentiometer readout and the “SID Display” shows “OK”.			
	P3.2	<b>STEP 1:</b> Press 6 to select P3.2. P3.2 is shown in the “Angle Display” and the stored Configuration value is shown in the “SID Display”.		150 cm	
		<b>STEP 2:</b> With the Tube facing the Wall Stand, press 1 and position the Tube at the required SID to set the second point (value configured in C4.2)			
		<b>STEP 3:</b> Press 2 to store the value. For two seconds, the “Angle Display” shows the potentiometer readout and the “SID Display” shows “OK”.			
	P3.3	<b>STEP 1:</b> Press 6 to select P3.3. P3.3 is shown in the “Angle Display” and the stored Configuration value is shown in the “SID Display”.		Wall Stand at right side: 180 cm  Wall Stand at left side: 110 cm	
		<b>STEP 2:</b> With the Tube facing the Wall Stand, press 1 and position the Tube at the required SID to set the third point (value configured in C4.3)			
<b>STEP 3:</b> Press 2 to store the value. For two seconds, the “Angle Display” shows the potentiometer readout and the “SID Display” shows “OK”.					
	Press 5 to exit from Sub-menu level P3.3				

**Table 3-2 (cont.)****Calibration Parameters**

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE
P04	P4.1	Press 6 to select Menu P04	-90°	
		<b>Tube Angle reference Points.</b>		
		These values are factory set. Recalibrate only in case of detecting wrong reading in the Tube Angle.		
	P4.2	STEP 1: Press 5 to select P4.1. P4.1 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".	0°	
		STEP 2: Press 1 and turn the Tube -90° Counterclockwise. Use the mechanical detent and check with a level to obtain the correct calibration point (value configured in C5.1).		
		STEP 3: Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".		
	P4.3	STEP 1: Press 6 to select P4.2. P4.2 is shown in the "Angle Display" and the stored Configuration value is shown in the "SID Display".	+90°	
		STEP 2: Press 1 and turn the Tube to 0° (pointing the Table). Use the mechanical detent and check with a level to obtain the correct calibration point (value configured in C5.2).		
		STEP 3: Press 2 to store the value. For two seconds, the "Angle Display" shows the potentiometer readout and the "SID Display" shows "OK".		
Press 5 to exit from Sub-menu level P4.3				

4. Press simultaneously buttons "1 + 2 + 3" to exit from Calibration Main Menu. "Angle" and "SID" display the normal operation values.
5. Exit from Service Mode by turning OFF the System.

### 3.3 EXAMPLE OF CONFIGURATION AND CALIBRATION DATA

The following table shows the Configuration data extracted from the Inspection Report of a DX-D400 US Navy Unit:

MENU	SUB-MENU	PARAMETER TO BE CONFIGURED	STORED VALUE
C01	C1.1	Type of Table.	2
	C1.2	SID measure unit.	CM
	C1.3	Type of Column.	MSW
	C1.4	Height of Fixed Table.	70 cm
	C1.5	Detent for Elevating Table.	70 cm
C02	C2.1	Minimum height of Elevating Table.	50 cm
	C2.2	Maximum height of Elevating Table.	90 cm
C03	C3.1	Minimum height of Tube.	40 cm
	C3.2	Maximum height of Tube.	167 cm
C04	C4.1	Wall Stand SID: First reference point.	110 cm
	C4.2	Wall Stand SID: Second reference point.	150 cm
	C4.3	Wall Stand SID: Third reference point.	180 cm
C05	C5.1	Tube Angle: -90° reference point.	-90°
	C5.2	Tube Angle: 0° reference point.	0°
	C5.3	Tube Angle: +90° reference point.	+90°
C06	C6.1	Type of Braking: Negative / Positive	NEG

The following table shows the Potentiometer Readout (Calibration data) extracted from the Inspection Report of a DX-D400 US Navy Unit:

MENU	SUB-MENU	PARAMETER TO BE CALIBRATED	STORED VALUE	POT VALUE
P01	P1.1	Minimum height of Elevating Table.	50 cm	30
	P1.2	Maximum height of Elevating Table.	90 cm	91
P02	P2.1	Minimum height of Tube.	40 cm	4
	P2.2	Maximum height of Tube.	167 cm	81
P03	P3.1	Wall Stand SID: First reference point.	110 cm	N/A
	P3.2	Wall Stand SID: Second reference point.	150 cm	56
	P3.3	Wall Stand SID: Third reference point.	180 cm	N/A
P04	P4.1	Tube Angle: -90° reference point.	-90°	25
	P4.2	Tube Angle: 0° reference point.	0°	51
	P4.3	Tube Angle: +90° reference point.	+90°	76

## SECTION 4 SPARE PARTS

The following table is a complement of the Spare Parts Table included in the Service Manual SM-1097RX.

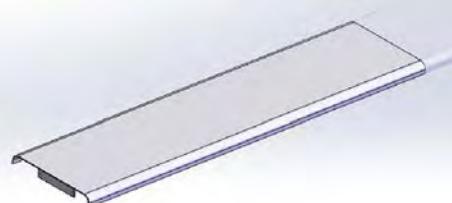
ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
1A1	Transport Locks Kit	1	SAT-A10166-01	
1A2	Tube Stand Steel Cables	1	SAT-7235-11	
1A3	Wall Stand Steel Cables	1	SAT-7235-79	
1A4	Wall Stand Front Cover	2	SAT-20827-01	
1A5	Tube Stand Bottom Front Cover	1	SAT-23517-01	
1A6	Tube Stand Upper Front Cover	1	SAT-7823-79	
1A7	Base Column Brake Kit	2	A520072-01	For Negative Brakes



1A1



1A4 - 1A5 - 1A6



1A2 - 1A3



1A7



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