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Installation

X-ray System

REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	SEP 19, 2022	First Edition.

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.

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SECTION 1 PREVIOUS CONSIDERATIONS

1.1 PURPOSE AND SCOPE OF THIS MANUAL

This manual provides a sequential listing of tasks and procedures for the complete installation of the X-ray System.

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.

Installation is broken into two primary tasks: mechanical installation of all components and positioners of the X-ray Room and the configuration and calibration procedure of the System, to be completed by software.

Most mechanical tasks focus on the physical aspects of hardware assembly, equipment positioning and cabling. Software tasks refer to the user GUI configuration, automatic movements setup and room layout, generator calibration, etc.

1.2 REQUIRED TOOLS

The following hand tools are required for the Installation:

- Standard service engineers tool kit including Allen and Torx key sets
- Electric drill motor and assorted bits
- Silicone Insulating Grease (proofing compound).
- Hammer drill
- Step Ladder
- Digital Level
- Laser alignment tool
- Meter
- Torque wrench 0 – 200 Nm (0–150 ft.–lbs.)
- Hexagonal or Allen wrench set
- Loctite 243
- Optionally Lifting Tool for the OTC Main Assembly
- Marker
- Masking Tape
- Alcohol cleaning agent
- Optional Installation Kit for the RAD Wall Stand
- Optional Metal Cutting Chop Saw

The following test equipment is required for Configuration and Calibration:

- Voltmeter
- Dynamometer
- Digital Multimeter
- Non-invasive kVp Meter
- Digital mAs Meter
- Calculator

- Only for AEC purposes:
  - Sensitometer
  - Densitometer
  - Filtration based on the RQA5 standard (21 mm Al) for the Collimator Filter Holder (recommended for AEC/ABC calibration)
  - Copper Plates can be used Instead of Aluminum:
    2 units of 1 mm thickness
    1 unit of 0.5 mm thickness
    2 units of 0.2 mm thickness
    1 unit of 0.1 mm thickness
  - Acrylic Plastic Plates can be used Instead of Copper Plates:
    6 units of 5 cm. thickness
    5 units of 1cm. thickness

- Only for Tomo purposes:
  - Tomophantom tool

- Only for Fluoro purposes:
  - Dosimeter, with R/min and mR/min meters and/or mGy/min and μGy/min meters
  - Imaging Test Phantom tool
  - Copper Plates: 2 units of 1 mm thickness
    1 unit of 0.5 mm thickness
    2 units of 0.2 mm thickness
    1 unit of 0.1 mm thickness

1.3 GENERAL CAUTIONS

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.

MAKE SURE THAT THE MAIN STORAGE CAPACITORS OF THE HIGH VOLTAGE INVERTER DO NOT CONTAIN ANY RESIDUAL CHARGE. WAIT UNTIL THE LIGHT EMITTING DIODES ON THE CHARGE/DISCHARGE BOARD AND ON THE ROTOR CONTROLLER ARE OFF (APPROX. 3 MINUTES AFTER THE UNIT IS TURNED OFF).

ALWAYS HAVE THE "IPM DRIVER BOARD" CONNECTED IN THE GENERATOR PREVIOUS TO THE ACTIVATION OF THE MAINS POWER. IF THE "IPM DRIVER BOARD" IS NOT CONNECTED, IRREVERSIBLE DAMAGE WILL OCCUR TO THE IGBTS.

TO AVOID THE RISK OF ELECTRIC SHOCK, THIS EQUIPMENT MUST ONLY BE CONNECTED TO A SUPPLY MAINS WITH PROTECTIVE EARTH. DO NOT TOUCH ANY HEATSINK OF THE CIRCUIT BOARDS EVEN IF THE GENERATOR IS TURNED OFF. PREVIOUS TO DISASSEMBLE ANY BOARD, REMOVE ALL CONNECTORS PLUGGED TO IT.

THIS GENERATOR IS PERMANENTLY CONNECTED TO THE POWER LINE AND POWERED ON UNLESS THE SAFETY SWITCH INSTALLED IN THE ROOM ELECTRICAL CABINET IS OFF. WHEN THE GENERATOR IS POWERED, THE NEON LAMP (GREEN) LOCATED IN THE TRANSFORMER T2 (GENERATOR CABINET) IS ON.

INTERNAL PARTS OF THE GENERATOR (ALL FUSES, LINE CONTACTOR [K2], INPUT TRANSFORMER [T2] AND ON/OFF RELAY [K1]) ARE PERMANENTLY POWERED ON THROUGH POWER LINE EVEN IF THE GENERATOR IS OFF. BE SURE THAT THE SAFETY SWITCH IS OFF BEFORE HANDLING ANY INTERNAL PART OF THE EQUIPMENT.

1.4 PRE-INSTALLATION CHECKS

1.4.1 CEILING PRE-INSTALLATION CHECKS

Prior to beginning installation it is recommended to inspect the site and verify that the X-ray room complies with requirements such as:

Space Requirements to allow installation and system movements must consider the maximum dimensions and travels of the equipment.

Note ☞ *The ceiling should have been previously prepared before beginning with the installation. Ceiling preparation requires to drill anchorage holes and routing the cables under the Table. Refer to Pre-installation Manual of this equipment for further pre-installation details.*

THIS UNIT IS EQUIPPED WITH EMC FILTERS. THE LACK OF THE PROPER GROUNDING MAY PRODUCE ELECTRICAL SHOCK TO THE USER.

BEFORE ANCHORING THE UNIT, CHECK THAT THE CEILING AND THE ANCHORING SYSTEM ARE STRONG ENOUGH (2000 NEWTON TRACTION FORCE) TO ENSURE A SAFE INSTALLATION. THE CEILING MUST HAVE A STRUCTURE WHICH ACCEPTS, AT LEAST 500KG/M (336 LB/FT), FOR A SAFETY OPERATION AND ANCHORS MUST SUPPORT 156 KG (343.92 LBS) LOAD PER BOLT

1.4.2 PRE-INSTALLATION CHECKS FOR THE X-RAY GENERATOR

Prior to beginning installation, it is recommended to inspect the site and verify that the X-ray room complies with Pre-installation requirements, such as:

- Incoming Line.
- Main Switch and Safety Devices.
- Conduits.
- Space Requirements.

1.4.3 FLOOR PREPARATION

RAD WALL STAND

Before carrying on with the Wall Stand installation procedure it is mandatory to check the pre-installation work.

Note ☞ *The Tube Support and Table must be already installed and properly aligned with the Tube and other equipments of the system to complete the Wall Stand installation. If not, it will not be properly aligned with the Tube Support and it will be required to dismount and install again the equipment.*

The floor area where the Wall Stand is to be installed should have been prepared before the installation also. Floor preparation requires drilling anchor holes and possible routing of the cables (refer to *Pre-installation Manual*).

A Drilling Template is supplied with the equipment. Optionally it is supplied an Additional Installation Kit, which is formed by:

P/N	DESCRIPTION	QTY.
07696P01	LEVELING PLATE 1 mm.	6
07696P02	LEVELING PLATE 2 mm.	4
07696P03	LEVELING PLATE 3 mm.	2
53062P01	TIE WRAP	10
S0002301	ANCHOR BOLT (HLC 12X100/60-H)	5
2227196	LABEL COVER	4

RAD TABLE

The floor area where the table is going to be installed, should have been previously prepared, before beginning with the installation. Floor preparation requires to drill anchorage holes and routing of the cables under the table.

If the floor has not been previously prepared for the installation, refer to the Drill Template of the Pre-installation Manual to mark the anchorage holes position and the cable entrance under the Table base.

1.5 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*, except in case that 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.*	

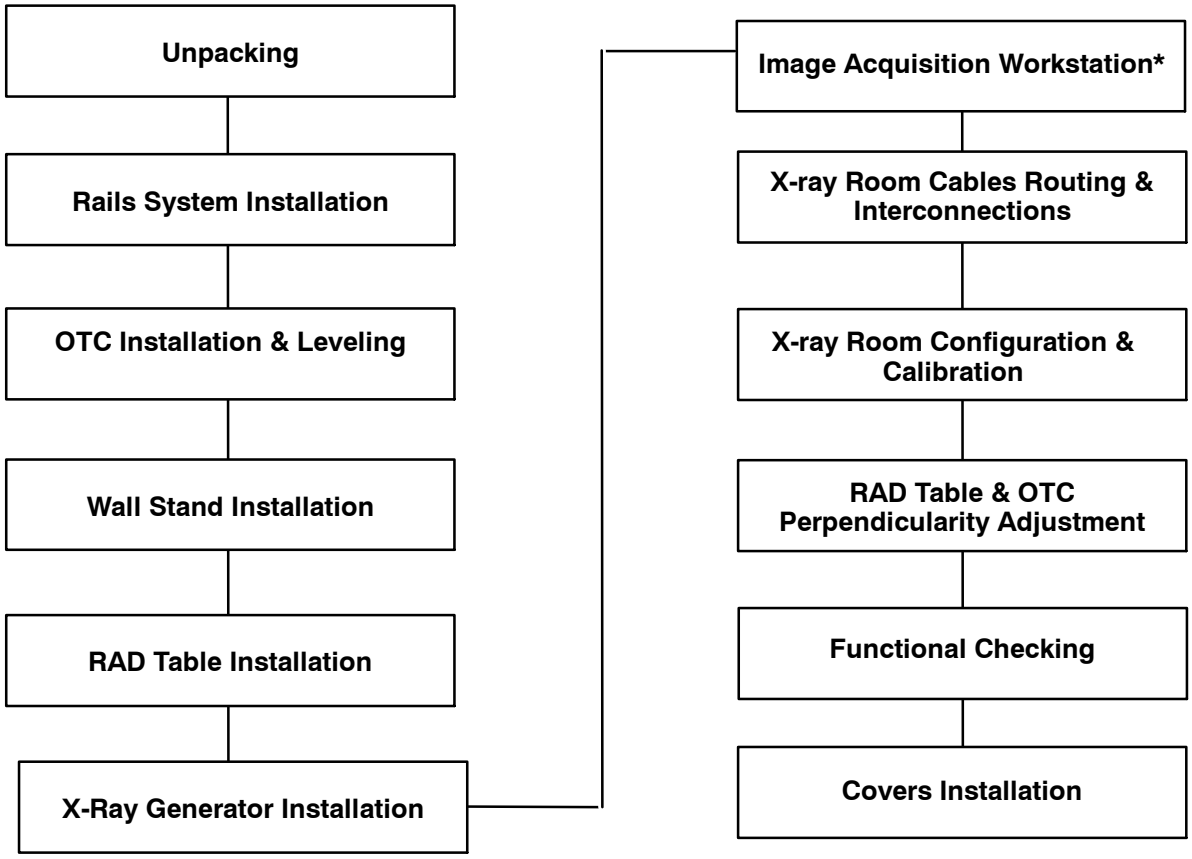
1.6 SYSTEM INSTALLATION STEERING GUIDE

Mechanical Installation tasks are designed to be performed in sequence. Once each step is successfully completed mark the Checking box and continue with the next step.

Note ☞ *It is absolutely mandatory to proceed to the installation in the order indicated by the Installation Quick Guide and once each step is completed mark the correspondent checking box.*

Install the different components of the X-ray System in the next order:

Illustration 1-1
System Installation Steering Guide



** NOTE For the information of the Image Acquisition Workstation refer to its own documentation.*

INSTALLATION CHECKING LIST

1	PRE-INSTALLATION CHECK	DONE	
1.1	**Does X-ray Room meet the Pre-installation requirements?** Check following points:		❑
	Complete room floor, ceiling and wall finished	❑	
	Installation of conduits, ducts, raceways and junction boxes with covers	❑	
	Enviromental requirements	❑	
	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	❑	
1.2	**Receive, unpack and inventory of the System**		❑
	Upon receipt of the equipments, inspect all shipping crates for signs of damage. If damage is found, notify the carrier or his agent immediately of any damaged or missing parts	❑	
	Place crates close to its final location at room and unpack the equipment. **WARNING: AT LEAST TWO/THREE PEOPLE ARE REQUIRED TO REMOVE ALL HEAVY COMPONENTS FROM THE SHIPPING PALLETS**	❑	
	Check the packing lists, part numbers and serial numbers of each component. Verify that all items on the customer order are present	❑	

2	INSTALLATION OF THE OVERHEAD TUBE CRANE		DONE
2.1	**Preliminary Checks**		❑
2.2	**Longitudinal Rails Unpacking & Installation**		❑
	Longitudinal Rails Unpacking from the Shipping Crate	❑	
	Longitudinal Rails fixation to Ceiling	❑	
	Check leveling of both rails and parallelism between them	❑	
2.3	**Transverse Rails Installation**		❑
	Unpack Transverse Rails	❑	
	Unpack the main Assembly and all the shipped components	❑	
	Mount Transverse Rails on the Main Assembly.	❑	
2.5	**Lifting the Overhead Tube Crane and Transverse Rails**		❑
	Install both Lifting Tools to lift the Overhead Tube Crane and Crate, which is required to lift safely the OTC. Once it is fixed to the Longitudinal Rails it is possible to remove the Crate	❑	
	Lif the Main Crate with the Transverse Rails	❑	
2.6	**Fixation of the Transverse Rails To the Longitudinal Rails**		❑
	Fix Transverse Rails to the Lonngitudinal Rails. Tighten both self locking bolts for each bearing.	❑	
	Check Transverse Rails parallelism and leveling	❑	
	Remove definitely the Crate	❑	
2.7	**Adjustment of the Longitudinal and Transverse Potentiometers**		❑
2.8	**Installation of the Longitudinal Brake**		❑
2.9	**Hose and Cables Installation**		❑
	Install Hose fixation brackets	❑	
	Route Hose with Cables	❑	
	Check that Hose allows the correct movemets of the X-ray Tube	❑	

3	INSTALLATION OF THE RAD WALL STAND		DONE
3.1	**Preliminary Checks**		❑
3.3	**Standing & Floor Mounting**		❑
	Use the Drilling Template to locate the correct position of the RAD Wall Stand on the Floor	❑	
	Raise the Wall Stand and anchor it (not definitely)	❑	
	Remove the Shipping Safety screws	❑	
	Check and adjust the Wall Stand leveling	❑	
3.4	**Receptor's Cabinet Installation** *(just when Detector is not factory installed)*		❑
	Cabinets Fixation to the Column Carriage	❑	
	Fixed Detector Installation in Cabinet	❑	

4	INSTALLATION OF THE RAD TABLE		DONE
4.1	**Unpack the RAD Table**		❑
	Remove the Base of the Table from the shippig container	❑	
	Unpack the Tabletop and remove all shipping Material	❑	
4.2	**Installation of the Table Base**		❑
	Place the Table in its final position	❑	
	Remove Covers from the Base	❑	
	Anchor the Table Base to the floor	❑	
4.3	**Receptor's Installation**		❑
	Installation of the fixed Detector and fixed Grid or	❑	
	Installation of the Fixed Detector and removable Grid	❑	
	Installation of the Portable Detector	❑	
4.4	**Tabletop Installation**		❑

4	INSTALLATION OF THE RAD TABLE		DONE
4.5	**Adjustments**		❑
	Configurate the Height Potentiometer	❑	
	Adjust the Longitudinal Brake of the Tabletop (if required)	❑	
	Adjust of the Switches for Portable Detectors and Removable Grid	❑	

5	INSTALLATION OF THE X-RAY GENERATOR	DONE
5.1	**Generator Unpacking**	❑
5.2	**Covers Dissasembly**	❑
5.3	**Cabinet Installation**	❑

6	X-RAY ROOM CABLES & INTERCONNECTIONS		DONE
6.1	**Generator Cables Connection**		❑
	Connect the Power Line of the Generator	❑	
	Route cables inside the Generator Cabinet	❑	
	Connect the HV Cables in the Generator	❑	
	Connect the cables of the Tube	❑	
	Connect the Door Open Signal and Warning Light Signal Cables	❑	
6.2	**System Interconnections. Connect the System Cables:**		❑
	Connect the Positioners Power Line Cable to Input Module and Room Cabinet (Overhead Tube Crane, RAD Table and RAD Wall Stand)	❑	
	Connect the GPIO Cables (green shielded) from Overhead Tube Crane to other Positioners. Plug the Terminator Connector in the last positioner of the circuit.	❑	
	Connect the BUS Hardware Cables (grey shielded) from the Overhead Tube Crane to the other Positioners of the Room	❑	
	Connect the CANBus Cables (black shielded) from the Overhead Tube Crane to the other Positioners of the Room. Plug the Terminator Connector in the last positioner of the circuit.	❑	

6	X-RAY ROOM CABLES & INTERCONNECTIONS	DONE
6.2.1	**Connect Overhead Tube Crane Cables**	❑
6.2.2	**Connect RAD Table Cables**	❑
6.2.3	**Connect RAD Wall Stand Cables**	❑
6.2.5	**Connect the Generator Cables**	❑
6.2.6	**Connect the PC Interface Box Cables**	❑

7	X-RAY SYSTEM ADJUSTMENT	DONE
7.1	**RAD Wall Stand Perpendicularity Adjustment**	❑
7.2	**RAD Table Parallelism Adjustment**	❑
7.3	**RAD Table Perpendicularity Adjustment**	❑

8	FUNCTIONAL CHECKING		DONE
8.1	**Overhead Tube Crane Functional Checking**		❑
8.2	**RAD Table Functional Checking**		❑
8.3	**RAD Wall Stand Functional Checking**		❑
8.4	**Definitive Installation Steps & Covers Installation**		❑
	Check and fix the Overhead Tube Crane Fixations	❑	
	Fix Definitely the RAD Wall Stand and the Table in its final positions	❑	❑
	Install all covers	❑	

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SECTION 2 INSTALLATION OF THE OVERHEAD TUBE CRANE

2.1 PRELIMINARY CHECKS

The whole system is shipped in different wood crates to facilitate transportation and installation. Upon receipt of the X-ray unit and associated equipment, inspect all shipping containers for signs of damage. If damage is found, notify the carrier or his agent immediately. Preliminary checks:

- Do not discard any packing material such as envelopes, boxes, bags until all parts are compared with the Checking List,
- check the general condition and external appearance of all parts for possible damages or missing items,
- notify the distribution center immediately of any damaged or missing parts.

2.1.1 CRATES AND PACKING BOXES

The OTC is shipped in different wood crates to facilitate transportation and installation:

- **Rails Crate**. It contains everything needed for installation of the Rail System. Refer to the Packing List for details of all parts needed for the rail system installation.

Illustration 2-1
Overhead Tube Crane Shipping Main Crate and Rails Crate

- **Main Crate**. It contains the main assembly of the OTC.

Note ☞ *Optionally depending on the Overhead Tube Crane configuration and if there are different options included, it may be necessary to ship some components in an **Auxiliary Crate**.*

TO AVOID PERSONAL INJURIES OR EQUIPMENT DAMAGE, DO NOT REMOVE ANY SHIPPING RETAINING PIN, BRACKETS OR HARDWARE FROM THE OVERHEAD TUBE CRANE UNTIL INSTRUCTED TO DO SO.

Note ☞ *When indicated and required, get out all Packing boxes carefully. Avoid mixing all boxes contents and items, so installation procedure will be more effective.*

2.1.2 PACKING LISTS

Both crates are provided with its corresponding Packing Lists:

- **Main Crate** is detailed in the **FIC-INS-2139-01**
- **Rails Crate** is detailed in the **FIC-INS-2139-02**

All the required elements for the installation are listed and identified by their part numbers and images, it is also indicated the Packing Box where they are shipped and the delivered quantity.

The main item is highlighted in grey and all items required for its installation or its parts are indicated below.

Note ☞ *Please refer always to both Checking Lists to know which items are required for the installation of the Overhead Tube Crane.*

2.1.3 REQUIRED CONDITIONS

Required Conditions

Before proceeding to the OTC installation there are some requirements which are obligatory or recommendable to fulfil to accomplish successfully the Installation procedure.

- Study the Equipment Nomenclatures and Parts in Operator Manual.
- It will be helpful to keep a printed copy of the Equipment Description and drawings when proceeding to the installation work.
- Read first this manual completely before starting with the OTC installation procedure.
- Plan the Equipment position. The longitudinal frontal rail must be installed on the frontal side of the room. Refer to the Pre-Installation Manual, which is provided together with this manual.
- Refer always to the complete Steering Guide.

Note ☞ *In the main crate, Packing List items are listed in the order they are required for the installation. So it is strongly recommended to check this document during the installation procedure.*

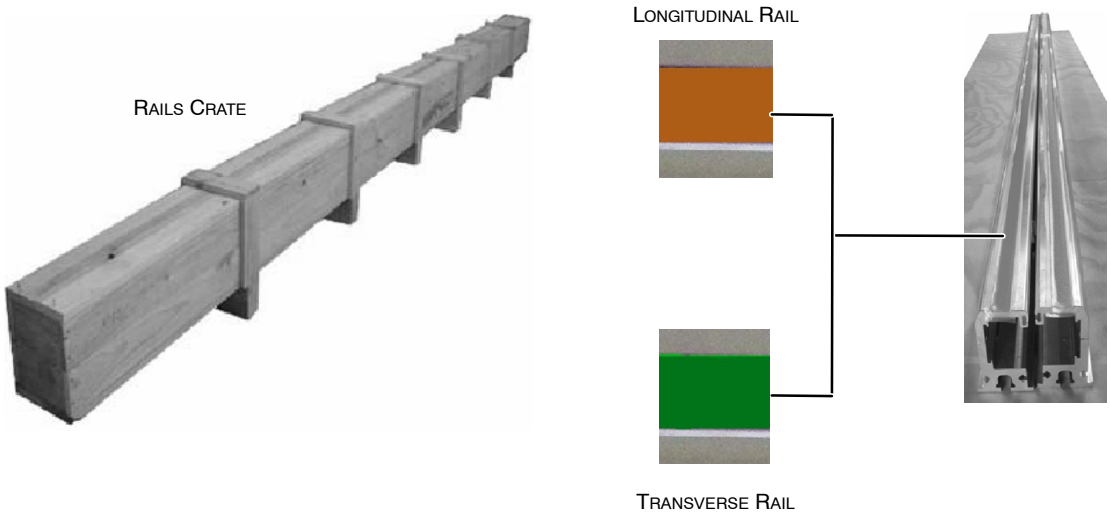
INJURY HAZARD! AT LEAST TWO SERVICE ENGINEERS ARE REQUIRED TO CARRY OUT THE OTC INSTALLATION. DUE TO THE EQUIPMENT AND RAILS HEAVY WEIGHT, IT CAN FALL DOWN WHEN LIFTING AND INSTALLING, WHAT COULD CAUSE SERIOUS DAMAGES TO EQUIPMENT AND PERSONNEL.

2.2 LONGITUDINAL RAILS UNPACKING AND INSTALLATION

1. Move the shipping crate of the Rails to the installation area and leave it in horizontal position and in the same direction in which the Longitudinal Rails will be installed.
2. Open the Rails Crate, loosen all the screws of the top cover.
3. Remove from the Crate all shipping material.
4. Both Longitudinal Rails are identified by the orange stripe, which is linked to the Longitudinal Axis, stuck at the bottom of both rails.

Note ☞ *Do not remove definitely any shipping material until checking completely the proper status of the equipment and that all elements have been received.*

Illustration 2-2
Rails Shipping Crate

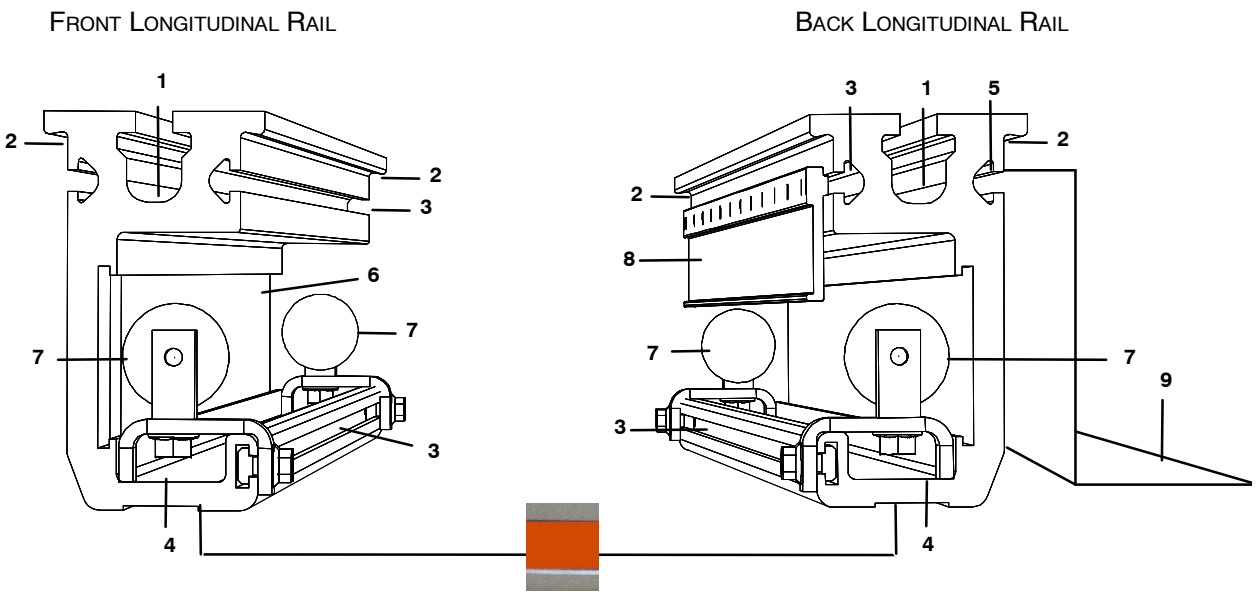


Remember that both pair of Rails are released with the standard lengths that are indicated in *Section Overhead Tube Crane Specifications* of the Operation Manual. In case that it is necessary to cut them to be fitted with the Room distances *refer to Section 2.4 Procedure for Cutting the Longitudinal and Transverse Rails*.

5. Locate both Rails in their correct position.

   - The Front Rail has the brake plate assembled.
   - The Back Rail has the Longitudinal Belt assembled.

Illustration 2-3
Longitudinal Rails



1 Track for Slide Screws for the fixation to not Unistrut Ceiling
2 Flange for Rails Clamps for the fixation to Unistrut Ceiling
3 Sliding Track for Belts, etc.
4 Sliding Track for Transverse Rails
5 Sliding Track for the Back Support of the Hose
6 Metal Plate for Longitudinal Brake, just in Front Rail
7 Longitudinal Travel End-stop
8 Longitudinal Belt, just in Back Rail
9 Back Support for the Hose

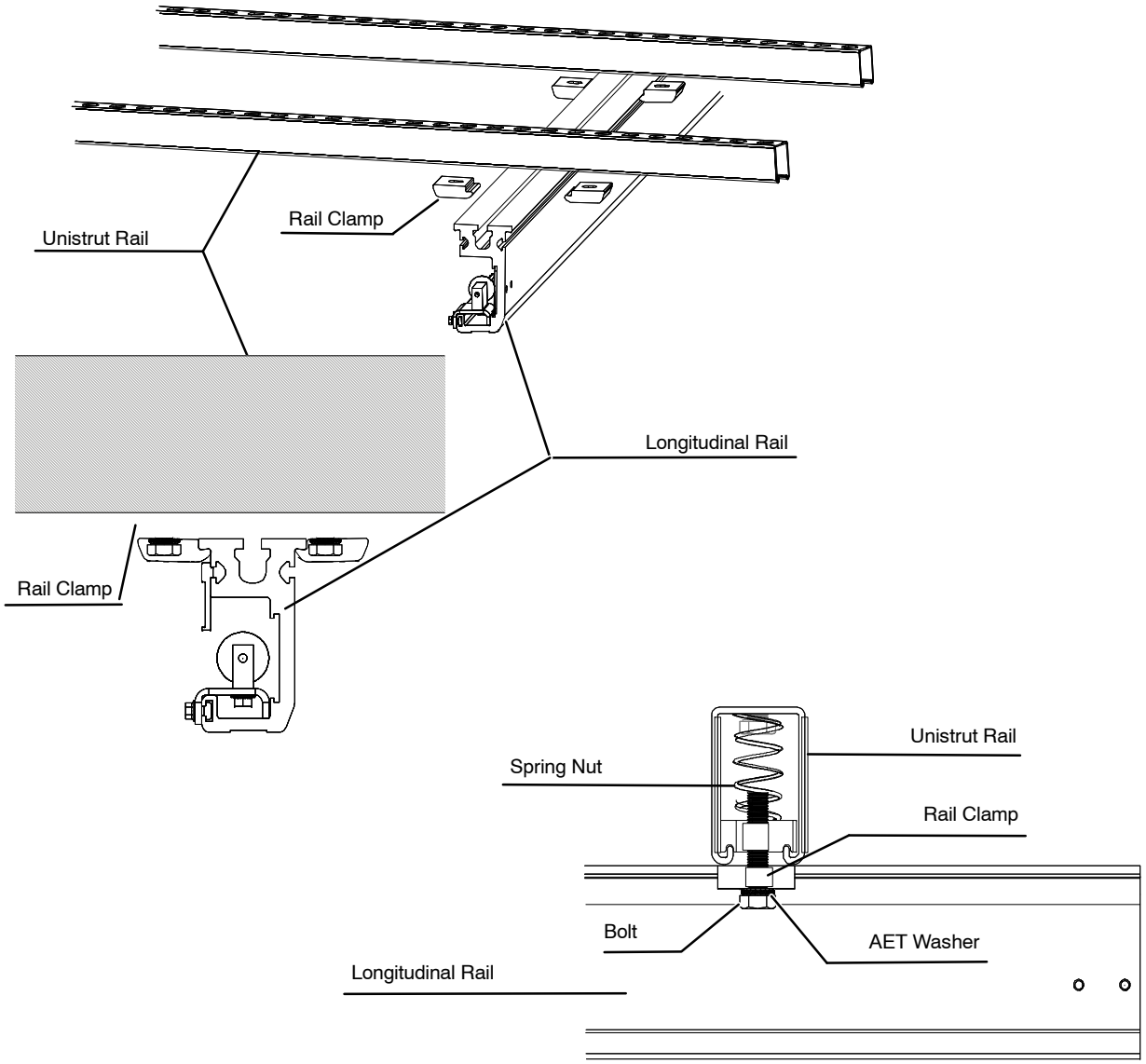
6. Install first the front Rail and later the back one. Tighten the fixing screws, the frontal rails go always nearest to the operator position. It is recommended to fix first both ends and later all intermediate mounting points.

Note ☞ *Rails are delivered by default for installation in Unistrut ceilings. For other Ceiling systems, contact Service to order the kit with slide screw and hex bolt (SAT-A18104-04).*

7. Depending on the type of ceiling there are two different methods of fixation of the Rail to the Ceiling:

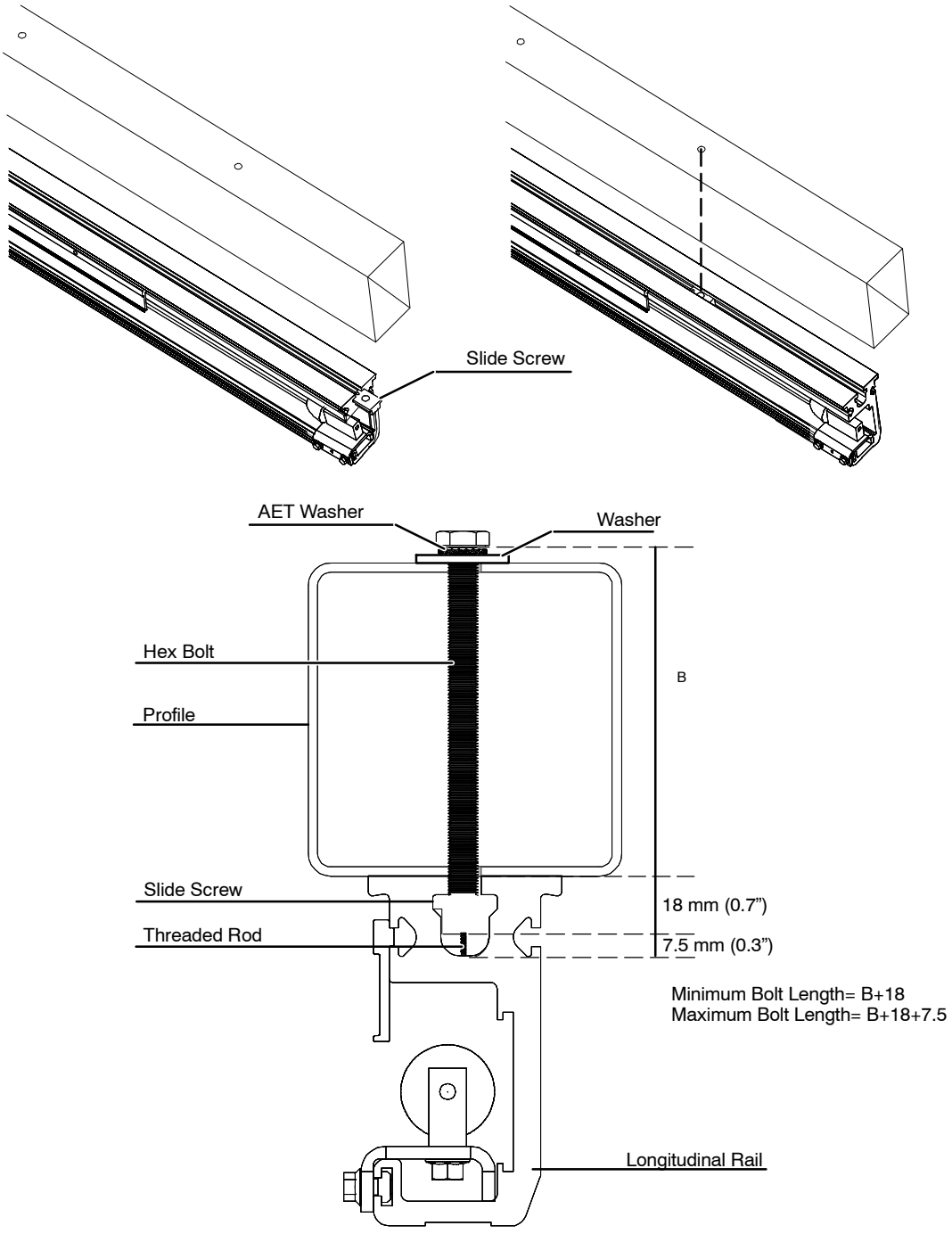
   - In case of **Unistrut Ceiling** use two Rail clamps at each rail mounting point. For each Rail Clamp, one bolt M10 class 8.8, one AET Washer and one Spring Nut.

Illustration 2-4
Fixation of the Longitudinal Rails to Unistrut Ceiling System



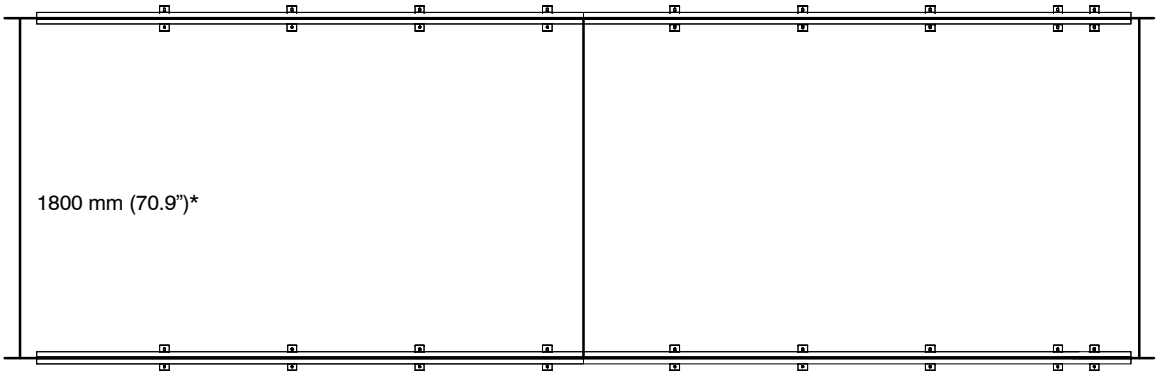
- In case of **other Ceiling Systems**, fix the Rails to the beams/profiles of the Ceiling. Use one Slide Screw M10, one Hex bolt M10 class 10.9, one AET Washer and one flat washer for each rail mounting point.

Illustration 2-5
Fixation of Longitudinal Rails to a Ceiling provided with Steel Profiles/Beams System



8. Check that the Distance between Longitudinal Rails is the same along the whole travel. It is possible to install both rails in a range from 1800 (70.9”), which is the standard distance, to 1400 mm (55.1”) between the centers of both Longitudinal Rails.

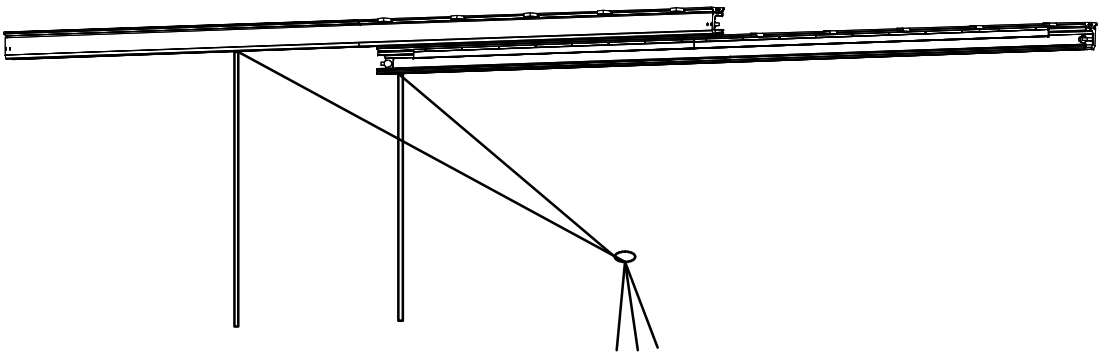
Illustration 2-6
Checking of the Rails Alignment



* Valid distance from 1800 mm (70.9”) up to 1400 mm (55.1”)

9. **Make sure that the rail is properly level before tightening definitely the Rails**. Use the digital Level. The maximum tolerance must be 0.1º. If rails are not properly level, check that all screws are tightened totally; but it may be also because the Ceiling is not level. Use a Laser Alignment Tool or Digital Level to check the Rails leveling.

Illustration 2-7
Check Rails Leveling



10. In case that the Ceiling structure does not allow to install the rails properly level, it is required to use the Leveling Shims to get the proper balance and horizontality of the Longitudinal Rails. Place the shims between longitudinal rails and the profile or alphen rail, if used, and fixed by the rail fixing screws.

Note ☞ *It is very important to check the proper leveling and distance of the Longitudinal Rails before tightening definitely all fixing points. An improper installation of rails can affect seriously the performance of the Overhead Tube Crane.*

11. Fix definitely all fixing points. The minimum fixation force by fixing bolt is 10 kN.

12. Fix to the back Longitudinal Rail the Back Support for the Hose.

Illustration 2-8
Fixation of the Back Support for Hose

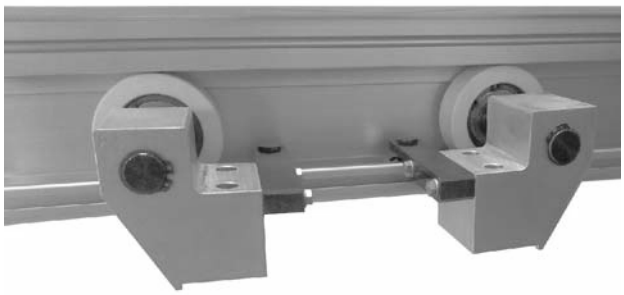
13. Prepare the Longitudinal Rails for the installation of the Transverse Rails:

    a. Loosen and remove temporarily one of the end-stops from each Longitudinal Rail. Both stops must be from the same side.

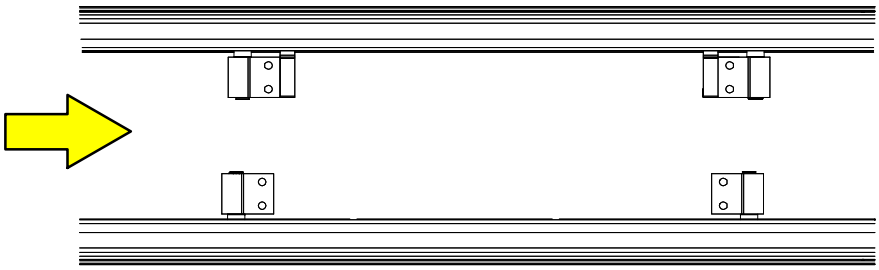
Illustration 2-9
Removal of one End-stop from Longitudinal Rails

b. Slide both pairs of Carriage Wheels on the sliding track of the Rails. Make sure that the wheels are located in their corresponding rail and correct position; the wheels provided with the bearing set must be installed in the back Longitudinal Rail, and those without bearing set in the front Longitudinal Rail.

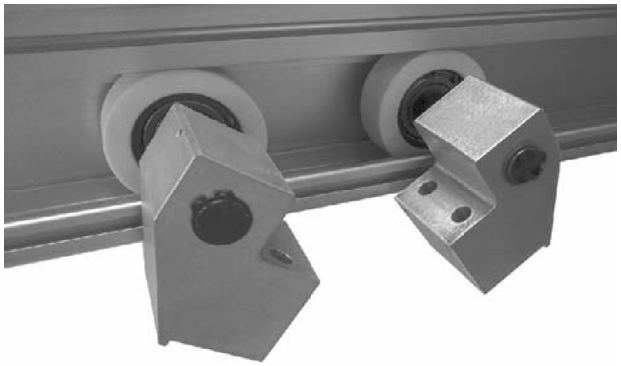
Illustration 2-10
Installation of the Carriage Rails



WHEELS FOR
BACK RAIL



WHEELS FOR
FRONT RAIL



14. Reinstall both End-stops that had been previously removed.

2.3 TRANSVERSE RAILS INSTALLATION

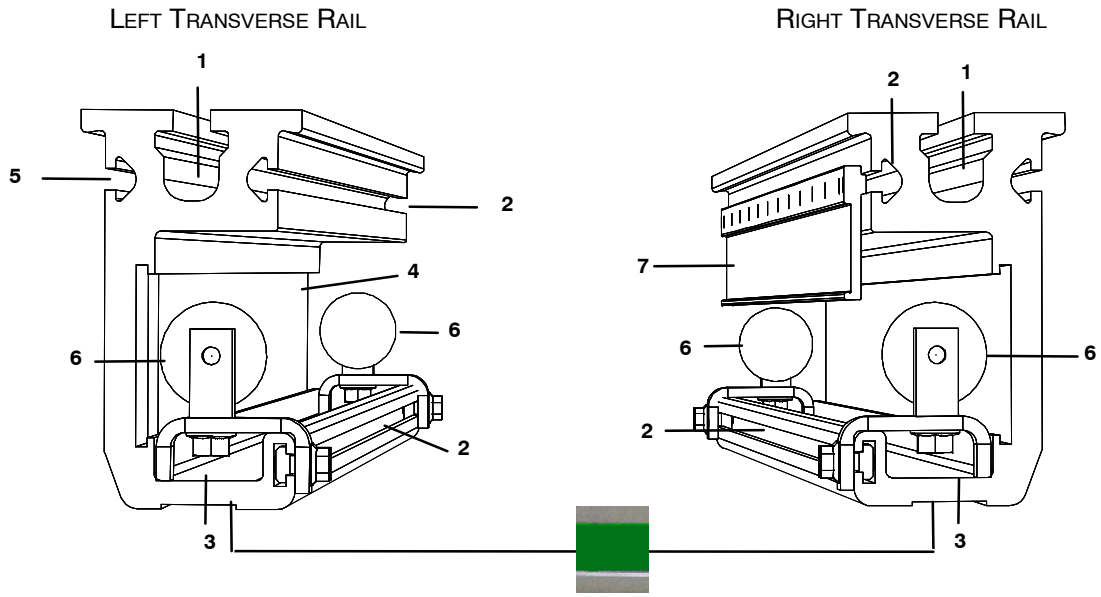
1. The Transverse Rails are identified by the green stripe, which is linked to the Transverse Axis, stuck at the bottom of both rails.

2. Locate the Main Assembly Crate in the center of the Longitudinal Travel, under Longitudinal Rails.

3. Locate both Rails in their correct position:

   - The Left Rail has the Brake Plate assembled at the left of the Crate.
   - The Right Rail has the Transverse Belt assembled at the right of the Crate.

Illustration 2-11
Transverse Rails



1 Track for Slide Screws for the fixation to the Longitudinal Rails
2 Sliding Track for Belts, etc.
3 Sliding Track for Carriage Wheels
4 Metal Plate for Transverse Brake, just in Left Rail
5 Sliding Track for Transverse Hose Cover, just Left Rail
6 Transverse Travel End-stop
7 Transverse Belt, just in Right Rail

4. Remove the laterals of the Main Crate.

5. Loosen and remove temporarily one of the End-stops from each Transverse Rail.

6. Install the Transverse Rails in the Main Carriage:

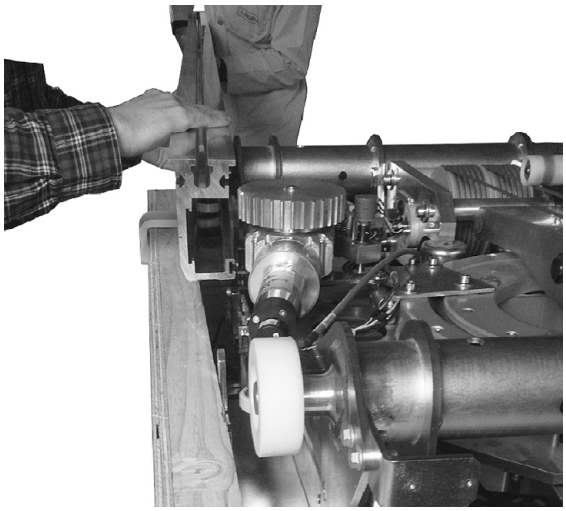
   a. Lift the Transverse Rails and run them with the Carriage wheels rolling in the tracks of the Rails.

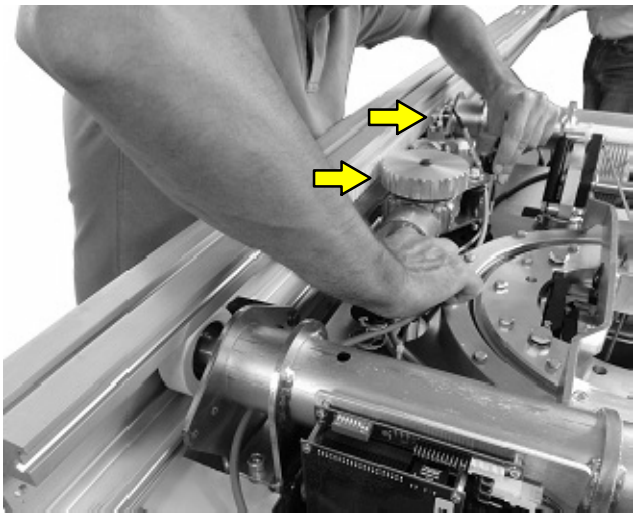
   b. Install first the Right Transverse Rail. Be careful with the Transverse Motor. Push it to make sure that its gear is not engaged with the Transverse Belt until the Rail is properly installed.

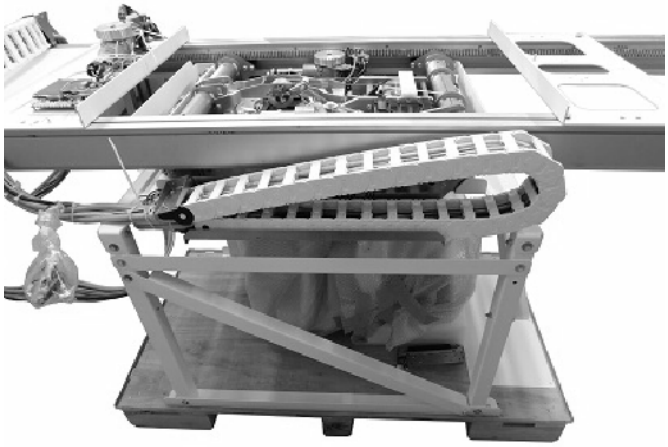
   c. Install the Left Transverse Rail, which includes the Brake Plate.

   d. Reinstall the previously removed End-stops.

Illustration 2-12
Transverse Rails Installation on the Carriage and Back View of the Transverse Rails installed on the Carriage



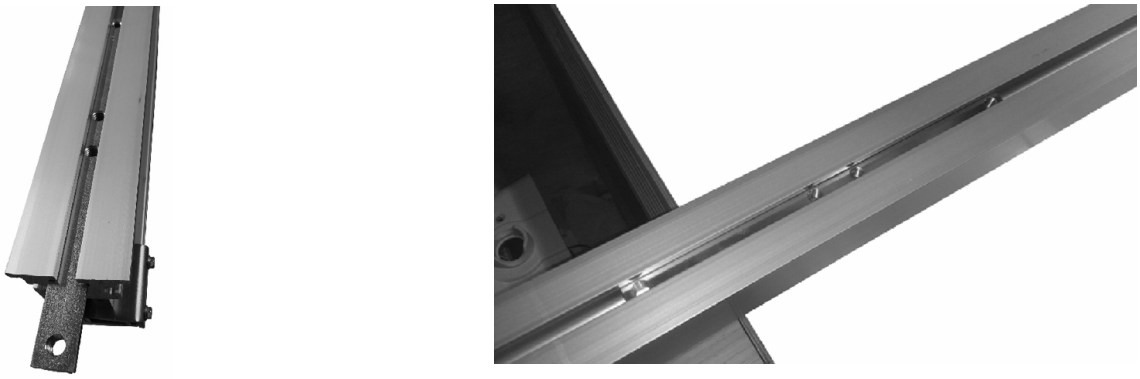




7. Check that both Rails are installed in parallel.

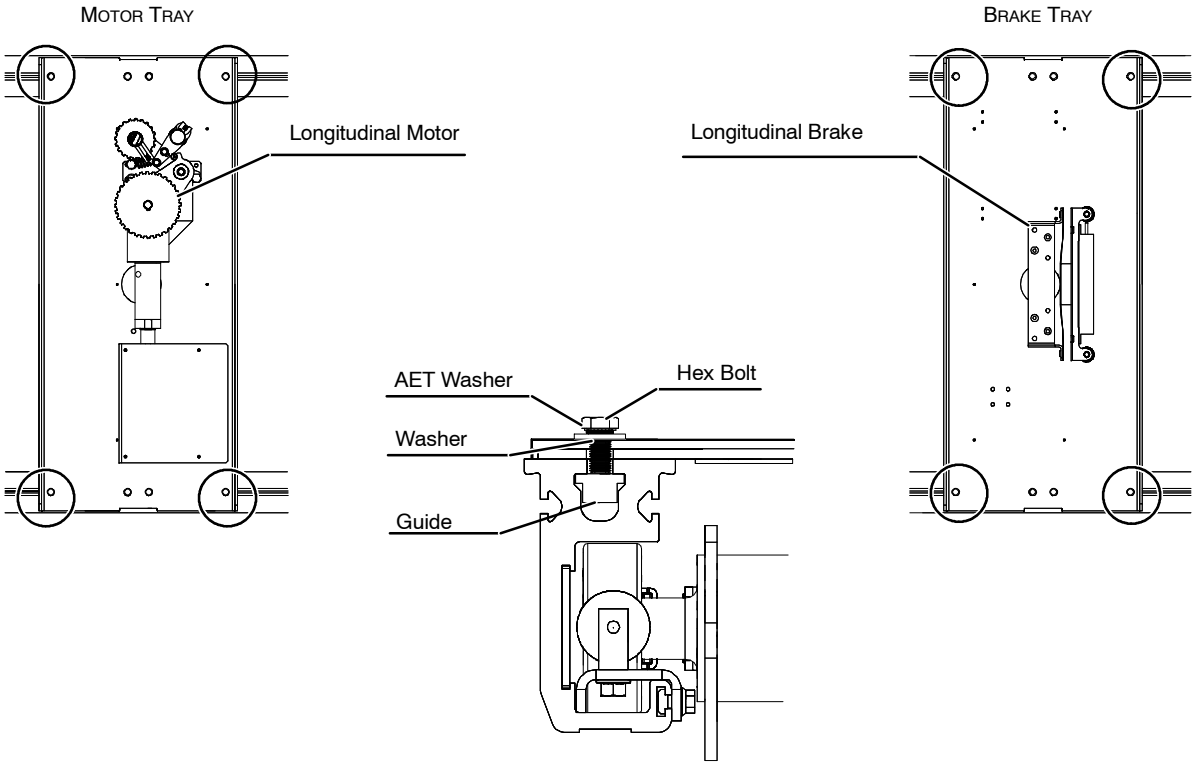
8. Slide into the top tracks of the Transverse Rails the Guides for Transverse Trays.

Illustration 2-13
Guides for Transverse Trays Installation



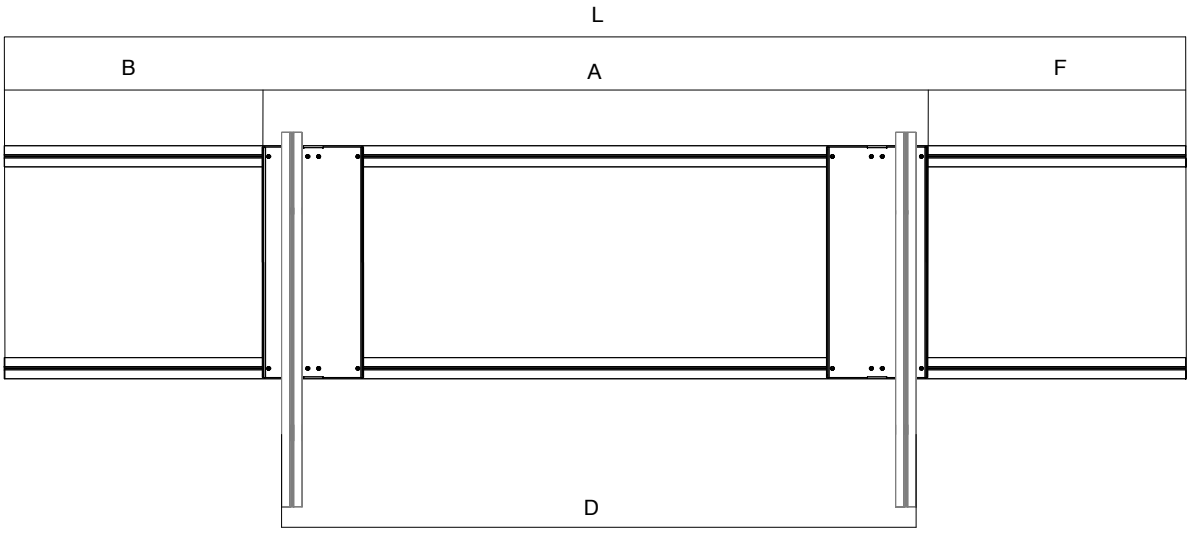
9. Install both Transverse Trays and fix them to the Guides. Use for each fixing Point one Hex Bolt M8 Class 8.8, one AET Washer and one washer. Do not fix them definitely yet.

Illustration 2-14
Transverse Trays Fixation



10. Calculate the correct position of both Trays as it can change depending on the length of the Transverse Rails or on the distance between both Longitudinal Rails. Refer to the Illustration Below for the calculation of the position of both Trays.

Illustration 2-15
Calculation for the Position of the Transverse Trays



L Length of the Transverse Rails
B Distance between the Motor Tray to the back end of the Transverse Rail
A Distance between the back end of the Motor Tray and the front end of the Brake Tray
F Distance between the front end of the Brake Tray and the front end of the Transverse Rails
D Distance between the Longitudinal Rails (external sides)

B + F = L – D – 104mm (4.1”)
A = D + 104 mm (4.1”)

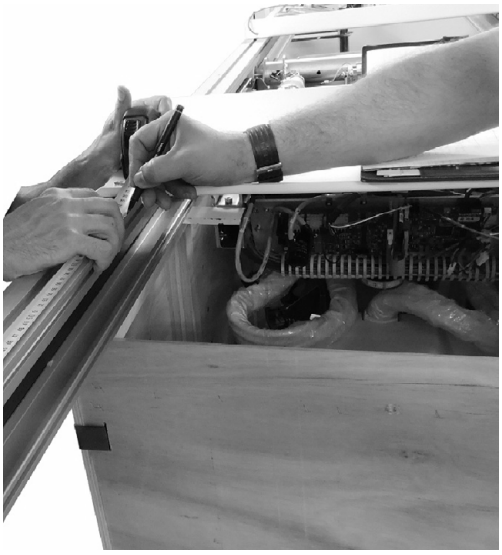
If Transverse Rails are centered, then B = F
F = B = (L – D – 104mm) / 2

For example:
L = 2900 (114.17”) mm and D = 1862 (73.3”) and Transverse Rails Centered:

B = F = (2900 – 1862 – 104) /2 = 467 mm
(114.17 – 73.3 – 4.1) /2 = 18.38”

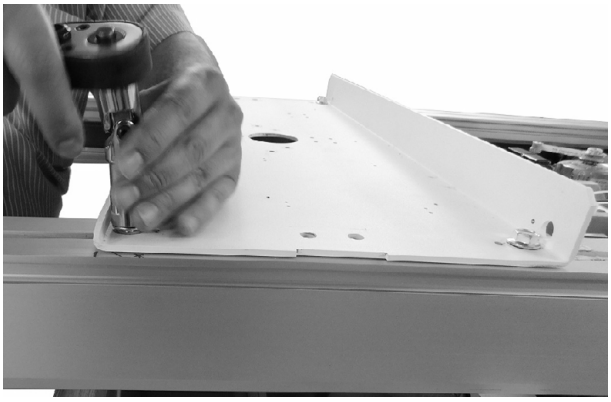
11. Mark the position of both Trays in the Transverse Rails with permanent marker.

Illustration 2-16
Mark the Position of the Transverse Trays



12. Fix definitely both Trays to the Transverse Rails.

Illustration 2-17
Definitive Fixation of the Transverse Trays



13. Check always that both rails remain parallel and symmetric. Measure the distance between them in different positions, it must be the same, 690 ±3 mm (27.17” ±0.12”).

14. Reinstall the previously removed End-stops.

15. Prepare the Crate and the Rails to lift the Overhead Tube Crane and Transverse Rails for their fixation to the Longitudinal Rails.

2.4 PROCEDURE FOR CUTTING THE LONGITUDINAL AND TRANSVERSE RAILS

Longitudinal and Transverse Rails can be adapted to any length by cutting them, so it is possible to have any rail length in addition to the standard lengths and thus, to adapt to any room with measures to which the standard ones do not fit perfectly.

THIS PROCEDURE IS OPTIONAL AND MUST BE COMPLETED IN ACCORDANCE WITH ALL SAFETY REGULATIONS AT WORK AND ENSURING THE MAXIMUM SAFETY FOR ALL OTHER COMPONENTS OF THE ROOM, PREFERABLY OUT OF THE ROOM WHERE ALL CRATES AND COMPONENTS ARE OR, IF IT IS POSSIBLE, BEFORE UNPACKING THE MAIN CRATE AND ALL THE OTHER POSITIONERS AND COMPONENTS.

To cut the Rails:

1. To avoid losing control, make sure that Rails are positioned in a horizontal, clean and stable position.
2. Hold or clamp all material securely when cutting. Do not perform operations freehand.
3. For operation of the chop saw, a full face shield and safety glasses are required, operators should always wear safety glasses under a full face shield. Use also safety gloves.
4. Clean the Rails and remove any component that may obstruct the perfect operation of the saw, that is, all moving components from the Rail as guides, Belts, End Stops, etc.; leave just those elements that might be cut.
5. Measure both rails and mark the required distance. If necessary, measure and mark the Belt too.
6. Use a Metal Cutting Chop Saw, preferably to an Air one.
7. Make sure that rails are evenly cut and both ends have neither edges nor burrs.

Note ☞ *It is recommendable that the new distances are longer than the minimum standard distance: 3000 mm (118.1”) for Longitudinal Rails and 2500 mm (98.4”) for Transverse Rails.*

8. Reinstall all the removed components from the Rails.

2.5 LIFTING THE OVERHEAD TUBE CRANE AND TRANSVERSE RAILS

Note ☞ *In case of using another lifting tool, remember that it must comply with all the ceiling installation and safety requirements.*

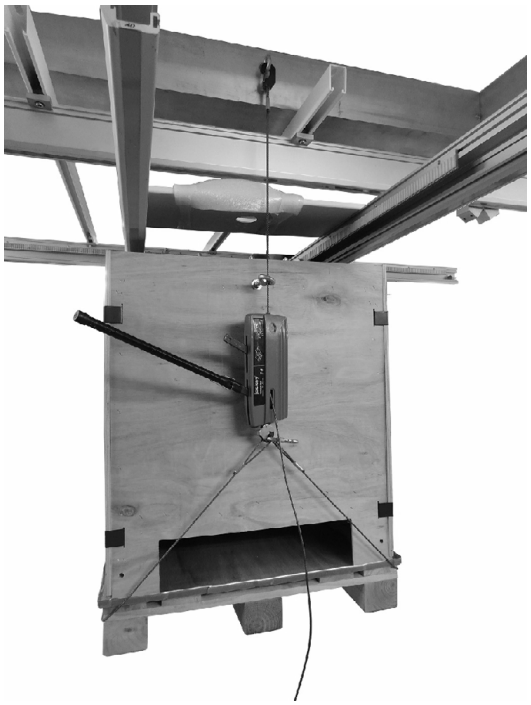
WARNING

TO LIFT THE OVERHEAD TUBE CRANE NEITHER REMOVE ANY COVER OF THE MAIN ASSEMBLY SUPPORT, NOR BAR HOLDERS.

The Lifting Tool provided by the manufacturer is an optional tool, P/N A18054-02. Another tractel or lifting equipment can be used, as long as it is capable to lift the main crate and the Transverse rails, refer to the *Section 1.4 Pre-installation Checks* for information about the equipment and crate weight.

It is required to use a pair of Lifting Tools, install one at each end of the crate.

Illustration 2-18
Lifting Tool and Rings Installation

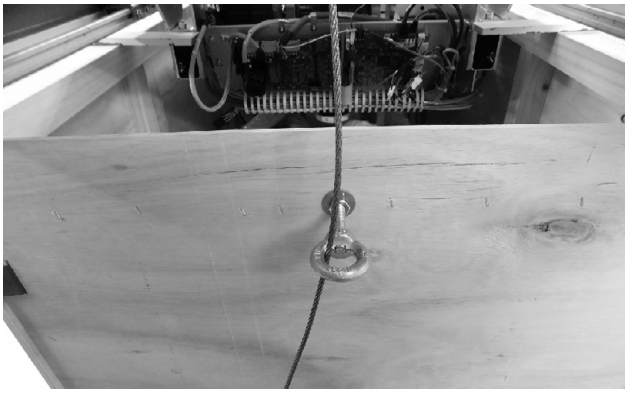


2.5.1 INSTALLATION OF THE LIFTING TOOL

1. Install the rings required for the Lifting Tool installation. Two at the Longitudinal Rails, one at each rail; and two more at the top of the Overhead Tube Crane Crate, one at the front and one at the back of the Crate (refer to *Illustration 2-18*).

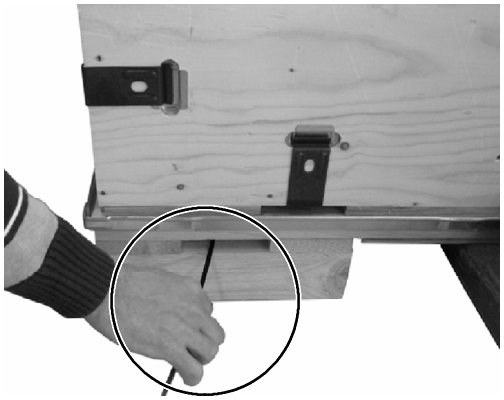
2. Pass the Lifting Tool wire ropes through the Crate rings.

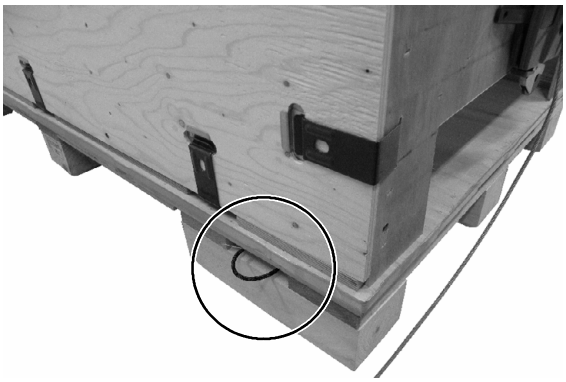
Illustration 2-19
Crate Ring with Wire Rope installed



3. Pass the other wire ropes through the gaps of the skids under the Crate to avoid unexpected overturns of the Crate during the lifting procedure.

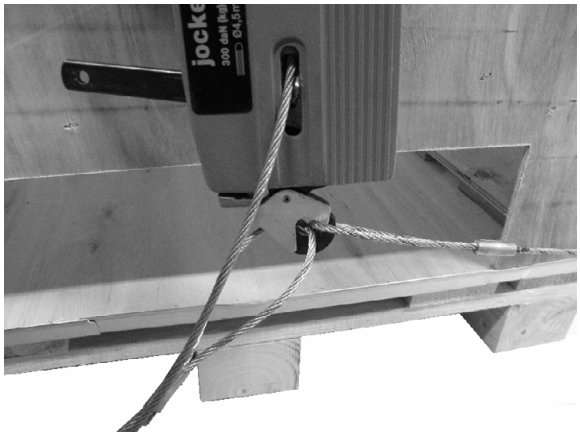
Illustration 2-20
Drive the Wire Rope through the Crate Skids





4. Hook the wire ropes with the bottom hook of the Lifting Tool.

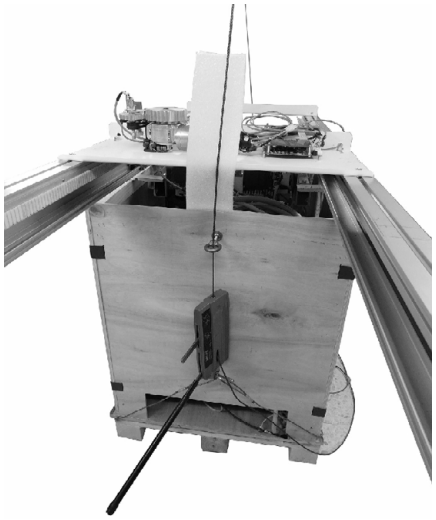
Illustration 2-21
Hook the Wire Ropes

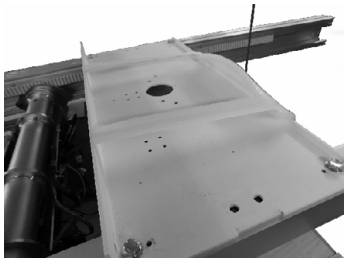


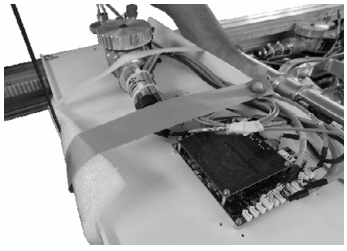
5. Adjust the wire ropes by lifting just a little bit the Crate using the forward lever. Make sure that there are not knots, wire ropes are tightened and that Overhead Tube Crane can be lifted safely.

6. Use any propene sheet to cover the areas of both trays that are in contact with the wire rope of both tractels, so no part of the trays will be damaged during the lifting procedure. Be specially careful with the Longitudinal Motor.

Illustration 2-22
Make sure that the Lifting Tool is properly installed and Trays are protected



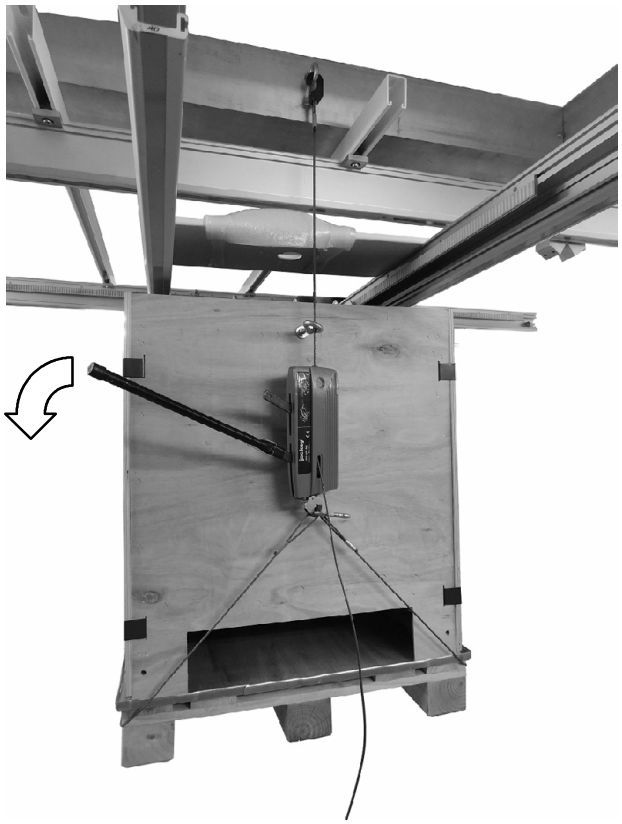




2.5.2 LIFTING & LOWERING THE TRANSVERSE RAILS AND OVERHEAD TUBE CRANE

1. To lift the Overhead Tube Crane and Crate, fit the operating handle in the forward lever and move it back and forth at the same time in both tractels.

Illustration 2-23
Overhead Tube Crane Lifting procedure



2. Lift the Main Crate with the Overhead Tube Crane main assembly until the Transverse Rails are 1 cm (0.39”) away from the Longitudinal Rails.

Note ☞ *Lift safely the Overhead Tube Crane. It must be always horizontally without any sway motion. Try to keep always the same pace when rolling the Lifting Tools.*

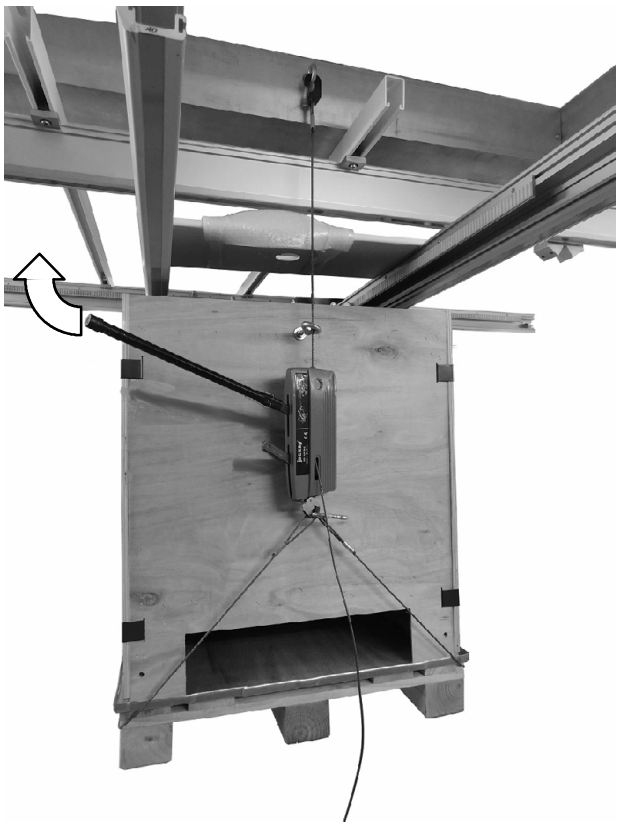
WARNING

DO NOT DISASSEMBLE THE SHIPPING CRATE YET. PROCEED TO LOWER IT WHEN THE TRANSVERSE RAILS HAVE BEEN FIXED COMPLETELY TO THE LONGITUDINAL RAILS.

3. Once the Transverse Rails and Overhead Tube Crane have been fixed to the Longitudinal Rails *(refer to Section 2.6),* remove the Main Crate Bar Holders and any shipping element from the Overhead Tube Crane.

4. To lower the Main Crate, fit the operating handle in the reverse lever and move it back and forth at the same time in both tractels.

Illustration 2-24
Overhead Tube Crane Lowering procedure



WARNING

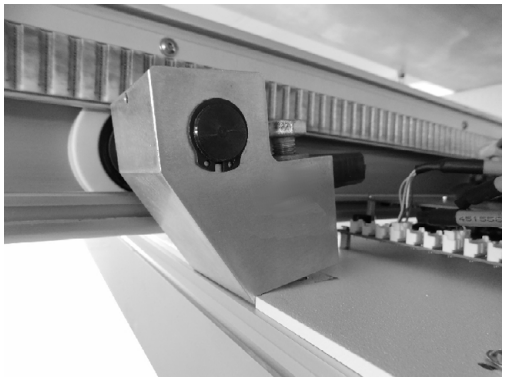
LOWER THE CRATE ONCE THE TRANSVERSE RAILS AND THE OTC HAVE BEEN FIXED TO THE LONGITUDINAL RAILS, REFER TO SECTION 2.6.

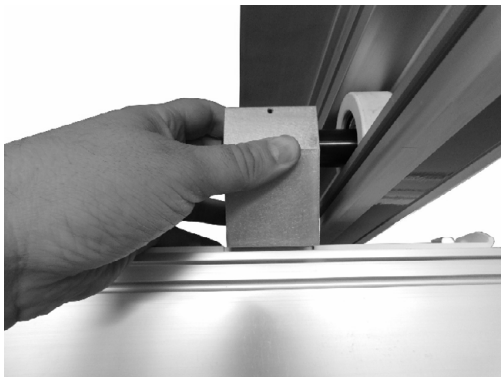
2.6 TRANSVERSE RAILS FIXATION TO THE LONGITUDINAL RAILS

For the fixation of the Transverse Rails to the Longitudinal Rails:

1. Align the screws of the Wheels, which are already installed in the Longitudinal rails, with the central bores of the Transverse Trays. Match the wheels with the flange of the Tray.

Illustration 2-25
Adjustment of the Wheels



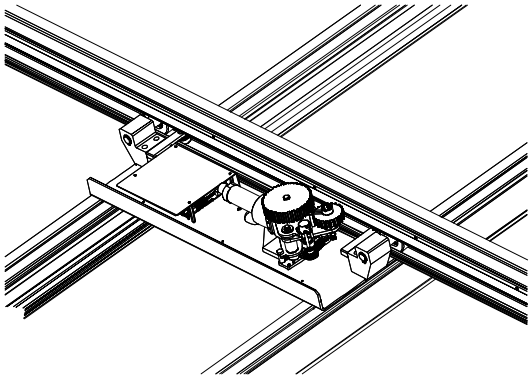


2. Tighten the Back Wheels to the Back Transverse Tray, which includes the Longitudinal Motor. Fit the Gear of the Longitudinal Motor to the notched Longitudinal Belt.

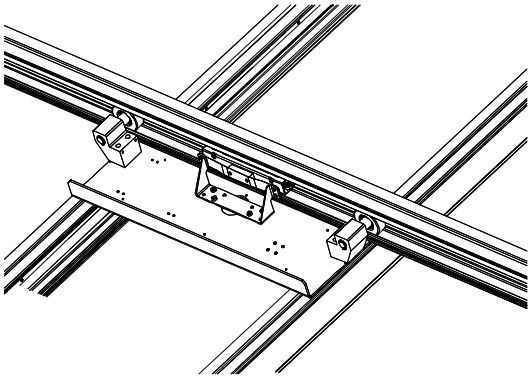
3. Tighten the Front Wheels to the Front Transverse Tray, which includes the Longitudinal Brake, that must be installed now *(refer to Section 2.8 Longitudinal Brake Installation*).

Illustration 2-26
Transverse Trays

Back Transverse Tray

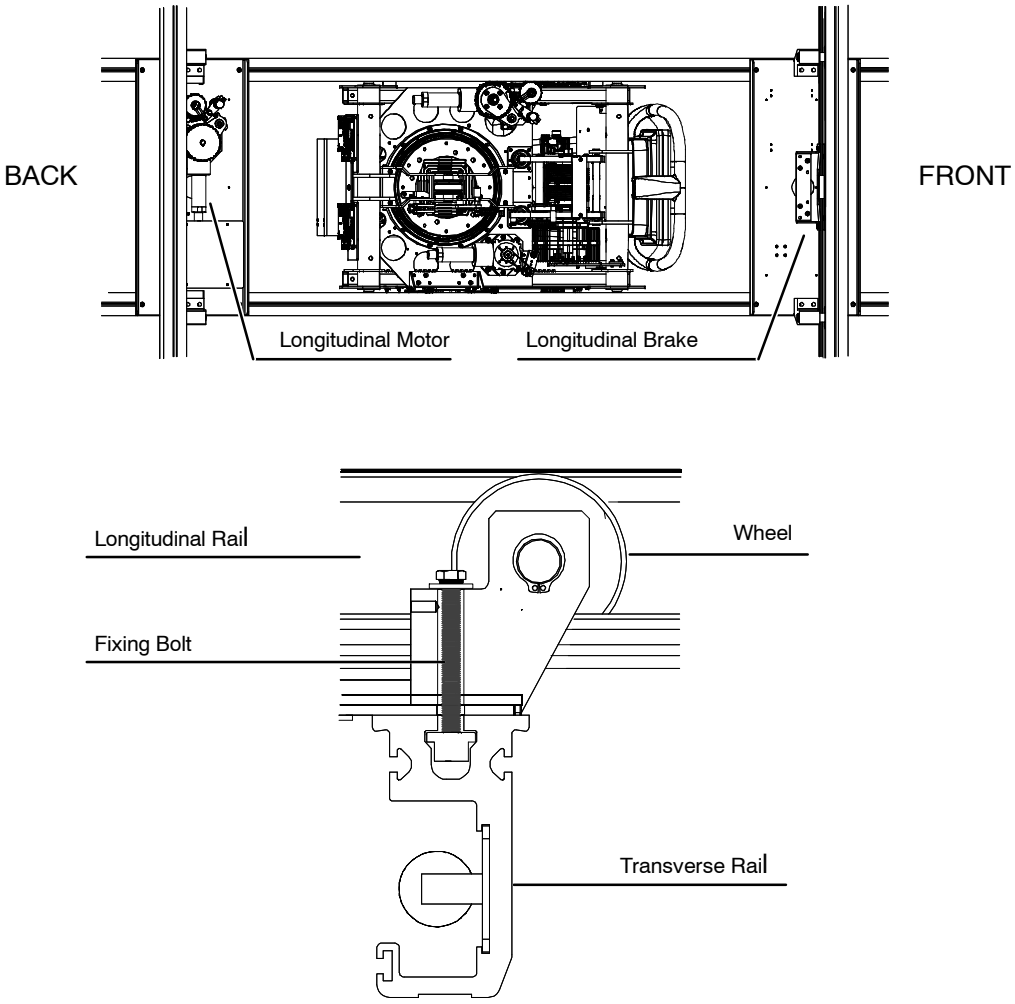


Front Transverse Tray



4. For the fixation of the Transverse Rails, use two HEX Bolts M8 Class 8.8 with two AET Washers and two Washers for each Wheel.

Illustration 2-27
Fixations of the Wheels to the Transverse Trays

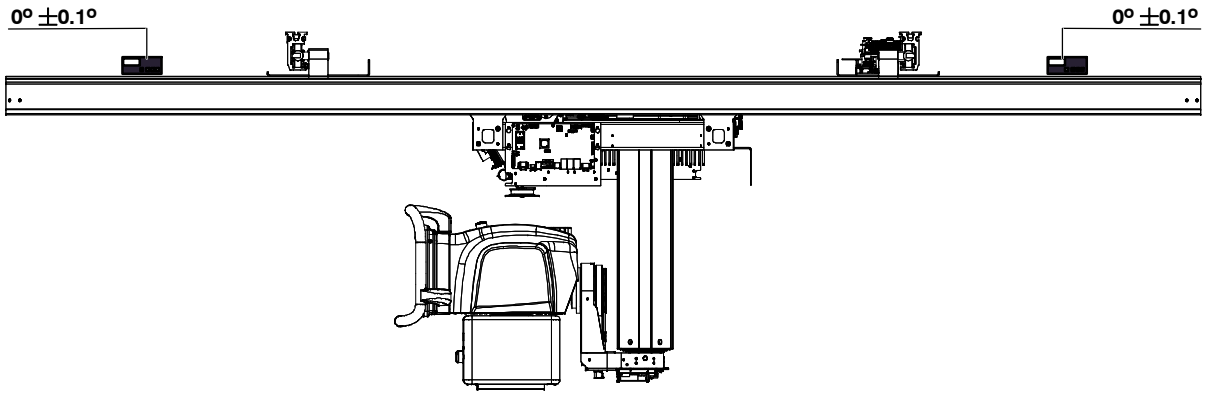


5. Check that the distance between both Transverse Rails is correct and the same in both ends of the Rails, 690 mm (27.17”).

Note ☞ *When tightening definitively the Wheels make sure that this distance is respected.*

6. Check the leveling of the Transverse Rails.

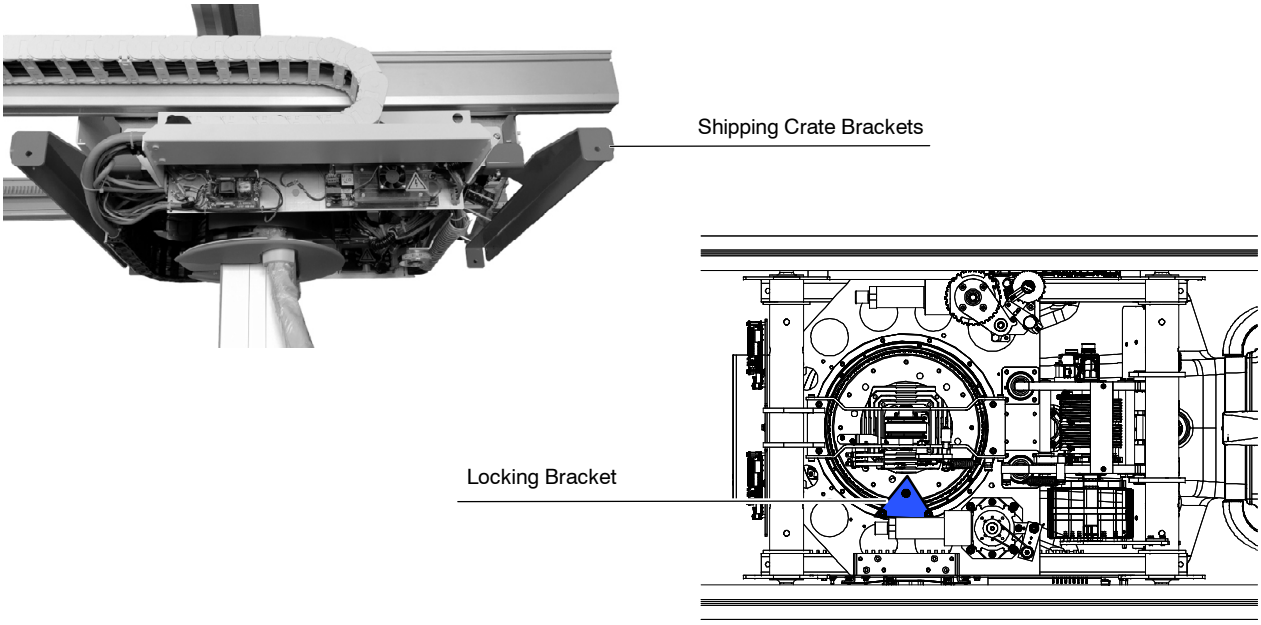
Illustration 2-28
Leveling of the Transverse Rails



7. Check that the Transverse Rails run properly along the whole Longitudinal Rails.

8. Remove all the items that have been used to support and lift the Overhead Tube Crane with the Transverse Rails as the lifting Tools or the brackets.

Illustration 2-29
Shipping Brackets Location



9. Lower the crate and all shipping material as indicated in *Section 2.5.2 Lifting and Lowering the Transverse Rails and OTC*.

2.7 LONGITUDINAL & TRANSVERSE POTENTIOMETERS ADJUSTMENT

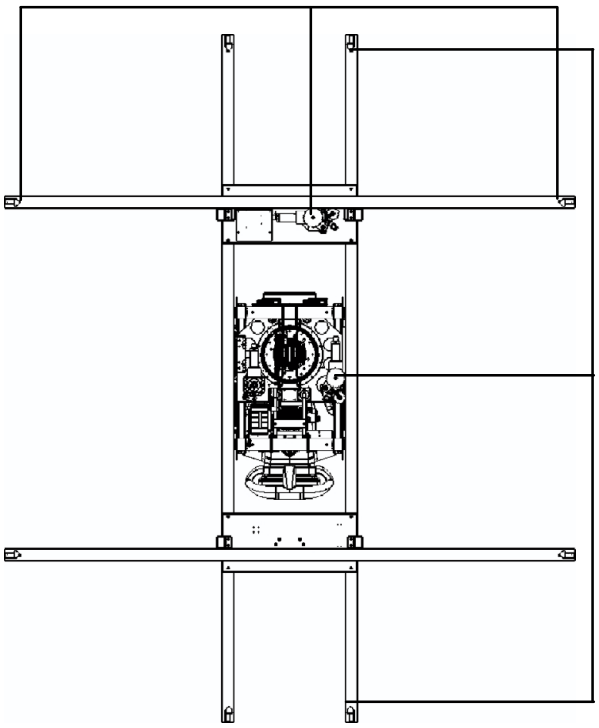
Longitudinal and Transverse Axes are provided with one potentiometer each that must be adjusted now to avoid any possible damage before continuing with the installation of the Hose, etc.

CAUTION

Do not engage Transverse and Longitudinal motors yet and do not move the Overhead Tube Crane along the Transverse and Longitudinal axes until both potentiometers have been properly adjusted. If not, the potentiometers could be damaged.

1. Locate the OTC in the center of the Transverse and Longitudinal Travels:
   a. Measure the distance between the End stops of the rails.
   b. Mark the central points of both travels with a marker on a masking tape stuck on the rails.

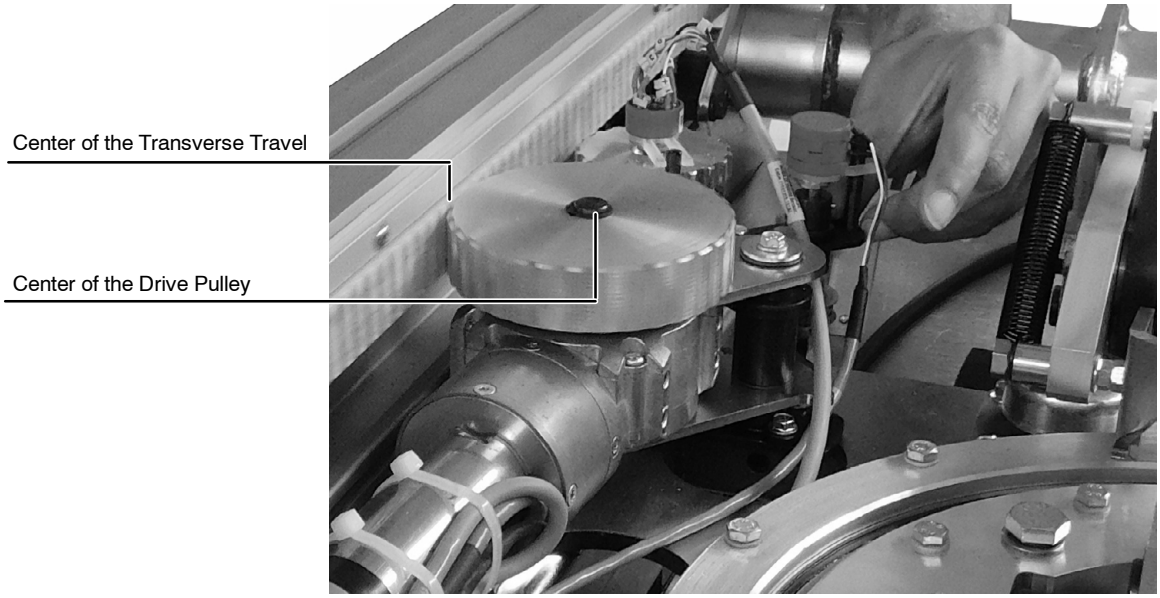
Illustration 2-30
Location of the Central Points in Transverse and Longitudinal Rails



c. Align the center of the travel with the center of the drive pulley of the Transverse and Longitudinal Motor assemblies.

2. To adjust the Potentiometers turn them to their middle position. To do so, turn them five times from end position.

Illustration 2-31
Adjustment of the Potentiometers



3. Engage both motors with both notched belts.

4. Move along both axes to check if the Carriage can move up to all ends of both travels properly.

2.8 INSTALLATION OF THE LONGITUDINAL BRAKE

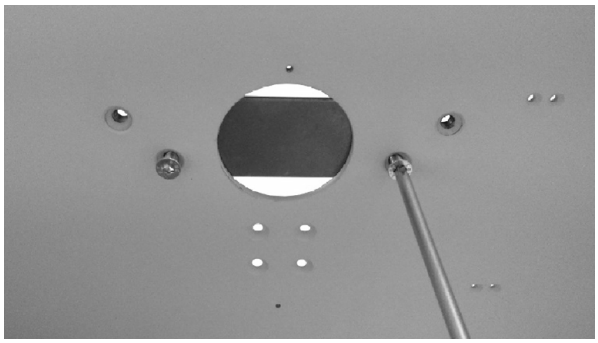
Always install the Longitudinal Brake at the same time that the front Transverse Tray is being fixed to both front Wheels assemblies.

To install the Longitudinal Brake:

1. Adjust the position of the Longitudinal Brake to the front Longitudinal Rails.

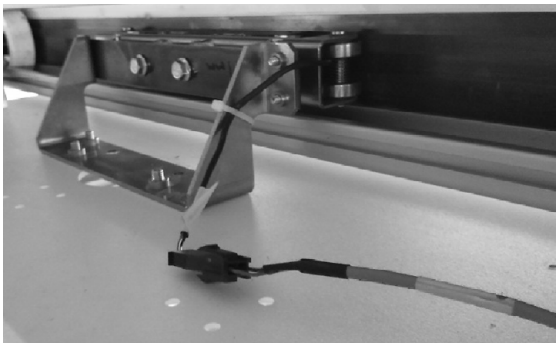
2. Tighten the four fixing screws and washers to fix the Longitudinal Brake to the front Transverse Tray.

Illustration 2-32
Fixation of the Longitudinal Brake to the Front Transverse Tray



3. Route the Longitudinal Motor Cable through the rail track, Cables bore and both Transverse Trays, and connect it with the Longitudinal Brake.

Illustration 2-33
Connection of the Longitudinal Motor Cable with the Brake

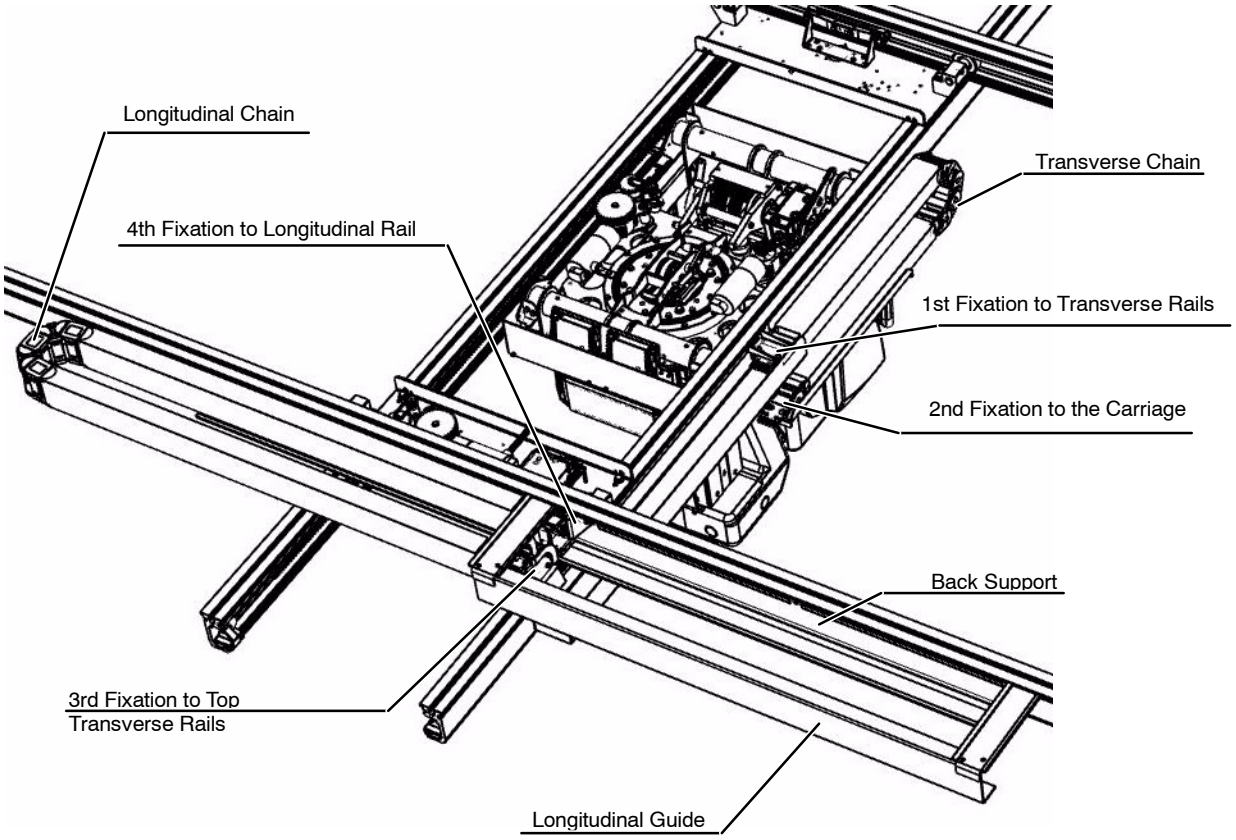


2.9 HOSE INSTALLATION

The Hose is shipped almost installed on the Overhead Tube Crane, but it is also required:

a. Installation of the Hose brackets to fix the Hose to the Carriage, to the Transverse Rails and to the Longitudinal Rails. Check the order in the illustration below.

Illustration 2-34
Components and Brackets of the Hose

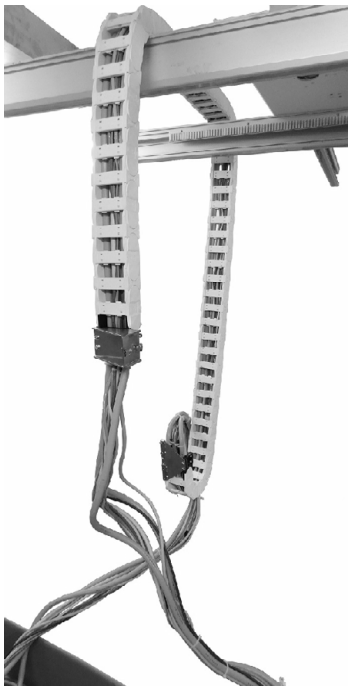


b. Routing of the Hose Chain.

c. Electrical Connection of the Hose.

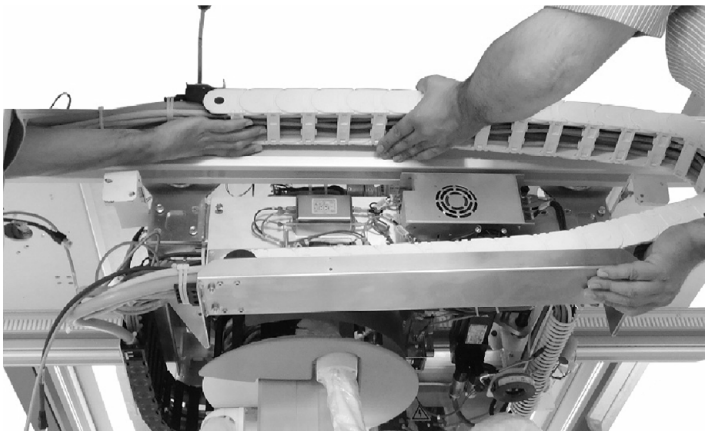
1. Unpack the Hose of the Overhead Tube Crane. When unpacking, try to route the hose the nearest to its final position. Route the Longitudinal Chain along the Back Support for the Hose.

Illustration 2-35
Hang the Longitudinal Chain on the Back of the Transverse Rails



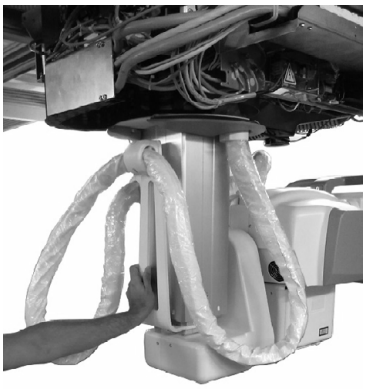
2. Fix the fixing bracket of the Transverse Chain to the Transverse Rail. Do not fix definitely yet.

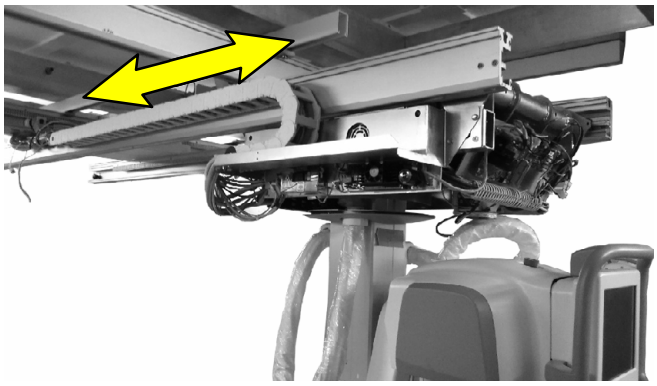
Illustration 2-36
Fixation of the Transverse Chain to the Transverse Rail



3. Move manually the OTC forwards and backwards along the Transverse axis and check that it runs properly from end to end. Then fix definitely the Bracket of the Transverse Rail.

Illustration 2-37
Checking of the Travel of the Transverse Chain





MOVE MANUALLY AND CAREFULLY THE EQUIPMENT TO NOT DAMAGE IT. DO NOT USE THE CONTROL CONSOLE NOR THE WHEEL TO PUSH THE OVERHEAD TUBE CRANE WHEN IT IS NOT POWERED, AS IT MAY CAUSE DAMAGES TO BOTH PARTS OF THE EQUIPMENT.

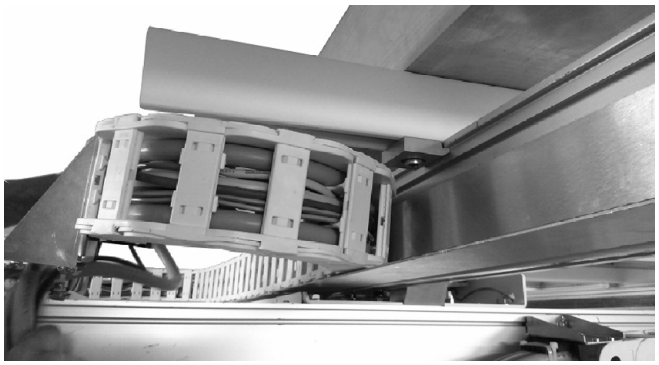
4. Proceed to install the Longitudinal Chain. It can be installed running from left to right as configured by default in factory or from right to left, depending on the room configuration.

5. Proceed to install the Longitudinal Guide, so that it covers the Longitudinal displacement of the Chain (*refer to Illustration 2-34*).

RIGHT CONFIGURATION OF THE HOSE (DEFAULT)

1. Route the Hose Chain along the Back Support for the Hose.

Illustration 2-38
Routing the Longitudinal Chain along the Back Support

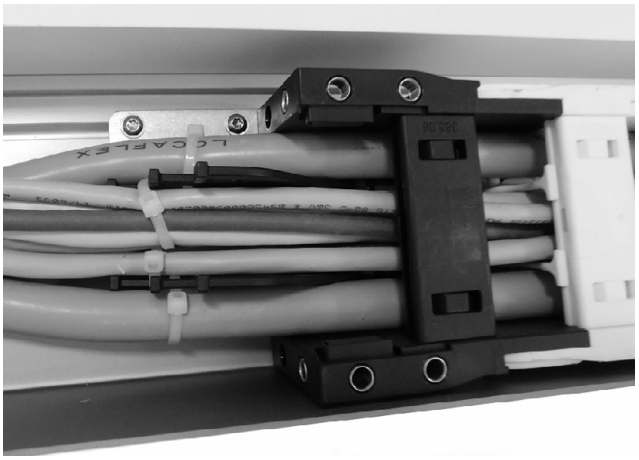


2. Tighten both fixing screws of the bracket for the fixation of the Hose to the top of the Transverse Rail at the back of the Longitudinal Rail. Install it on the left Transverse Rail. Remember that depending on the room configuration, this bracket may be installed on the right Transverse Rail too. In this case, the travel of the Hose will be slightly shortened.

Illustration 2-39
Fixation Bracket at the Back of the Transverse Rail

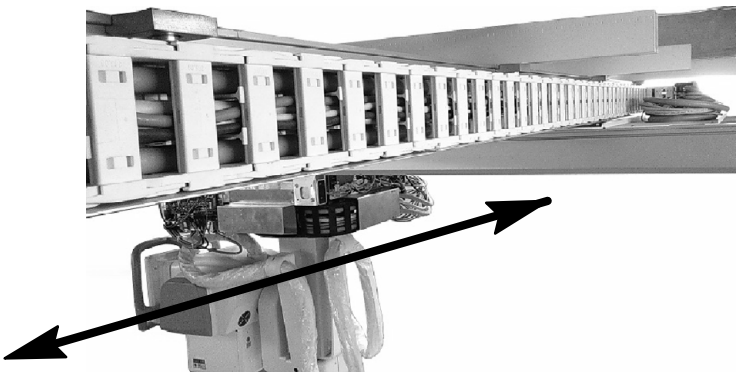
3. Fix the Hose Chain to the Longitudinal Rail. Do not tighten definitely until checking that the fixing bracket is placed where it must be fixed to allow a perfect movement of the Hose. The fixing bracket must be installed above the left Transverse Rail.

Illustration 2-40
Fixing Bracket at the Back of the Longitudinal Rail



4. Move the Overhead Tube Crane from end to end of the Longitudinal Axis to check the proper movement of the Hose Chain along the Longitudinal Axis. Get the Hose stretched at its maximum and tighten definitely the fixation to the Longitudinal Rail.

Illustration 2-41
Checking the Travel of the Longitudinal Chain



5. Tie the Cables that are outside of both Hose Chains to the Transverse and Longitudinal Rails with a tie wrap.

6. Install the Longitudinal Guide.

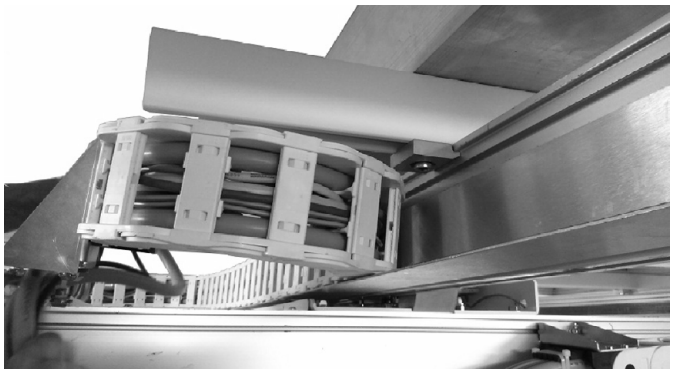
7. Route all cables of the Overhead Tube Crane through the cable ducts of the room.

LEFT CONFIGURATION OF THE HOSE

Once the Hose Tray is installed on the Transverse Rails, proceed to install the Longitudinal Chain.

1. Route the Hose Chain along the Back Support for the Hose.

Illustration 2-42
Routing the Longitudinal Chain along the Back Support

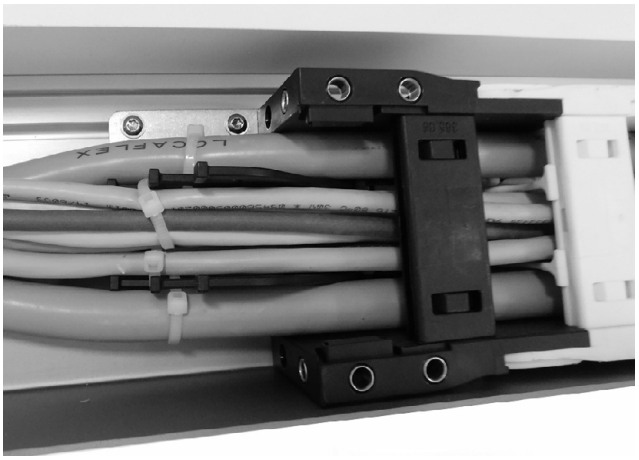


2. Tighten both fixing screws of the bracket for the fixation of the Hose to the top of the Transverse Rail at the back of the Longitudinal Rail. Install it on the right Transverse Rail. Remember that depending on the room configuration, this bracket may be installed on the left Transverse Rail too.

Illustration 2-43
Fixing Bracket at the Back of the Transverse Rail

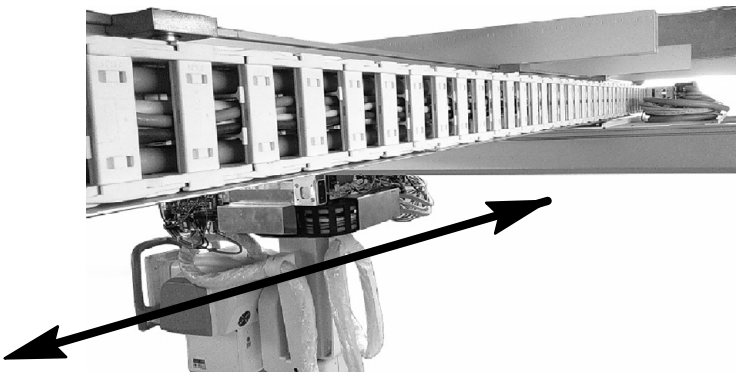
3. Fix the Hose Chain to the Longitudinal Rail. Do not tighten definitely until checking that the fixing bracket is placed where it must be fixed to allow a perfect movement of the Hose. The fixing bracket must be installed above the right Transverse Rail.

Illustration 2-44
Fixing Bracket at the Back of the Longitudinal Rail



4. Move the Overhead Tube Crane from end to end of the Longitudinal Axis to check the proper movement of the Hose Chain along the Longitudinal Axis. Get the Hose stretched at its maximum and tighten definitely the fixation to the Longitudinal Rail.

Illustration 2-45
Checking the Travel of the Longitudinal Chain



5. Tie the Cables that are outside of both Hose Chains to the Transverse and Longitudinal Rails with a tie wrap.

6. Install the Longitudinal Guide.

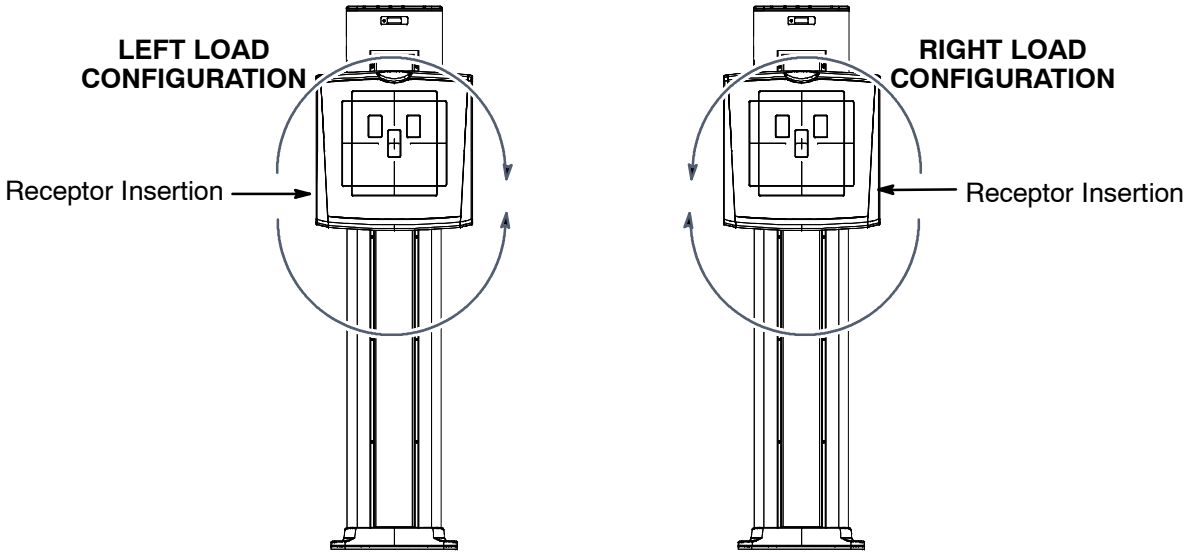
7. Route all cables of the Overhead Tube Crane through the cable ducts of the room.

SECTION 3 INSTALLATION OF THE RAD WALL STAND

3.1 PRELIMINARY CHECKS

Note ☞ *The Wall Stand can be either Left or Right loaded (refer to Illustration 3-1). The Wall Stand is factory Left handed configured. This figure shows the correct rotation for each configuration.*

Illustration 3-1
Correct Bucky Rotation way depending on the Configuration



Note ☞ *To complete a Right hand configuration, Service personnel must get in contact with the Manufacturer Technical Service and follow their instructions.*

Preliminary checks:

- Do not discard any packing material such as envelopes, boxes or bags until all parts are compared to the packing list.
- Check the general condition and external appearance of all parts for possible damages or missing items.
- Notify the distribution centre immediately of any damaged or missing parts.

Illustration 3-2
Wall Stand Crate and Shipping

WARNING

TO AVOID PERSONNEL INJURY OR EQUIPMENT DAMAGE DO NOT REMOVE SHIPPING RETAINING PIN, BRACKETS, OR HARDWARE FROM THE WALL STAND UNTIL INSTRUCTED TO DO SO. THE SHIPPING RETAINING PINS LOCK THE MOBILE PARTS IN A FIXED POSITION THAT PROVIDES THE INSTALLER A SAFETY FEATURE DURING INSTALLATION. RETAINING PINS SHOULD NOT BE REMOVED UNTIL THE WALL STAND IS FIXED TO THE FLOOR AND FULLY INSTALLED.

WARNING

WHEN THE PINS ARE REMOVED, THE PATIENT SUPPORT MOVEMENTS ARE FREE. AVOID TO INTRODUCE FINGERS AND OTHER OBJECTS BETWEEN THE MOBILE AND FIXED PARTS.

The RAD Wall Stand is shipped in one crate to facilitate transport and installation *(refer to Illustration 3-2).* Proceed with the unpacking procedure as follows:

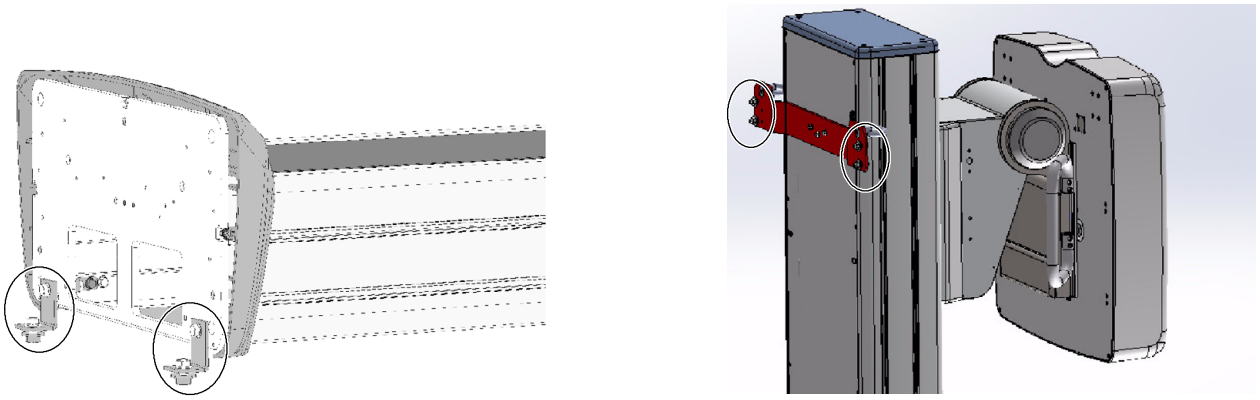
1. Move the equipment in the shipping container to the installation area and in horizontal position.

2. Remove banding and all plastic clamps of the crate top cover and remove the top and lateral covers of the Crate.

3. Remove the shipping fixations (two brackets) that hold the base of the column of the Wall Stand to the pallet and discard them.

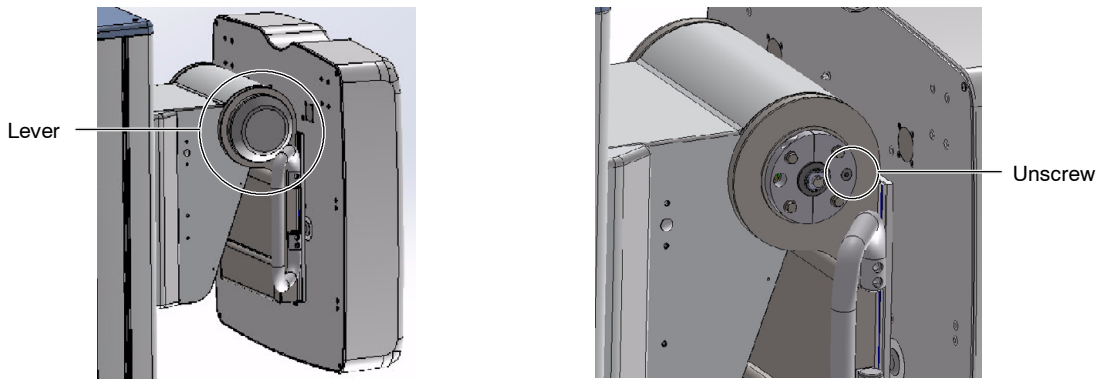
4. Remove the shipping fixation (the red bracket) that hold the column of the Wall Stand to the pallet from the pallet (4 screws). Do not remove the bracket from the Wall Stand yet.

Illustration 3-3
Shipping Fixations



5. If the Wall Stand is provided with the tilting option, remove the screw that avoids the tilting movement. To do so, lever the lateral cover of the tilting assembly with a screwdriver and remove the allen screw.

Illustration 3-4
Tilting Fixation



WARNING

DO NOT REMOVE YET THE RECEPTOR FIXATION BRACKET. WHEN IT IS REMOVED, THE RECEPTOR MOVEMENTS ARE FREE. AVOID TO INTRODUCE FINGERS AND OTHER OBJECTS BETWEEN THE MOBILE AND FIXED PARTS.

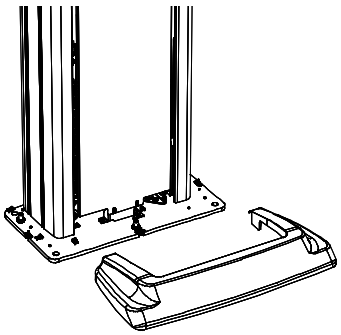
6. Rest the bottom end of the equipment on the soft support material outside the shipping container.

3.2 COVERS REMOVAL

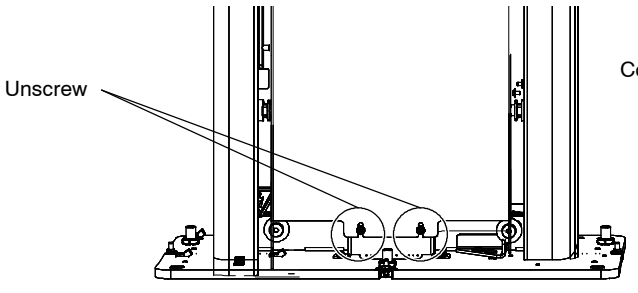
CAUTION

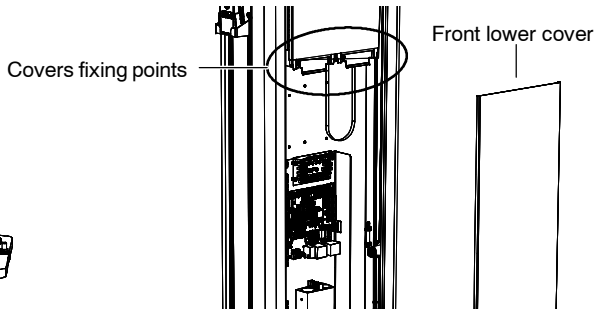
Do not remove the Wall Stand covers yet. Each cover has to be removed at different stages of the installation. Refer to this section when instructed to do so during the installation procedure.

1. Remove the base cover by pulling it out (no screws).

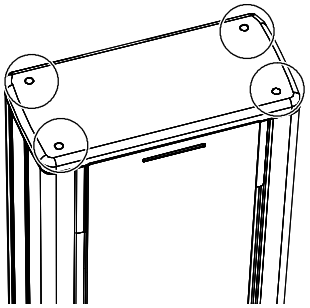


2. Remove the front lower cover. To do so, unscrew to two screws on the bottom and then pull down to separate it from the top cover as it is not screwed to it.



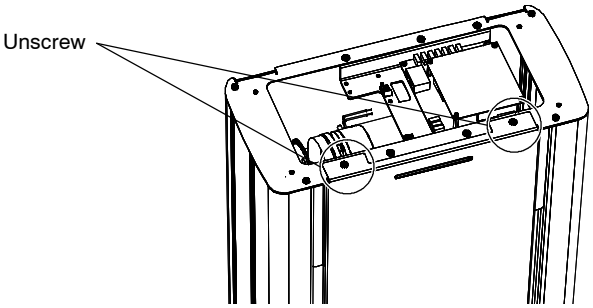


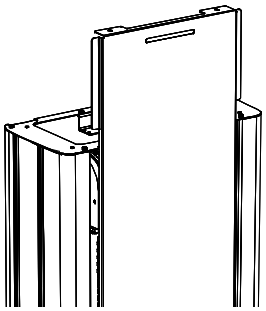
3. Unscrew the top cover of the column.



Note ☞ *For most service procedures, it is not necessary to remove the front top cover, as all the electronics of the equipment are in the lower part and at the top of the column. However, it is necessary to remove it to counterbalance the equipment when it is provided with portable detectors.*

4. Remove the front top cover. To do so, lower the Receptor assembly, unscrew the two screws on the top of the cover, slightly pull out the cover and then lift it to separate it from the column.





Note ☞ *If the Wall Stand is too close to the ceiling, it will not be possible to remove the front top cover.*

3.3 STANDING AND FLOOR MOUNTING

WARNING

INJURY HAZARD! AT LEAST TWO PEOPLE ARE REQUIRED TO LIFT OR TILT THE EQUIPMENT. IT WEIGHS APPROXIMATELY 270 KG (595 LBS) AND CAN EASILY BE TIPPED OR UNBALANCED.

CAUTION

Do not use the Vertical Movements Handle to raise the equipment during the installation procedure. This piece may become damaged.

REQUIRED TOOLS

- Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.
- Wrench Set
- Marker
- Laser Alignment Tool

Note ☞ *Remember that the Wall Stand must be installed after installing the Tube Support as its definitive position and alignment must be determined by the X-ray Tube position.*

1. Raise carefully the Column to get it in Vertical Position and in the same location where it must be installed.

   - Remove it from the shipping pallet. Hold it from the top and bottom ends.
   - Lift the Column carefully. Hold it at the top of the Column.
   - A lifting strap tied to the bar which is factory installed at the back of the column of the Wall Stand can be used to lift the Wall Stand with a crane. Tie the strap to both rings of the bar of the Wall Stand and lift it always from its original lying position *(refer to Illustration 3-5).*

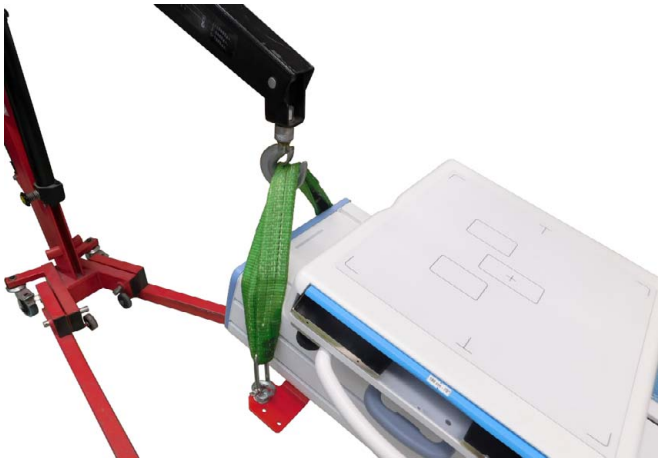
Note ☞ *It is recommended that the crane used to lift the Wall Stand is at least 2.5 m high.*

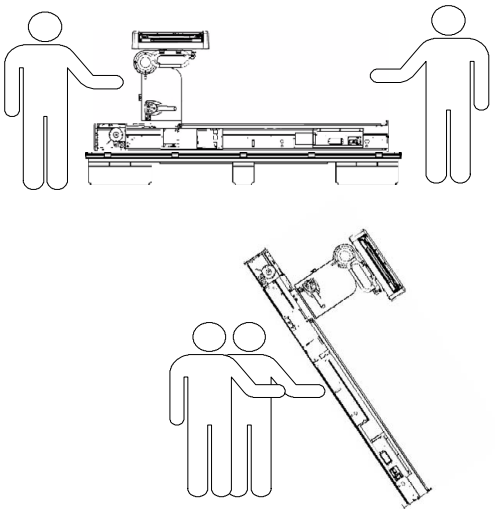
DANGER!

WHEN USING A CRANE TO RAISE THE EQUIPMENT, NEVER LIFT THE WALL STAND COMPLETELY FROM THE FLOOR, THE BASE OF THE EQUIPMENT MUST ALWAYS BE IN CONTACT WITH THE FLOOR, ENSURING THAT IT DOES NOT DRAG ACROSS IT.

ALWAYS KEEP FEET AND OTHER PARTS OF THE BODY AWAY FROM THE BASE OF THE EQUIPMENT DURING THE LIFTING PROCEDURE AS IT COULD SLIP.

Illustration 3-5
Wall Stand Lifting





PLEASE HOLD THE COLUMN TIGHT WHILE IT IS NOT TOTALLY FIXED TO THE FLOOR YET. IF IT FALLS DOWN, IT MAY CAUSE SERIOUS INJURIES OR DAMAGES TO PERSONNEL AND/OR EQUIPMENT.

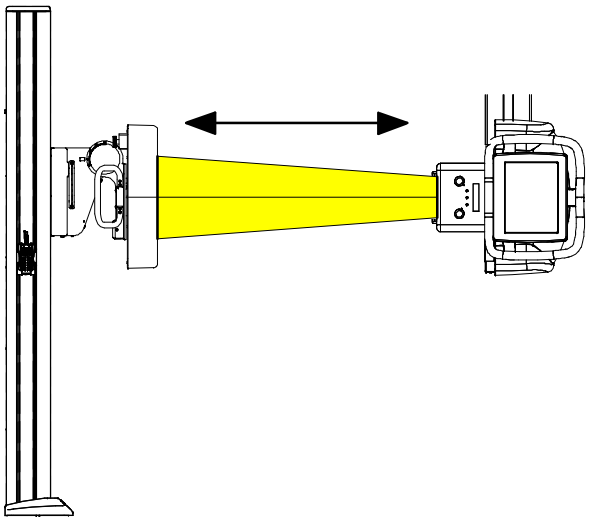
2. Check the distance to the wall. The recommended minimum distance between column rear cover and wall is 50 mm.

3. Remove the base cover by pulling it out *(refer to Section 3.2).*

4. Drill just one of the back bores *(refer to Illustration 3-7)* and fix the Wall Stand to it. Do not fix it definitely, it might be required to relocate the Wall Stand to get it correctly aligned.

5. Align the Receptor with the Tube Support. Use the Collimator Light. Point it to the center of the Wall Stand Receptor, move backwards and forwards the Tube Support to check the alignment, the light must be pointing always to the center.

Illustration 3-6
Alignment Checking

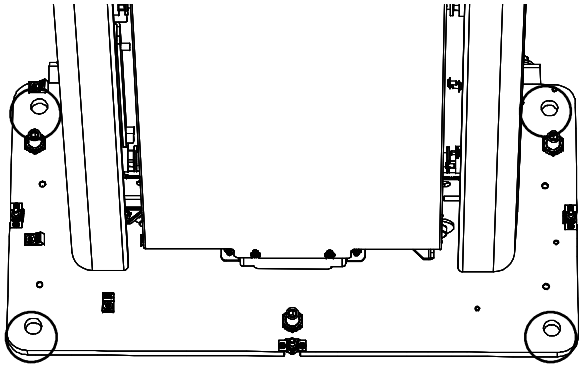


Do not use the Vertical Movements Handle to move the equipment. This piece may become damaged. There is a NOTICE label in the rear cover, near the Vertical Movements Handle, as reminder.

6. Once it is aligned, mark with a Marker the position of the last three bores.

7. Drill the holes and fix the four fixation bolts.

Illustration 3-7
Fixation Bolts



8. Level the equipment using the 3 leveling Bolts and tighten the anchor bolts, their needed tightness is 50 Nm.

9. Check the leveling of the equipment:

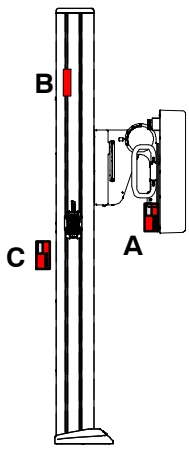
   a. at the back of the Receptor,

   b. at the lateral of the Column and

   c. at the back of the Column.

   It is recommended to use a digital level. Check that it indicates **90º ±0.1º** at the three points.

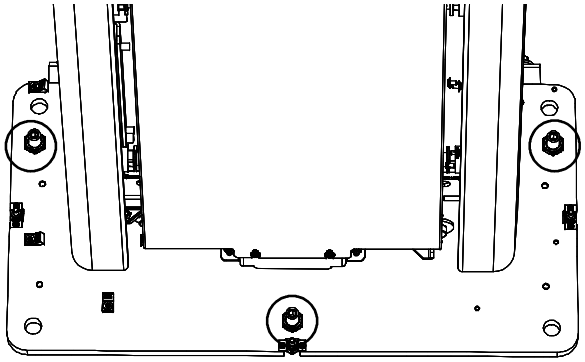
Illustration 3-8
Check Leveling Positions



Note ☞ *Defective leveling of the Wall Stand will result in lack of precision of the whole X-ray System. Please, check as much as possible that leveling is exact.*

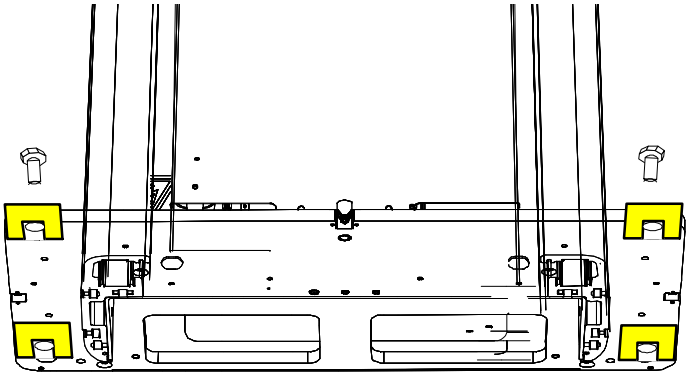
10. Use the Leveling Bolts to level correctly the Column.

Illustration 3-9
Leveling Bolts



11. If required, use the Leveling Plates to get the Column perfectly level, mount them under the column base and at the fixation points of the Column.

Illustration 3-10
Leveling Plates



12. Check again the alignment of the Wall Stand.

It is strongly recommended to move the Wall Stand away to drill the Bores safely and without any risk of getting the Wall Stand damaged.

13. Once the leveling and the alignment have been checked properly, fix definitely the equipment.

3.4 RECEPTOR INSTALLATION

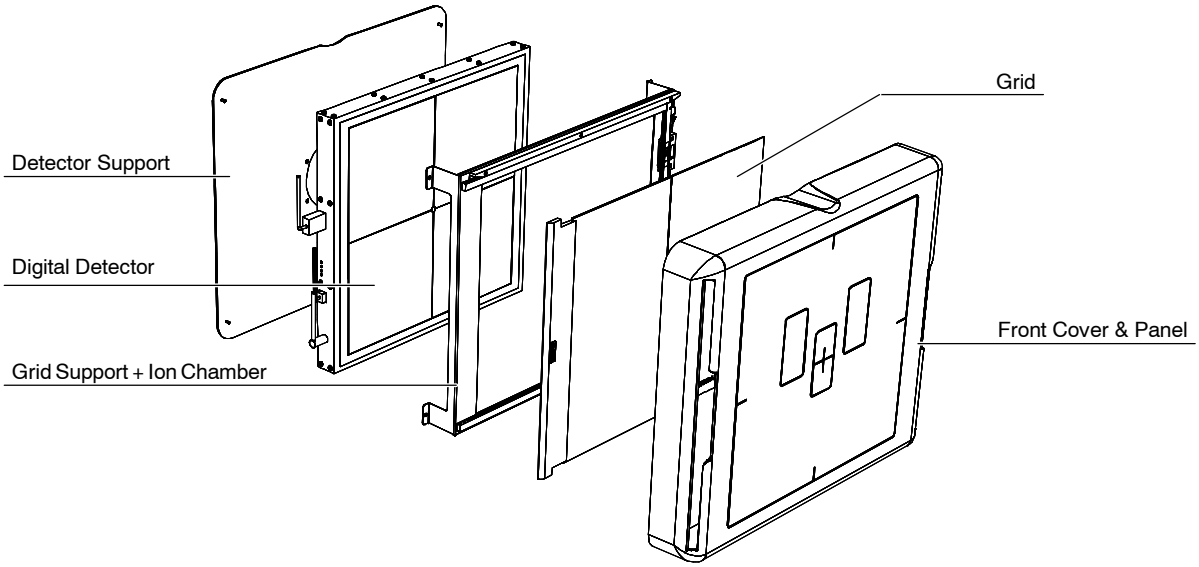
Depending on the Receptor, it may be necessary to proceed to its installation on field. Portable detectors do not require any installation procedure, but in the case of fixed detectors, they must be installed always on field.

Note ☞ *When it is required to install the Receptor on field, it is strongly recommended to contact Manufacturer Technical Service if required further information about installation and connections.*

3.4.1 FIXED DETECTOR INSTALLATION IN THE CABINET

The Detector Assembly of the Wall Stand is factory prepared to house a Digital Detector on the Detector Support located inside the Assembly.

Illustration 3-11
Fixed Digital Detector and Grid Assembly



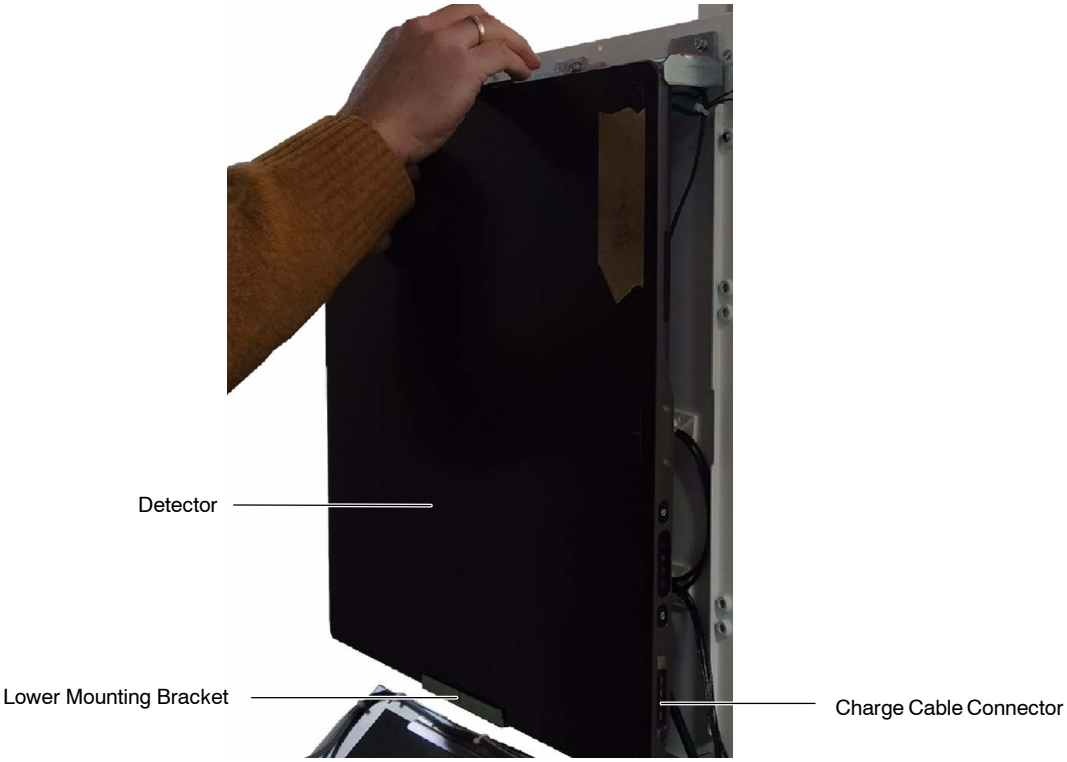
1. Remove the Grid from the Grid Support.

2. Remove the Front Cover & Panel. To do so, unscrew the screws located on the back side.

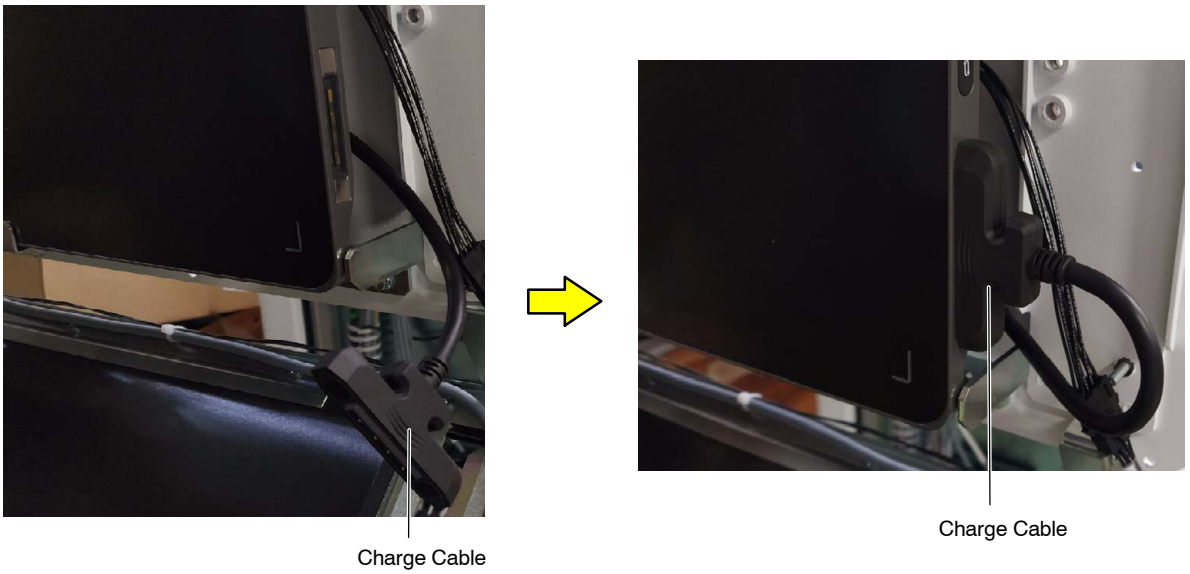
3. Unscrew the two upper nuts of the Grid Support.

4. Remove the two nuts located on the upper mounting bracket of the Detector Support. Then, loosen the two nuts located on the lower mounting bracket of the Detector Support.

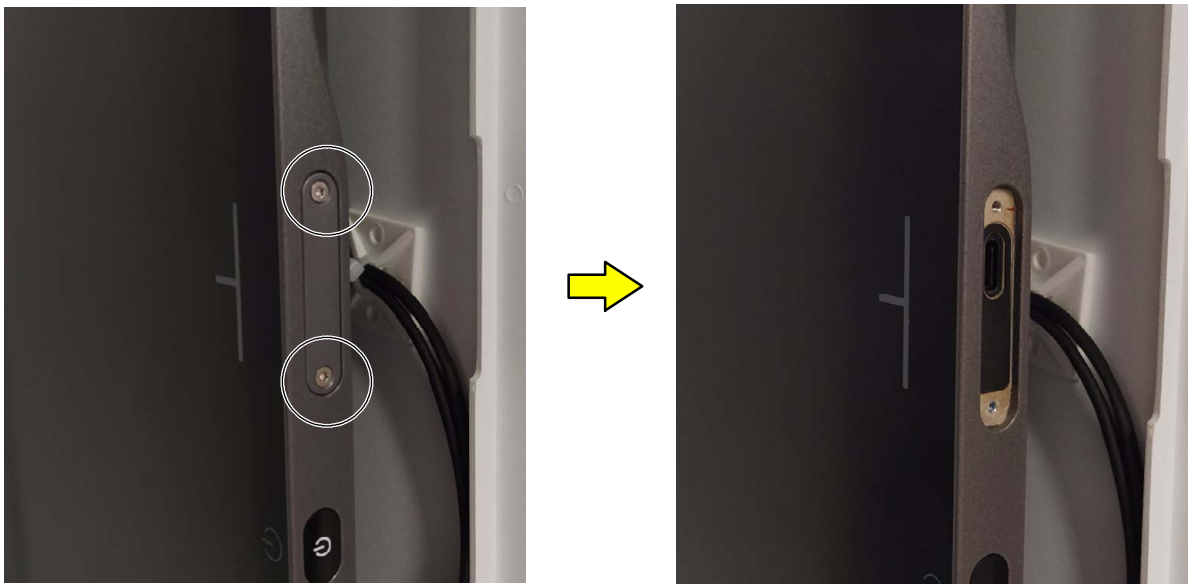
5. Install the Detector on the Detector Support, between the upper mounting bracket and the lower mounting bracket. Then, tighten the two nuts of the lower mounting bracket and replace the two nuts of the upper mounting bracket. The detector should be rotated 90º to the left, with the connector for the charge cable located on the right side.



6. Connect the charge cable to the Detector.



7. Remove the two screws from the Detector side plug and remove the protective flap.



8. Connect the PC cable to the side plug connector.

9. Reinstall the Grid Support on the Detector Support. To do so, screw the nuts removed in step 3.

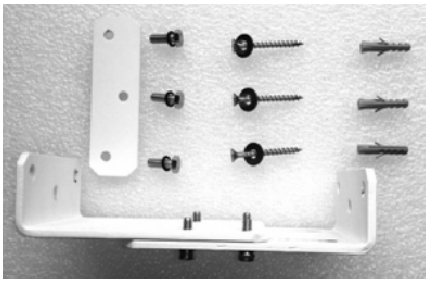
10. Reinstall the Front Cover & Panel. To do so, screw the screws previously removed in step 2.

11. Insert the Grid in the Grid Support.

3.5 WALL MOUNT KIT INSTALLATION

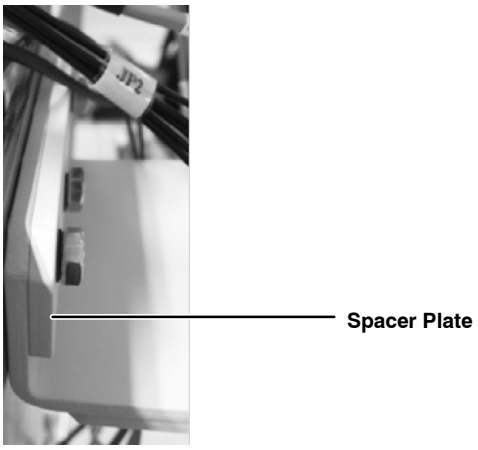
The Wall Mount Kit, P/N **S0018267_C22**, shipped in box F, is composed by:

Illustration 3-12
Wall Mount Bracket



1. Mount the bracket as indicated in *Illustration 3-12*.
2. Tighten the bracket and the Spacer Plate to the Wall Stand column top.

Illustration 3-13
Mount the Bracket at the Top of the Column

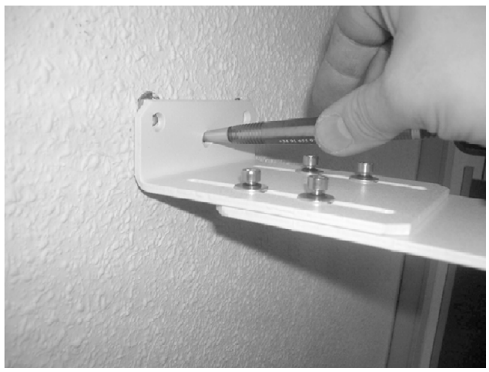


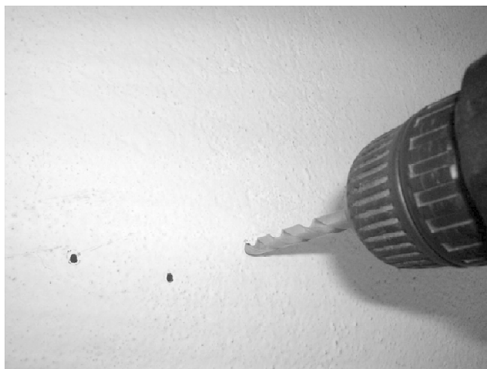
WARNING

IT IS MANDATORY TO USE ONLY THE SCREWS PROVIDED WITH THE WALL MOUNT BRACKET.

3. Put the bracket against the wall and measure the correct distance from the column to the wall.
4. Mark the drilling holes and drill the three holes in the wall.

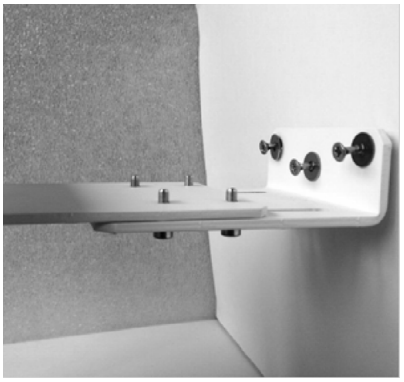
Illustration 3-14
Bracket Fixations Drilling





5. Fix and screw the bracket into the wall and make sure that all screws are well fixed.

Illustration 3-15
Fasten the Bracket to the Wall



6. Make sure that there is not interference of the screws with the cables of the Wall Stand.

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SECTION 4 INSTALLATION OF THE RAD TABLE

4.1 UNPACKING THE RAD TABLE

WARNING

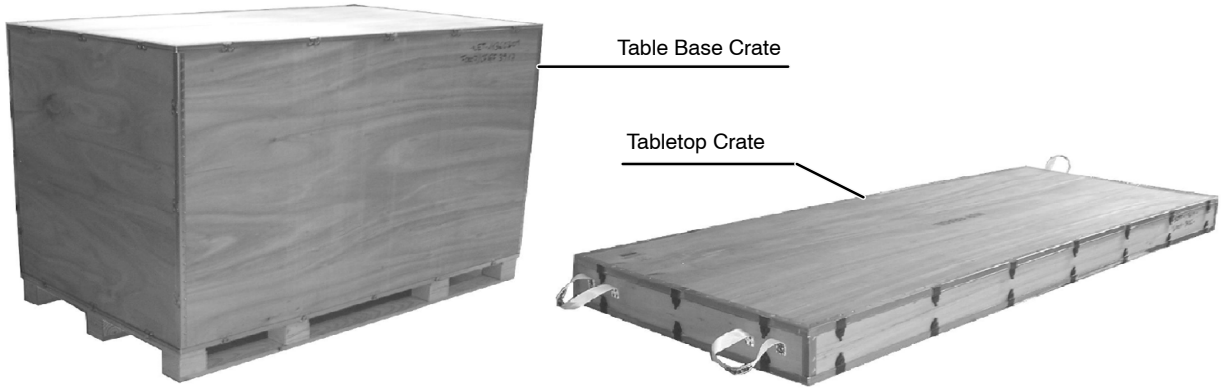
THE EQUIPMENT SHIPPING CRATES AND PARTS CAN ONLY BE OPENED BY MAINTENANCE OPERATORS WITH THE SPECIFIC FORMATION.

WARNING

THIS EQUIPMENT CAN ONLY BE INSTALLED AND MAINTAINED BY SERVICE PERSONNEL WITH THE APPROPRIATE FORMATION AND KNOWLEDGE ABOUT THE EQUIPMENT.

The Table 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.

Illustration 4-1
Table Base and Tabletop Shipping Crates



7. 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.

WARNING

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

8. 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.

9. Verify that all items on the customer order are present.

10. Leave a free working area around the equipment until installation is complete.

WARNING

THE MANUFACTURER DOES NOT ACCEPT ANY RESPONSIBILITY ABOUT ANY EQUIPMENT THAT HAS NOT BEEN PRE-INSTALLED, USED, MAINTAINED OR REPAIRED ACCORDING TO THE PRE-INSTALLATION, SERVICE OR OPERATOR MANUALS, NEITHER ABOUT EQUIPMENT THAT HAS BEEN MODIFIED IN ANY WAY.

4.1.1 TABLE BASE UNPACKING

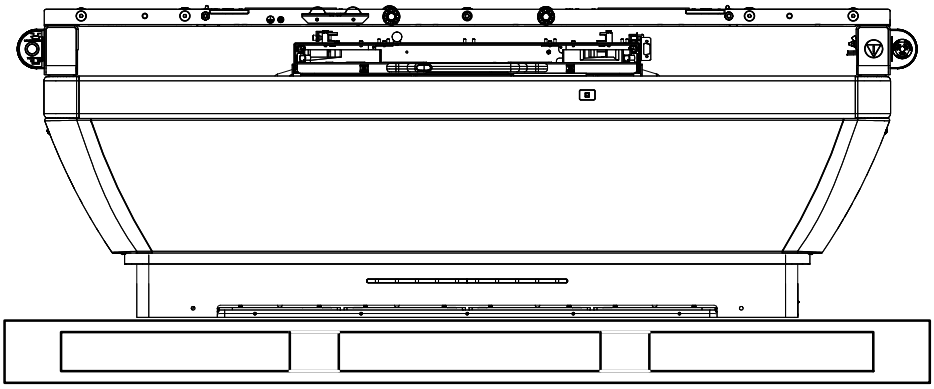
The Main crate corresponds to the Table Base.

1. Open the Table Base crate, take out all the parts and compare them to the packing list.

Illustration 4-2
Table Base Shipping Crate

2. Remove the Base Covers *(refer to Section 4.2).*

Illustration 4-3
Table Base on the Shipping Pallet



WARNING

REMEMBER THE CORRECT POSITION OF THE COVERS, AS THEY ARE NOT INTERCHANGEABLE. THEY MUST BE INSTALLED IN THE SAME POSITION THEY HAVE BEEN MOUNTED AND SHIPPED BY MANUFACTURER.

3. Remove the screws that fix the Table Base to the Shipping Pallet.

4. Carefully remove the Table base from the Shipping Pallet and leave it in the same position where it will be fixed to the floor.

5. Remove the shipping fixations that hold the elevating mechanism to prevent damages during transportation.

WARNING

AT LEAST 2/3 SERVICE ENGINEERS ARE REQUIRED TO REMOVE THE TABLE BASE FROM THE PALLET. CAREFULLY REMOVE THE TABLE BASE AND PLACE IT IN THE ROOM INSTALLATION. BE SPECIALLY CAREFUL WITH THE CONTROL PEDALS TO NOT BREAK OR DISASSEMBLE THEM.

4.1.2 TABLETOP UNPACKING

Note ☞ *It is not necessary to unpack right now the Tabletop, but in several cases that the Room is too small, it will be highly recommendable to remove all shipping material from the working area to have space enough. If desired, get the Tabletop Crate out from the working area and wait for the Installation of the Tabletop procedure. Refer to Section 4.4 Tabletop Installation*.

1. Unpack the Tabletop and check its external appearance for possible damages.
2. Place the Tabletop out of the working area until it has to be installed.

Note ☞ *For the fixation of the base of the Table to the floor it is required to remove the covers of the Base.*

3. Remove all shipping material from the working area to have space enough to proceed as much comfortably as possible.

4.2 INSTALLATION OF THE TABLE BASE

4.2.1 BASE COVERS DISASSEMBLY

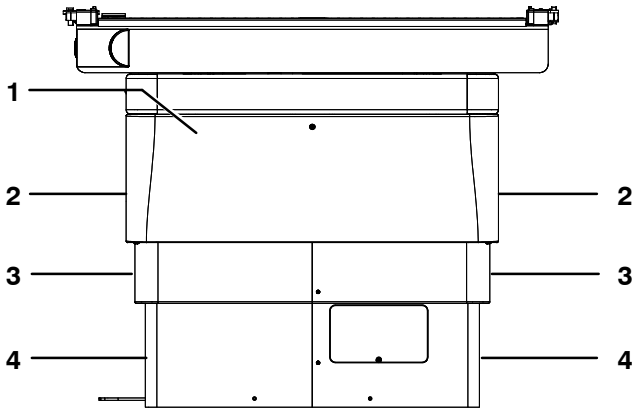
The Base is shipped with the covers mounted for its protection and lowered to help its safe transportation, but during the installation it is necessary to raise it to work as much comfortably as possible.

Note ☞ *It is strongly recommended to raise the Table to its highest position. The Table can be connected to mains to be raised, but remember that once it is raised, it cannot be lowered until the Tabletop is installed and the Anti-collision switches are activated.*

Proceed to remove the Table Base covers in the order indicated below:

1. Upper Lateral Covers
2. Upper Covers (Back & Front)
3. Intermediate Covers (Back & Front)
4. Bottom Covers (Back & Front)

Illustration 4-4
Table Base Covers removal order



WARNING

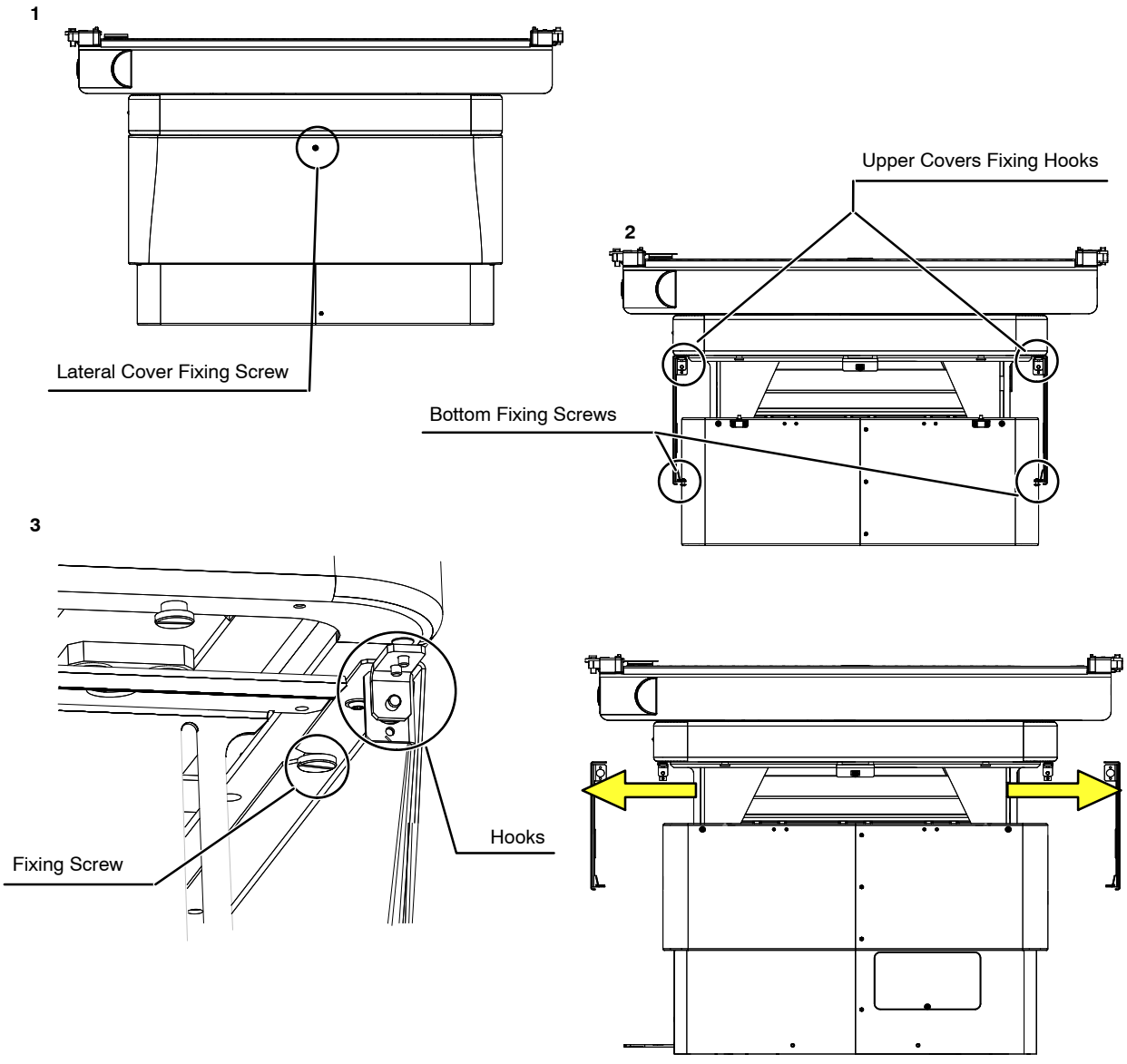
IT WILL BE NECESSARY TO DISCONNECT TABLE GROUNDS. IT IS HIGHLY RECOMMENDABLE TO TAKE NOTE OF THE CORRECT GROUNDING FOR A CORRECT CONNECTION OF THE GROUNDS DURING TABLE COVERS DEFINITIVE INSTALLATION.

1. Loosen the screw that fix each Upper Lateral Cover to the center of the Table framework and then the bottom screws that fix it to both Upper Covers.

2. Carefully disengage the Upper Lateral Covers from the hooks of the front and back upper covers and remove them. Leave them in a safe place to avoid damages and scratches.

3. Loosen the four fixing screws of both Upper Covers, two from each one. The screws are accessible under the framework of the Table. Disengage and remove the covers from the Hooks. Leave them in a safe place.

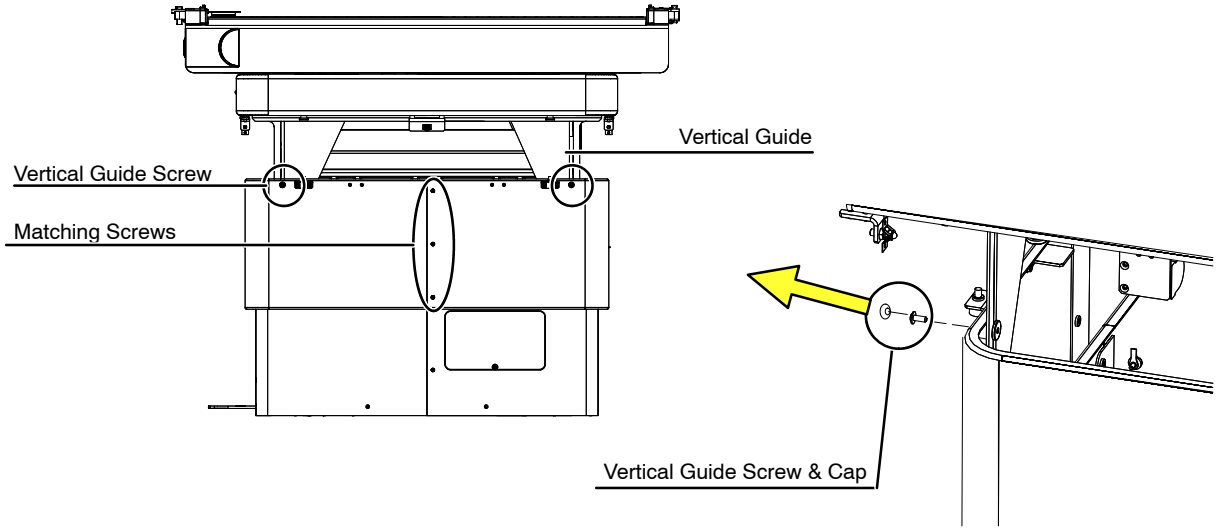
Illustration 4-5
Disassembly of the Top Covers



4. Loosen the four screws that fix the intermediate Covers (both are movable) to the four roller bearings of the Vertical Guides.

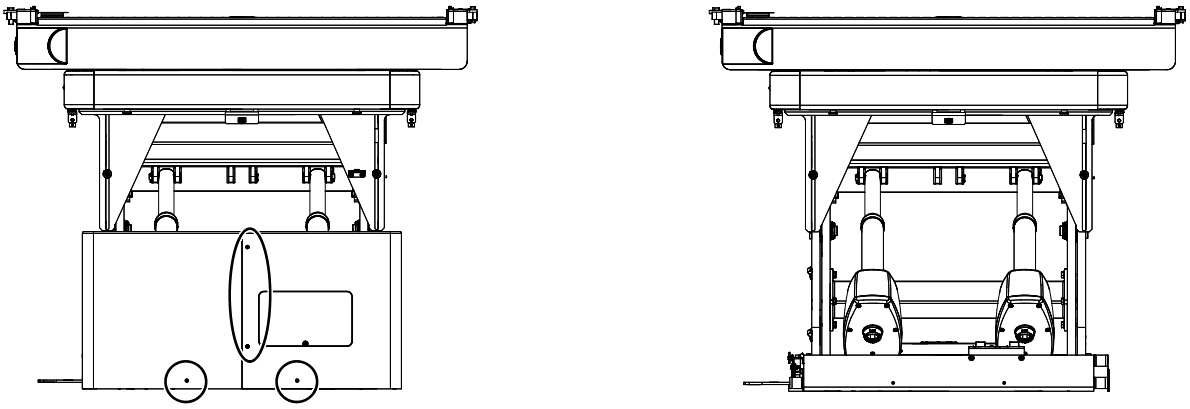
5. Loosen the six caps and screws that match both covers, three at each lateral. Carefully remove both covers to avoid damages and scratches and leave them in a safe place.

Illustration 4-6
Disassembly of the Intermediate Covers



6. Remove the eight lateral caps and screws, four at each side. Four of them match the covers and the other four fix the Lower Covers to the Table Base. Remove carefully the covers to avoid damages and scratches, and leave them in a safe place.

Illustration 4-7
Disassembly of the Bottom Covers



4.2.2 FIXATION OF THE TABLE BASE

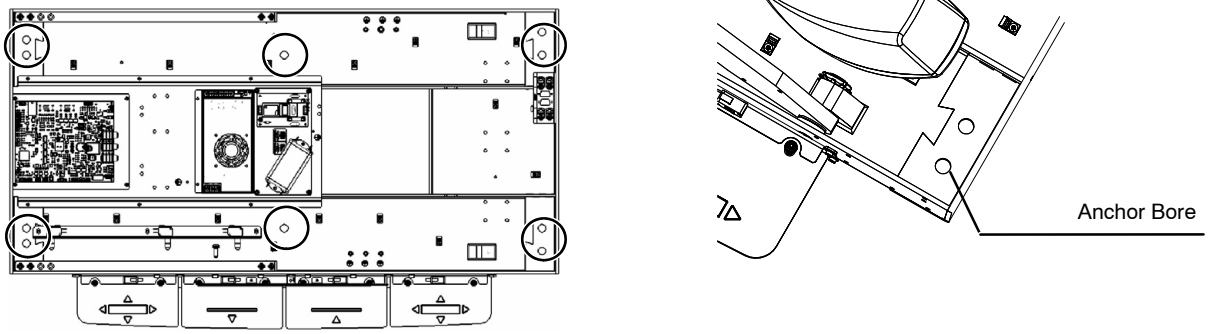
To facilitate the Table Base installation, it can be connected to the power line in order to elevate it with caution to avoid damages or injuries to any part or element (refer to *Section 8. Specifications* before connecting the Table to mains).

WARNING

THE TABLE IS FACTORY SET FOR OPERATION AT 100-240 V~. THIS IS THE ONLY ADMISSIBLE POWER LINE VOLTAGE, WITH A 10% TOLERANCE.

1. Move the Table Base into its position.
2. Mark on the floor the six anchoring holes of the Table Base. Keep in mind the Table position in the room, the Tabletop movements, cables entrances on the floor and the position of the rest of the components of the System.

Illustration 4-8
Table Fixation and Leveling Points



It is not required to drill any of the central anchoring holes, as using the four holes at the laterals is enough to fix the base to the floor.

3. Drill and prepare the anchors.
4. Position the Table Base at its final place and anchor the Table Base to the floor:
   - Check that it is properly leveled placing levels in different points of the Upper Frame.
   - Use leveling plates to level the Base before securing definitively the Table.
   - Use an extended level (1 m) or several standard levels placed in different points for leveling the Table Base.

5. Once the Table is leveled, tighten the anchor bolts, but not definitively yet.

6. Check leveling again after anchorage bolts are tightened and make final adjustments, if necessary.

4.3 RECEPTOR INSTALLATION

Depending on the Receptor, it may be necessary to proceed to its installation on field. The portable detectors do not require any installation procedure, but in the case of fixed Detector, it must be installed always on field.

Note ☞ *When it is required to install the Receptor on field, it is strongly recommended to contact the Manufacturer Technical Service if further information about installation and connections is required.*

4.4 TABLETOP INSTALLATION

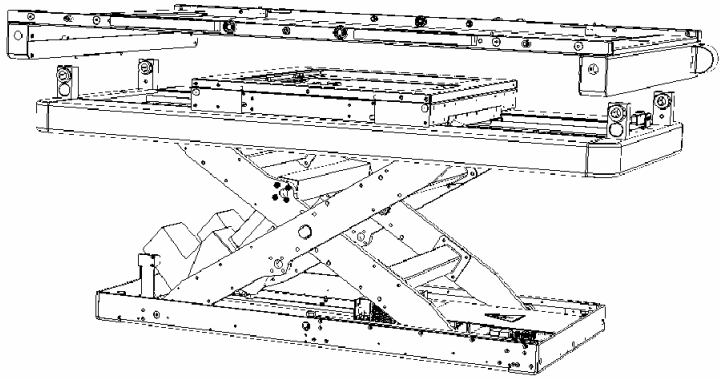
First of all, mount back the Tabletop Support once all connections have been completed.

WARNING

DUE TO THE TABLETOP SIZE, ITS INSTALLATION WORK MUST BE ACCOMPLISHED AT LEAST BY TWO PEOPLE.

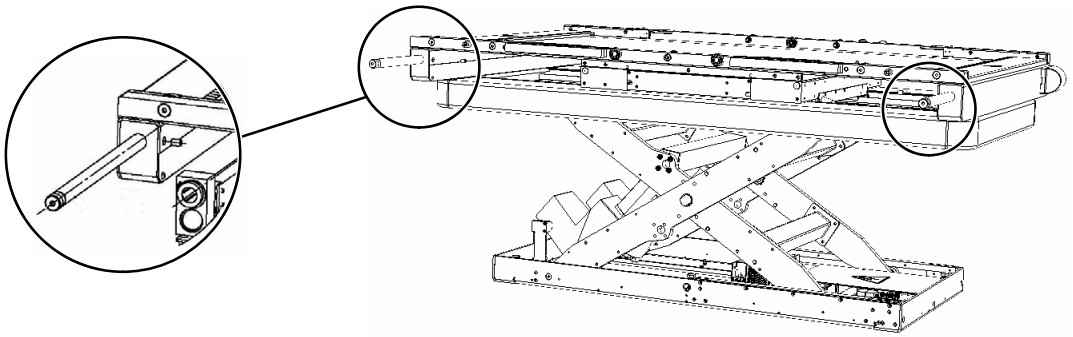
1. Mount the Tabletop Support in its original position.

Illustration 4-9
Assembly of the Tabletop Support



2. Insert both transversal rods inside the Tabletop support and fix them with the set screws, use an Allen key #4.

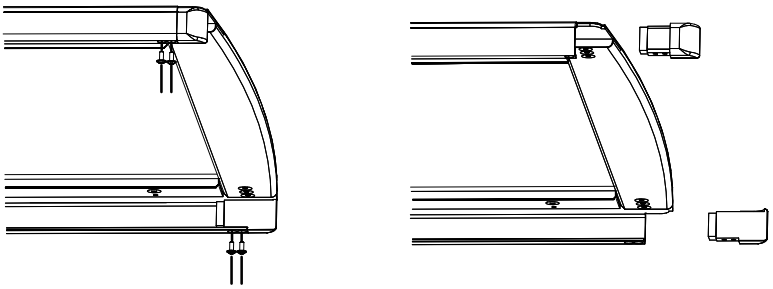
Illustration 4-10
Installation of the Transversal Rods



3. Check that the Tabletop Support is leveled and floats in all directions correctly.

4. Remove the two travel end-stops from the same side.

Illustration 4-11
Disassembly of the End Stops



5. Install the Tabletop from one of the Table sides (right or left) inserting the Bearings inside their Rails.

BE VERY CAREFUL WHEN SLIDING THE TABLETOP SO THE ANTI-COLLISION SWITCHES DO NOT GET DAMAGED.

Illustration 4-12
Anti-collision switches warning label

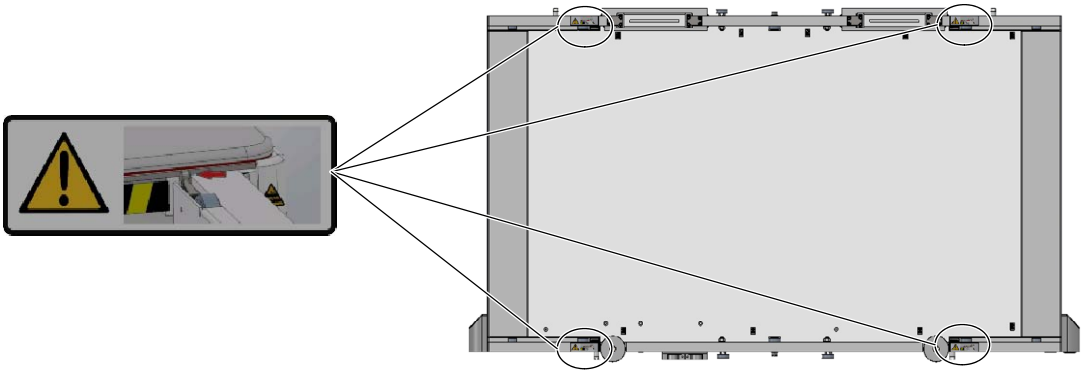
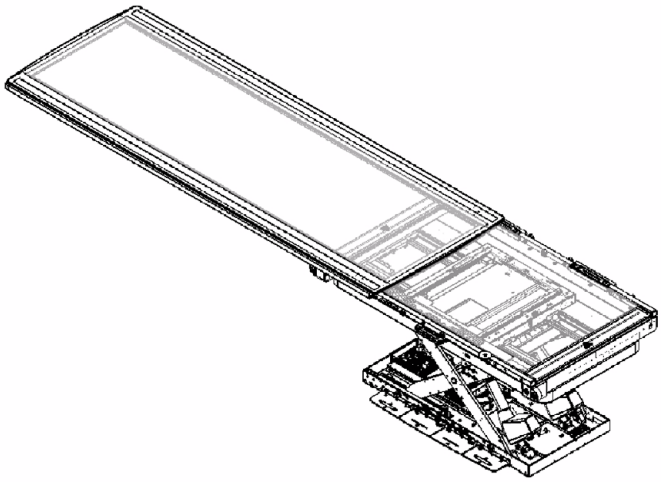


Illustration 4-13
Mount Tabletop over the Tabletop Support



WARNING

THE TABLETOP MUST BE INSTALLED WITH THE ORANGE LABEL OVER THE FRONT PEDALS SIDE FOR A CORRECT ASSEMBLY.

6. Remove the wire tie-wrap of the Longitudinal Lock Pin.
7. Install again the Travel End-stops.

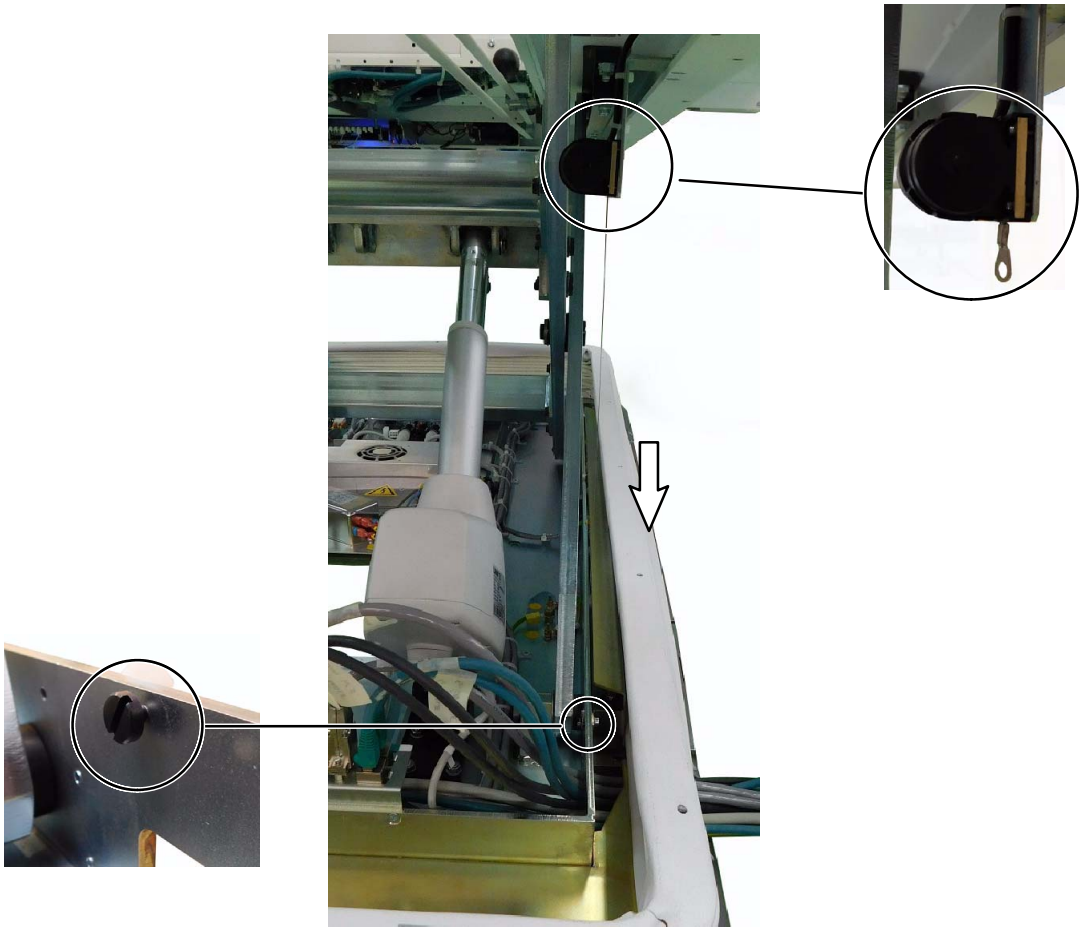
4.5 ADJUSTMENTS

4.5.1 HEIGHT POTENTIOMETER CONFIGURATION

The Elevating Table is provided with a Vertical SID Wired Potentiometer or Height Potentiometer, located at the top of the base of the Table.

The potentiometer is factory configured, it is not necessary to turn or configure it. Just tie the potentiometer wire to the screw located at the bottom frame of the Base.

Illustration 4-14
Vertical SID Wired Potentiometer



WARNING

BE CAREFUL WHEN CONFIGURING THE TABLE HEIGHT POTENTIOMETER. DO NOT LEAVE IT TO ROLL UP SHARPLY AS IT COULD GET DAMAGED.

4.5.2 TABLETOP LONGITUDINAL BRAKES ADJUSTMENT

The Tabletop longitudinal brakes are supplied with a slotted adjustment screw located under the brakes.

Longitudinal brakes are factory adjusted, but it will be necessary to perform this procedure in case of brakes replacement:

1. Power ON the Table.
2. Step on the Tabletop Horizontal motion pedal to keep the brakes released during the adjustment.
3. To adjust the Longitudinal brakes, turn the adjustment screw to the left if you need to raise the brakes or turn the adjustment screw to the right if you need to lower them.

Illustration 4-15
Brakes' Adjustment Screw

4. Release the Tabletop Horizontal motion pedal to check the brakes operation, the Table should be automatically locked. Repeat the adjustment and checking as many times as necessary, until the brakes operate accurately.
5. Once the Longitudinal brakes are correctly adjusted, fix the nuts of the adjustment screws.
6. Proceed to functional checking *(refer to Section 8).*

WARNING

BEAR IN MIND THAT SOME APPLIED PARTS MAY HEAT UP TO 48 ºC (118.4 ºF) WHEN THE AMBIENT TEMPERATURE FOR OPERATION IS ON THE LIMIT. THIS IS COMPLETELY NORMAL AND DOES NOT MEAN A MALFUNCTION OF THE EQUIPMENT.

4.5.3 OPTICAL PROXIMITY SENSORS ADJUSTMENT

Note ☞ *This adjustment is factory set and should only be necessary in the case of mismatch.*

The Detector Cabinet is equipped with the A40101-XX board, installed in the lower part of the Tray. This board has four optical sensors which detect if the Tray and Detector are inserted in the Table when their respective hold-down cylinders get close to them.

Note ☞ *Perform these checks once the whole System is installed and connected.*

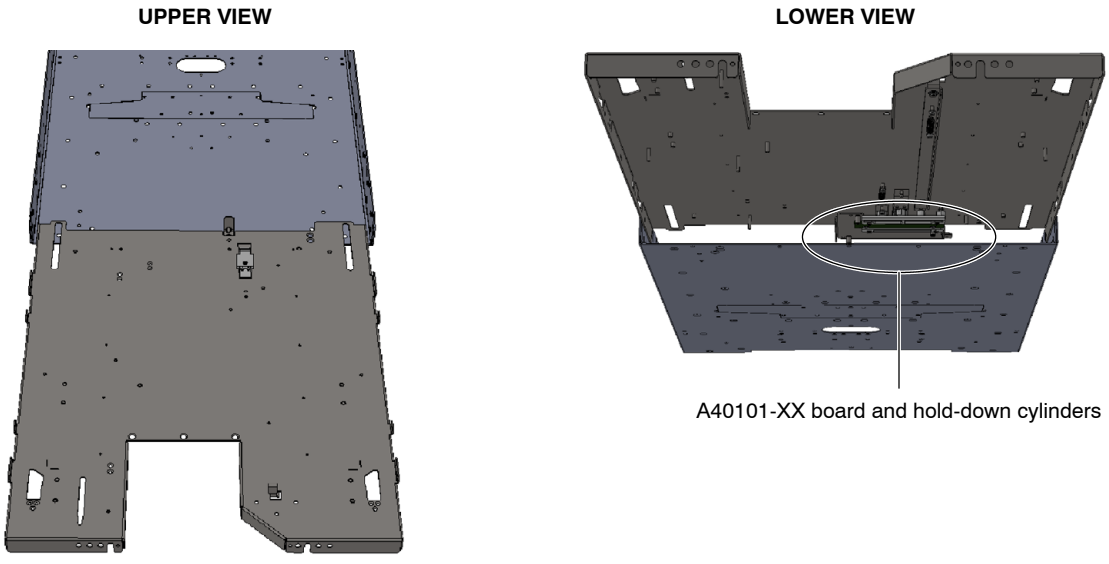
Insert Tray and Detector and check that the System detects the following actions:

- Tray in and Tray out.
- Detector in and Detector out.
- Detector size: 35x43 (14x17) or 43x43 (17x17).
- Detector position: Portrait or landscape.

If any of the previous signals is not detected, it will be necessary to adjust the hold-down cylinders located in the lower part of the Tray:

1. Fully extract the Tray.

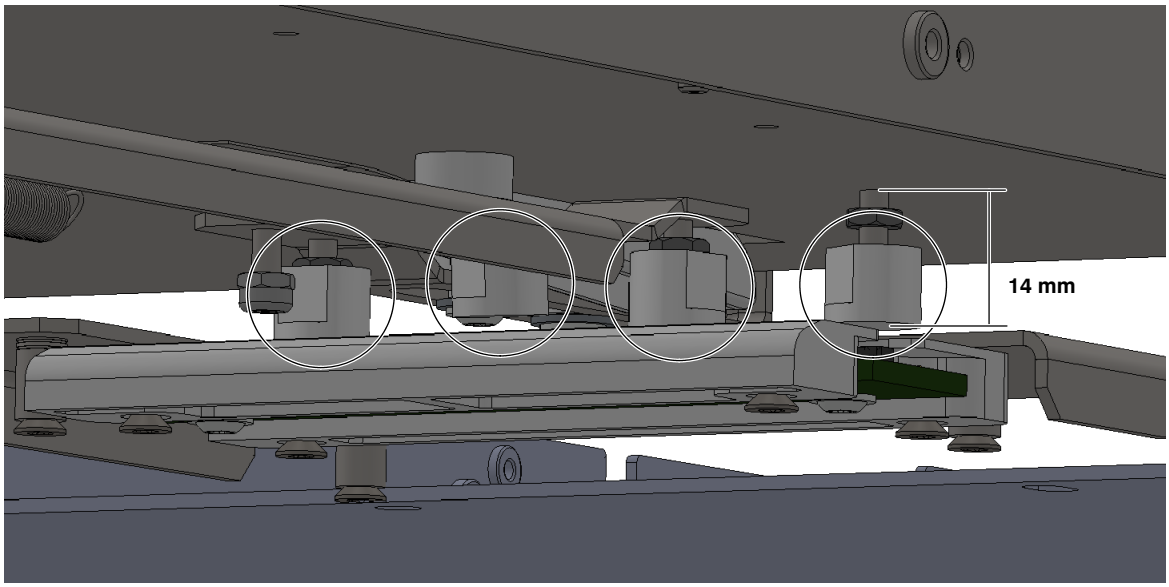
Illustration 4-16
Tray out



2. Loosen the hold-down cylinders to move them closer to the A40101-XX board. There should be 14 mm from the base of the cylinder to the lower part of the Tray.

3. Tighten the lock nuts of each cylinder to fix them in place.

Illustration 4-17
Hold-down cylinders



4. Insert the Tray and check that all the signals are detected.

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SECTION 5 X-RAY GENERATOR INSTALLATION

5.1 UNPACKING THE X-RAY GENERATOR

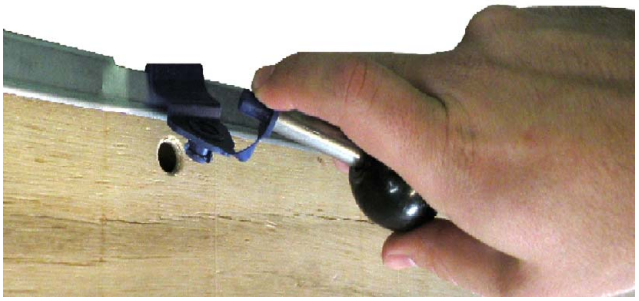
The Generator is shipped in one wooden shipping crate to facilitate transport and installation.

1. Upon receipt of the X-ray unit and associated equipment, inspect all shipping containers for signs of damage. If damage is found, immediately notify the carrier or agent.

Illustration 5-1
Shipping crate

2. Remove the upper plastic clips in order to remove the top of the shipping crate. Take out the Control Console (if present), Interconnection Cables, Manuals and other documentation and the rest of furnished parts. Do not discard any packing material such as envelopes, boxes or bags until all parts are accounted for as listed on the packing list.

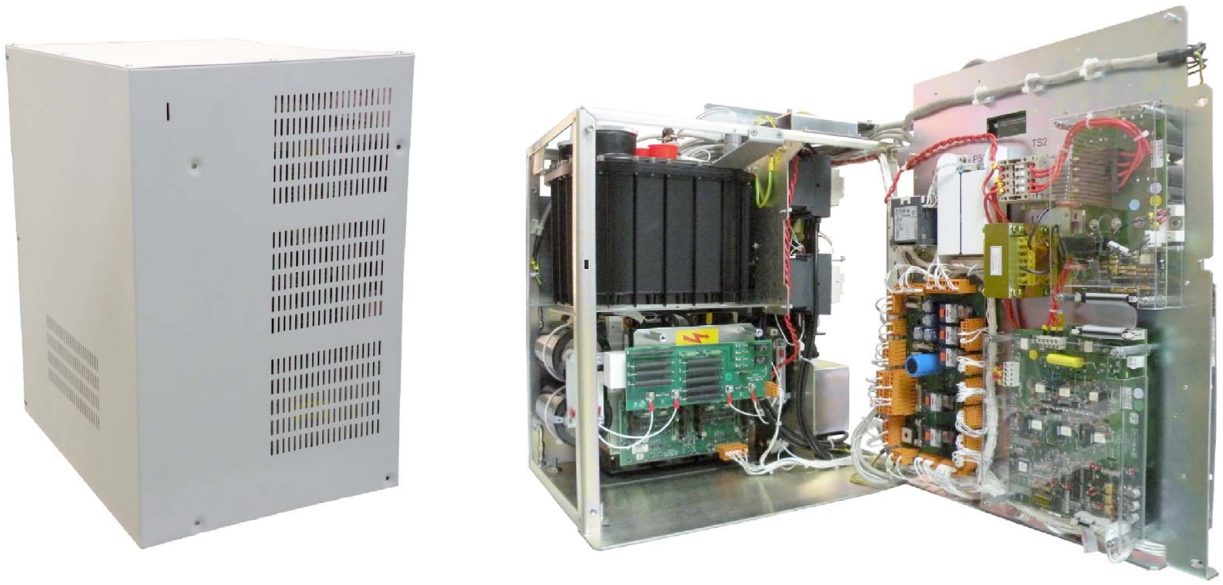
Illustration 5-2
Plastic clip removal



3. Remove the sides of the crate and take out the packing material from the pallet.

4. Remove the Generator covers *(refer to Section 5.2)*.

Illustration 5-3
SHFR Generator with and without covers



5. Remove the three screws M8 that secure the Generator cabinet to the rubber bushings mounted on the shipping pallet.

6. Remove the Generator Cabinet from the shipping pallet, placing it near its chosen room position.

CAUTION

This operation requires at least two people.

7. When the equipment is unpacked, verify that all items on the customer order are present, and the hardware and internal wiring is secure.

8. Check the part numbers/serial numbers of each component with their identification labels, and inspect all pieces for visible damage. If any damaged parts are found, repair or order replacements to prevent unnecessary delay in installation.

Note ☞ *The regulation certification as well as the final report and other documents related to the Generator are included together with the Service manual.*

5.2 COVERS DISASSEMBLY

The SHFR Generator covers consist of two parts joined by three rows of screws (two rows in the upper part and another one in the front).

To disassemble the covers, remove the eight lateral screws (four on each side) with an allen wrench. There is no need to remove the rest of the screws, as the two parts can be removed together.

Disconnect the internal ground wires before removing the covers.

Illustration 5-4
Internal ground wires

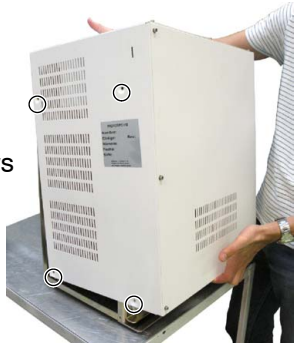
CAUTION

Remove the covers taking care not to pinch any cable. Take the same precautions when installing the covers back.

Optional handles can be used to easily remove and install the covers. The Generator covers have two specific slots, one on each side, to insert the handles as seen in the illustration below.

Illustration 5-5
Covers disassembly

Remove the lateral screws



Optional handles

CAUTION

Handles are only for covers removal and installation. Never use them to carry the Generator.

Remove the fastening plates for cables entrances from the Rear Cover of the Cabinet to proceed with the installation process.

Illustration 5-6
Fastening Plates in Cables Entrances

To disassemble the fastening plates, remove the screws with an Allen key.

Illustration 5-7
Fastening Plates Disassembly

Note ☞ *Put all the plates and screws aside and store them until they need to be reassembled at the end of the installation.*

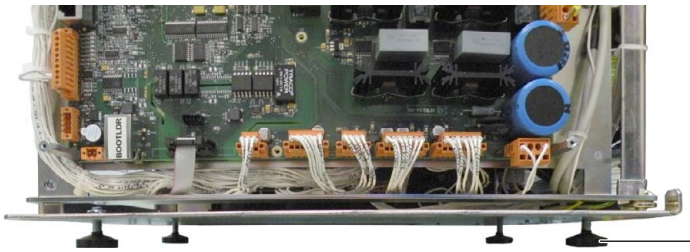
5.3 CABINET INSTALLATION

1. The Line Powered Generator Cabinet is installed **freestanding** without supports.

2. **To install the Generator Cabinet,** place the Cabinet near its chosen place in the room. Level it using the Adjustable Leveling Legs at the bottom of the Cabinet. Keep the Base at the maximum distance from the floor.

   Seismic areas and other conditions require the Generator to be secured to the floor. There are mounting holes on the bottom of the Cabinet. Keep the four Leveling Legs at the same height. (R*efer to Illustration 5-8.*)

Illustration 5-8
Adjustable Leveling Legs



3. Leave a sufficient working area around the equipment that will permit unhindered movements until its final assembly.

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SECTION 6 X-RAY ROOM CABLES & INTERCONNECTIONS

Note ☞ *The Cable end to be connected in the system components is marked with a Ring Color:*
- Orange rings for Generator connections
- Red rings for Table connections
- Green rings for Wall Stand connections
- White rings for Image System components (HUB, etc.)
- Cables without rings for others components in the Room.

Note ☞ *For more information about electrical requirements and cable connections, refer to the Pre-Installation document and to the Schematics document for the system interconnection maps.*

Some safety devices such as the Safety Switch/Emergency Switch, Warning Light, and Door Interlock Switch are supplied and installed by the customer. Verify that safety devices have been properly installed and routed during the Pre-Installation procedure.

6.1 GENERATOR CABLES CONNECTION

6.1.1 GENERATOR POWER LINE

KEEP IN MIND THE GENERAL CAUTIONS INDICATED IN SECTION 1.3.

DO NOT POWER ON THE GENERATOR UNTIL SPECIFICALLY INSTRUCTED IN THIS SERVICE MANUAL.

1. Verify that the power supply line is "*OFF*" in the Room Electrical Cabinet. Verify that the power line to the Generator is cut when the Emergency Switch(es) is(are) activated.

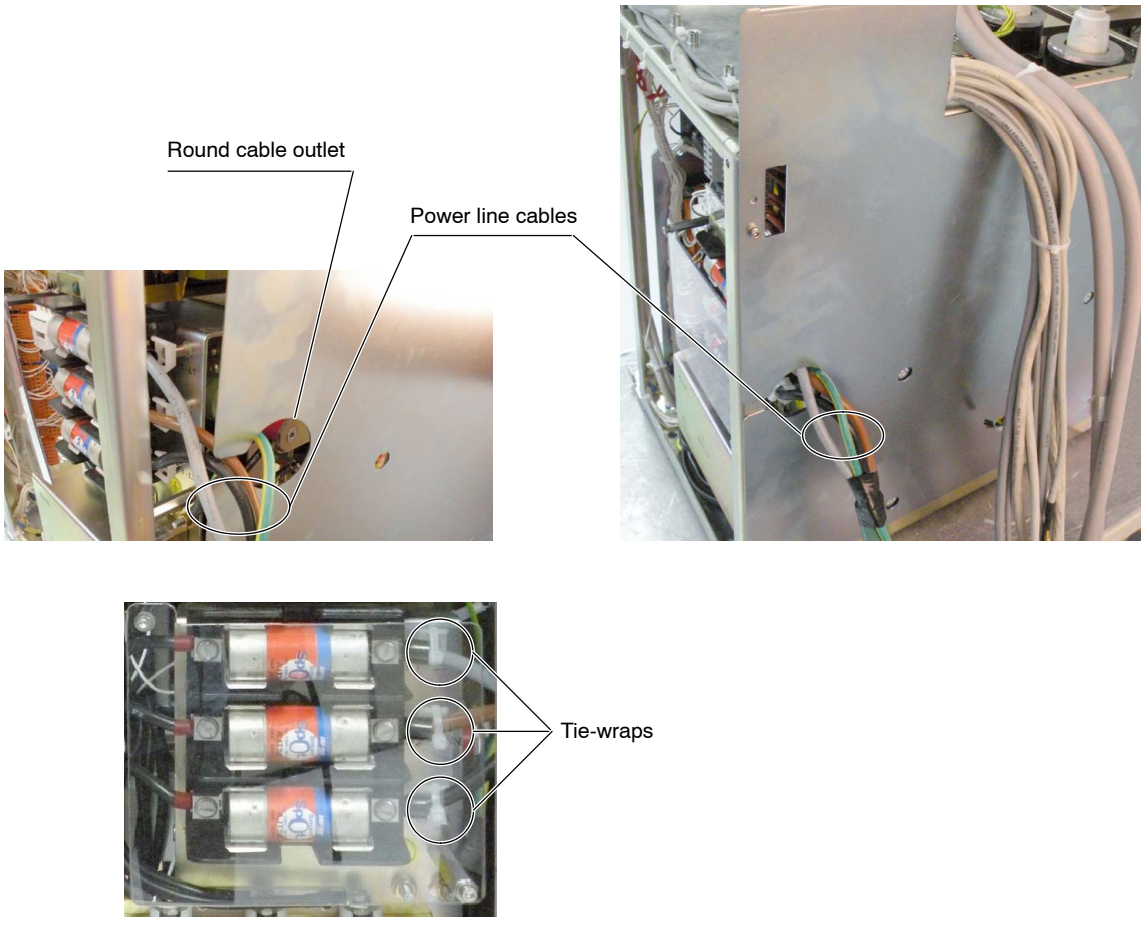
2. The power supply line should conform with the Generator model defined in the "*Pre-Installation*" document. Wire sizes indicated in this document are relative to the power supply line and wire length. Verify that the power line voltage and phase of the Generator coincides with the one for Room Electrical Cabinet.

3. Cut the cables to the appropriate length and remove insulation from both ends of the power and ground wires. Connect them to the respective terminals in the Room Electrical Cabinet.

4. Route the Power Line Cables to the Ground Terminal and Input Line Fuses through the Round Cable Outlet on the Rear Cover of the Cabinet (always apply Local Codes for cable routing). To do so, unscrew the Rear Cover, connect the cables to their respective terminals and secure them using tie-wraps.

   These cables can also be secured to the Fastening Bar of the Cabinet and routed internally along the rear side of the Cabinet when installing the Generator using a Wall support.

Illustration 6-1
Cable routing



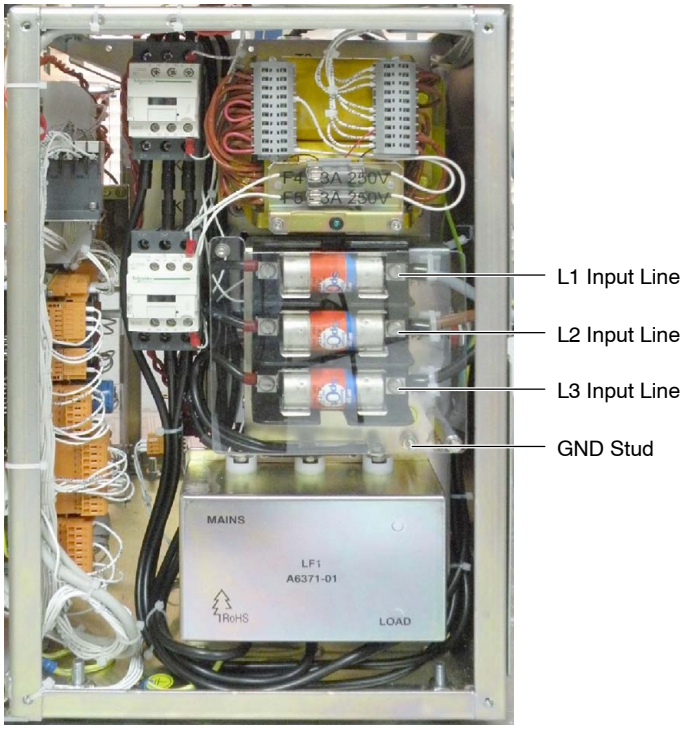
5. For Single Phase Generators, connect the Power wires L1 and N (L2) to the Fuse Holders of F1 and F2 (right side of the Cabinet), and the Ground wire to the Ground stud in the Cabinet Frame.

WARNING

SINGLE PHASE GENERATORS ARE FACTORY DELIVERED TO OPERATE ON PHASE AND NEUTRAL. IN CASE OF CONNECTING THE EQUIPMENT TO A TWO-PHASE LINE, REPLACE THE NEUTRAL CARTRIDGE WITH THE FUSE SUPPLIED WITH THE GENERATOR.

6. For Three Phase Generators, connect the Power wires L1, L2 and L3 to the Fuse Holders of F1, F2 and F3 (right side of the Cabinet), and the Ground wire to the Ground Stud in the Cabinet Frame. Three Phase Generators do not need Neutral (N) wire connection from the Line.

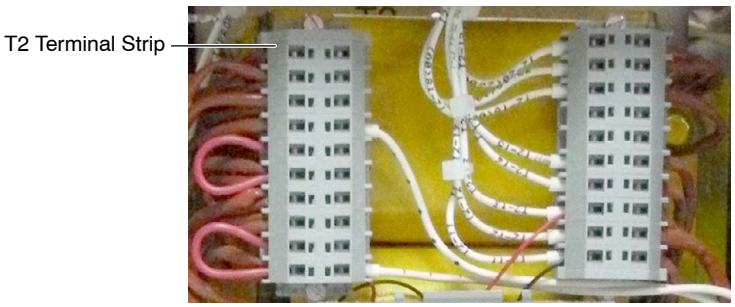
Illustration 6-2
Power Line connections



7. Place the Rear Cover back, passing the cables through the Cable Outlet slot. Finally, screw the cover. *(Refer to Illustration 6-1.)*

8. According to the **nominal voltage** of the line, verify or connect the wire "⁎" to the indicated terminal (TB) of Transformer T2. This wire is factory connected to 230 V~ (for 1-Phase) or to 230 V~ or 400 V~ (for 3-Phase Generators in accordance with the Generator configuration). (*Refer to Schematic 54302260*).

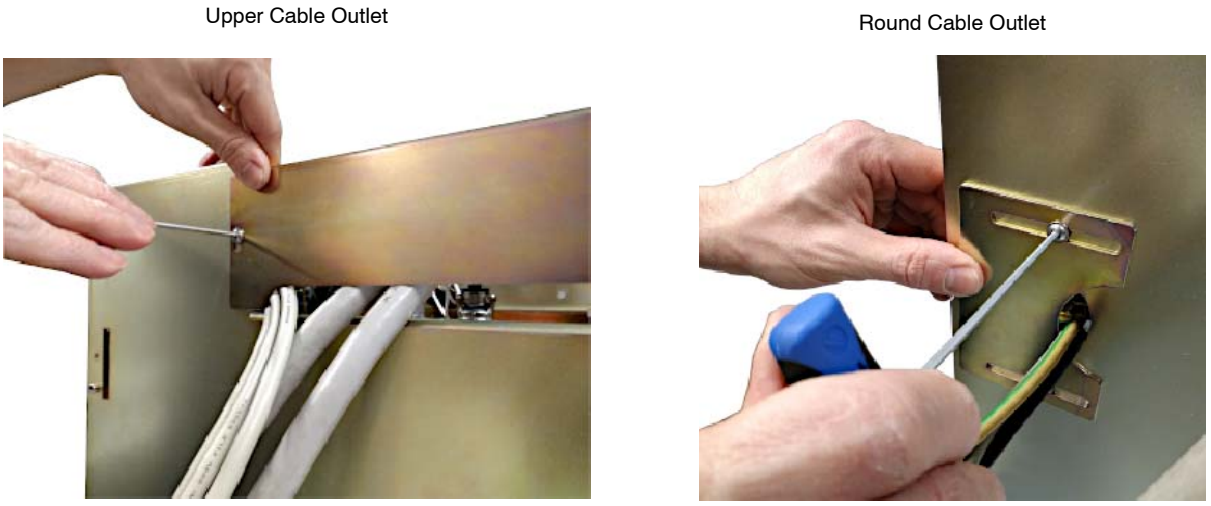
Illustration 6-3
Connections on Transformer T2



9. After connecting the Power Line Cables, secure them to the Fastening Bar using cable ties if they are routed over the Fastening Bar, or using a suitable clamp if they are routed through the Round Cable Outlet on the Rear Cover of the Cabinet (always apply Local Codes).

10. If factory installed, reassemble the optional fastening plates for cables entrances in the the Rear Cover of the Cabinet, by securing them with the removed screws.

Illustration 6-4
Fixing Cables with Fastening Plates

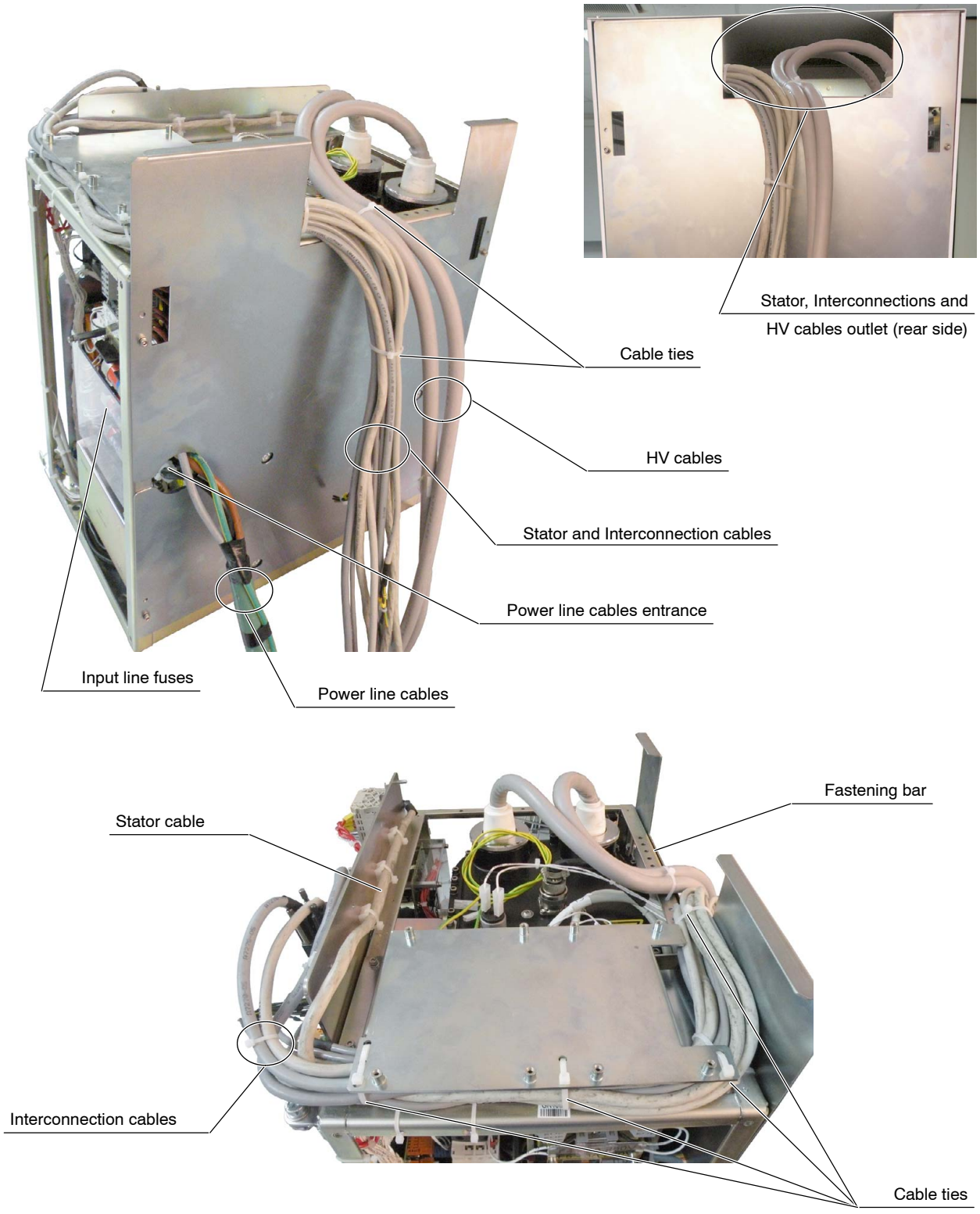


6.1.2 CABLE ROUTING INSIDE GENERATOR CABINET

1. Before connecting the Interconnection cables within the Generator Cabinet, cables must be first connected to each Device (Table, Wall Stand, etc.) and routed through the raceways. Remove the ferrite blocks of the cables (factory clamped) when it is required to carry out a correct routing, then re-install the ferrite blocks where they originally were around cables.

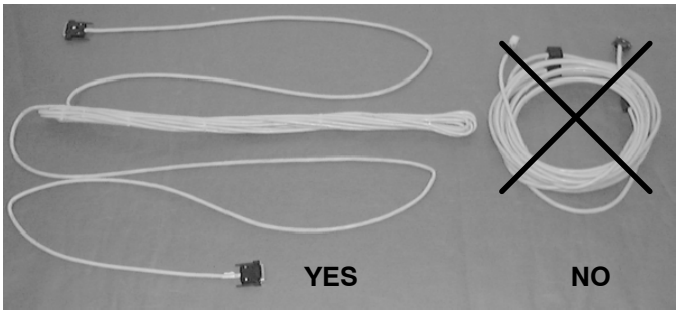
2. Inside the Generator Cabinet, all Interconnection cables must be routed over the Fastening Bar (upper rear bar) of the Cabinet Frame minding the upper Cable Outlet at the rear side of the Cabinet Cover. (*Refer to Illustration 6-5.*)

Illustration 6-5
Cable routing



CAUTION

In order to avoid signal interferences, it is strongly recommended to fold and fasten close to the Generator Cabinet the portion of cables not routed (see picture below). Never wrap in circles.



3. Connect all cables as indicated in the present Section.

4. Secure all cables to the Fastening Bar using cable ties after all cable/wire connections are complete.

6.1.3 HIGH VOLTAGE CABLES CONNECTION

Connect the HV Cables in the HV Transformer (Generator).

These cables must enter into the Generator through the cable outlet on the upper side of the Cabinet and then attached to the fastening bar (upper rear bar) of the Cabinet frame minding the upper cable outlet at the rear side of the Cabinet cover.

CAUTION

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

Anode and Cathode cables are furnished according to the room layout (length of the cables).

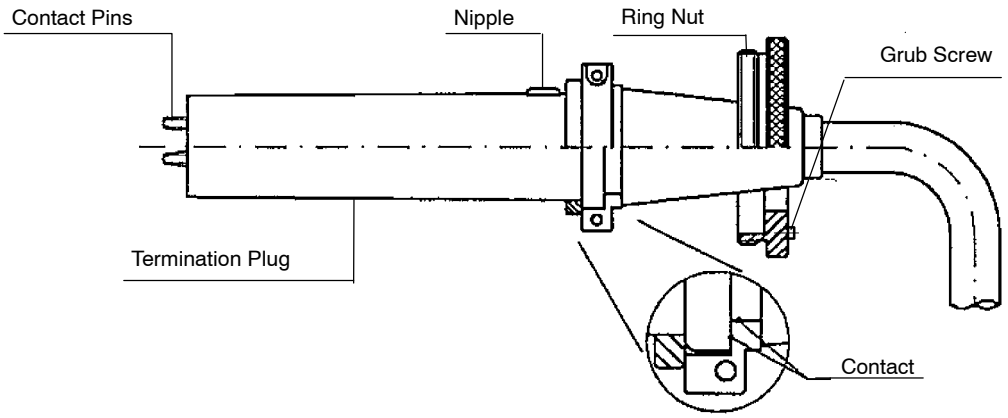
1. The mounting accessories of each termination plug are factory assembled. For extended information refer to the HV Cable manufacturer's instructions located inside the HV Cable package.

CAUTION

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

2. Unscrew the grub screw of the ring nut. (*Refer to the illustration below*).

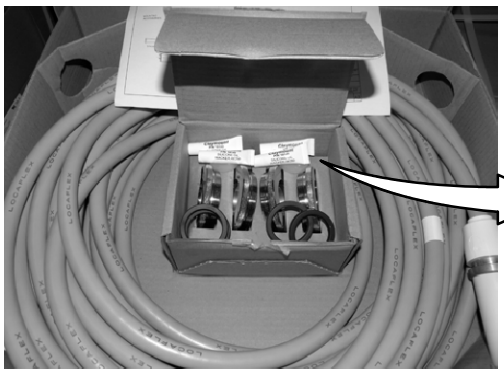
Illustration 6-6



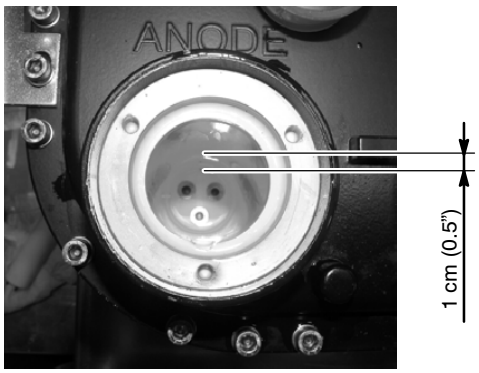
3. Prepare the High Voltage terminals that will be installed in the HV Transformer.

   - Put approximately 1 cm (0.5”) of HV Silicone Oil in the HV Transformer receptacles (included in the HV Cables package).
   - If HV Silicone Oil is not available, fill the receptacles using silicone paste provided with the X-ray Tube.

Illustration 6-7
USe Silicon Oil to prepare the HV Terminals


HV Cables Package

HV Silicone Oil



HV Transformer Receptacle


HV Silicone Paste


HV Cable Terminal with Silicone Paste

4. 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).

Illustration 6-8

5. Hand tighten the ring nut. It must be secure. Tighten the grub screw.

6. Prepare the High Voltage terminals that will be installed in the X-ray Tube(s) receptacles as previously described. Apply Silicone Paste over the entire surface of the Plug including the Pins.

7. Carefully connect the Anode and Cathode cables from the HV Transformer to the respective X-ray Tube(s) receptacles. Ensure that all connections are made correctly, maintaining correct Anode and Cathode orientation.

8. Hand tighten the ring nut. It must be secure. Tighten the grub screw.

6.1.4 X-RAY TUBE CONNECTION

6.1.4.1 STATOR CABLE

X-ray Tubes are equipped with the Stator cable installed.

Route the Stator cable together with the HV cables to the Generator Cabinet. Connect the Stator cable terminals to the indicated Terminal Block TS1:

STATOR WIRES	TERMINAL TS1
MAIN	TS1-1
AUX (Shift)	TS1-2
COMMON	TS1-3

MAKE SURE THAT STATOR WIRES ARE PROPERLY CONNECTED. BEFORE MAKING ANY EXPOSURE, CHECK THAT THE ANODE ROTATES CORRECTLY.

FOR SAFETY REASONS (TO AVOID ELECTRIC SHOCKS), THE STATOR CABLE MUST BE SHIELDED AND BOTH ENDS OF THE SHIELD MUST BE CONNECTED TO GROUND.

6.1.4.2 THERMOSTAT OR PRESSURE SWITCH SIGNAL

If the X-ray Tube is provided with a Safety Thermostat (approx. 65 ^{o}C) or Pressure Switch (must be NC Contact), the two wires should be routed to the Terminal Block TS1 in the Generator Cabinet and connected to the following Terminals.

In case that the X-ray Tube is provided with a Safety Thermostat (approx. 65 ^{o}C) and a Pressure Switch (both must be NC Contacts), connect them in series before routing, connecting both wire-ends to their respective Terminals in TS1.

THERMOSTAT WIRES	TERMINAL TS1
GND	TS1-4
THERMOSTAT T1	TS1-5

If a X-ray Tube is not provided with Thermostat signal, jump both connections in the Terminal Block TS1 (*refer to above table).*

6.1.4.3 FANS

Wires from fans should be routed with the Stator Cables, and connected to the indicated terminal of the Generator Cabinet. Depending on the model of X-ray Tube, the fans are powered at 120 V~ or 230 V~. Make the following connections to select the fan voltage:

0 V~	120 V~	230 V~
TS1-8	TS1-7	TS1-6

6.1.4.4 GND AND/OR SHIELD

Connect the GND and/or Shield wire of the Stator cables to:

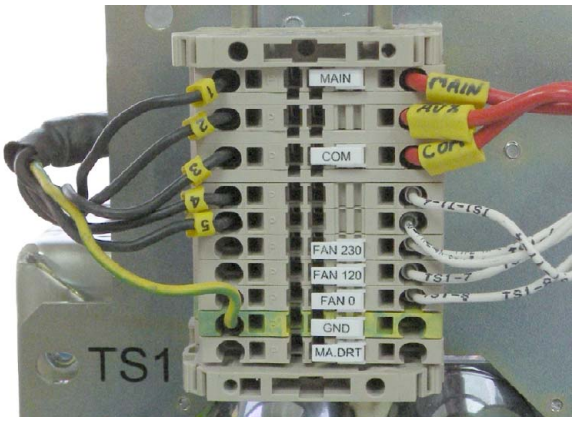
GND WIRE	TERMINAL TS1
GND and/or Shield	TS1-9

6.1.4.5 X-RAY TUBES WITH METALLIC INSERT ENVELOPE

In case of X-ray Tubes with a Metallic Insert Envelope, it is required to connect the wire from the Metallic Insert Envelope to the Terminal Block TS1-10 on the Generator. *(Refer to Illustration 6-9.)*

Also, verify that TS1-10 is connected to J18.5 of the A3640-XX Control board *(refer to schematic 54302260 in the Schematics document).*

Illustration 6-9
Terminal Block TS1



6.2 DIGITAL SYSTEM INTERCONNECTIONS

The Digital X-ray System is composed by the Generator, an Overhead Tube Crane, a Wall Stand, an Elevating Table and a PC Interface Box. The X-ray room equipment is provided with an isolated power system for electronic powering and a BUS Hardware system for signals and data transfer between them.

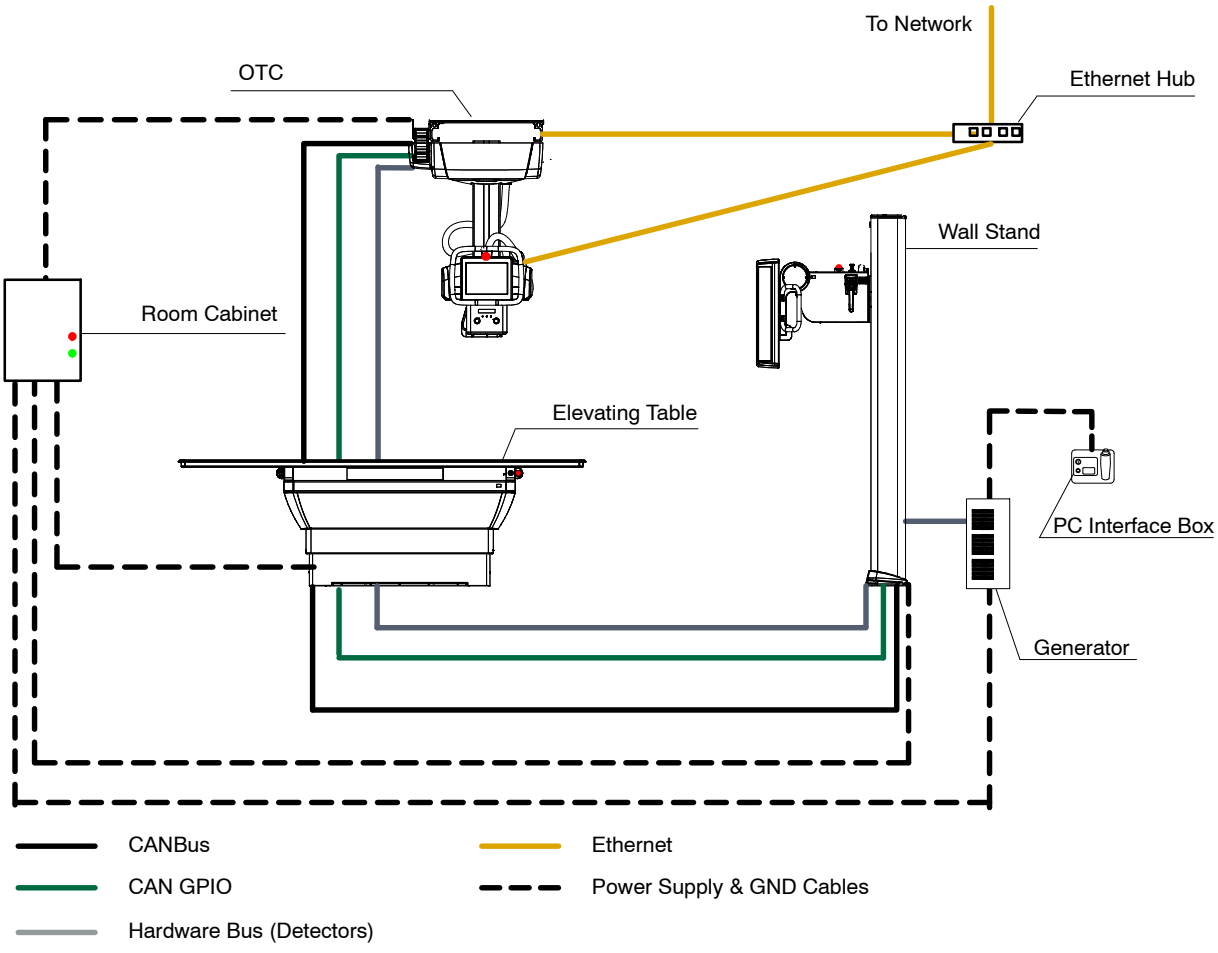
The Interconnection of the X-ray Room is composed by:

- CANBus which connects the Servos of the Overhead Tube Crane, Table and Wall Stand. Cables are identified by a black shielding jacket.
- CAN GPIO which connects the GPIO modules of the Overhead Tube Crane, Table and Wall Stand. The cables are identified by a green shielding jacket.
- BUS Hardware which connects the Overhead Tube Crane with the Detectors of the Table, Wall Stand and with the X-ray Generator. The cables are identified by a grey shielding jacket.

  The X-ray Generator, Elevating Table and Wall Stand are interchangeable, they can be connected in different positions of the BUS Hardware System. On the contrary, the Overhead Tube Crane is always the master positioner where cables come from to connect all the other devices of the X-ray Room.
- The Ethernet System which connects the Overhead Tube Crane, X-ray Generator and Image System (when available) with the Ethernet Hub and then with the general network. Cables are identified by a yellow shielding Jacket.
- Power Supply and Ground Cables which connect independently each device of the X-ray Room with the Room Cabinet.

The illustration below represents an example of a standard Interconnection scheme. Remember that the Overhead Tube Crane is always the Master and all other positioners, Table, Wall Stand, and Generator are interchangeable.

Illustration 6-10
Digital System Interconnection Diagram



Note ☞ *It is highly recommendable to connect first the Cables coming from the Hose of the Overhead Tube Crane to the nearest positioner or to the one that has been configured as the first one.*

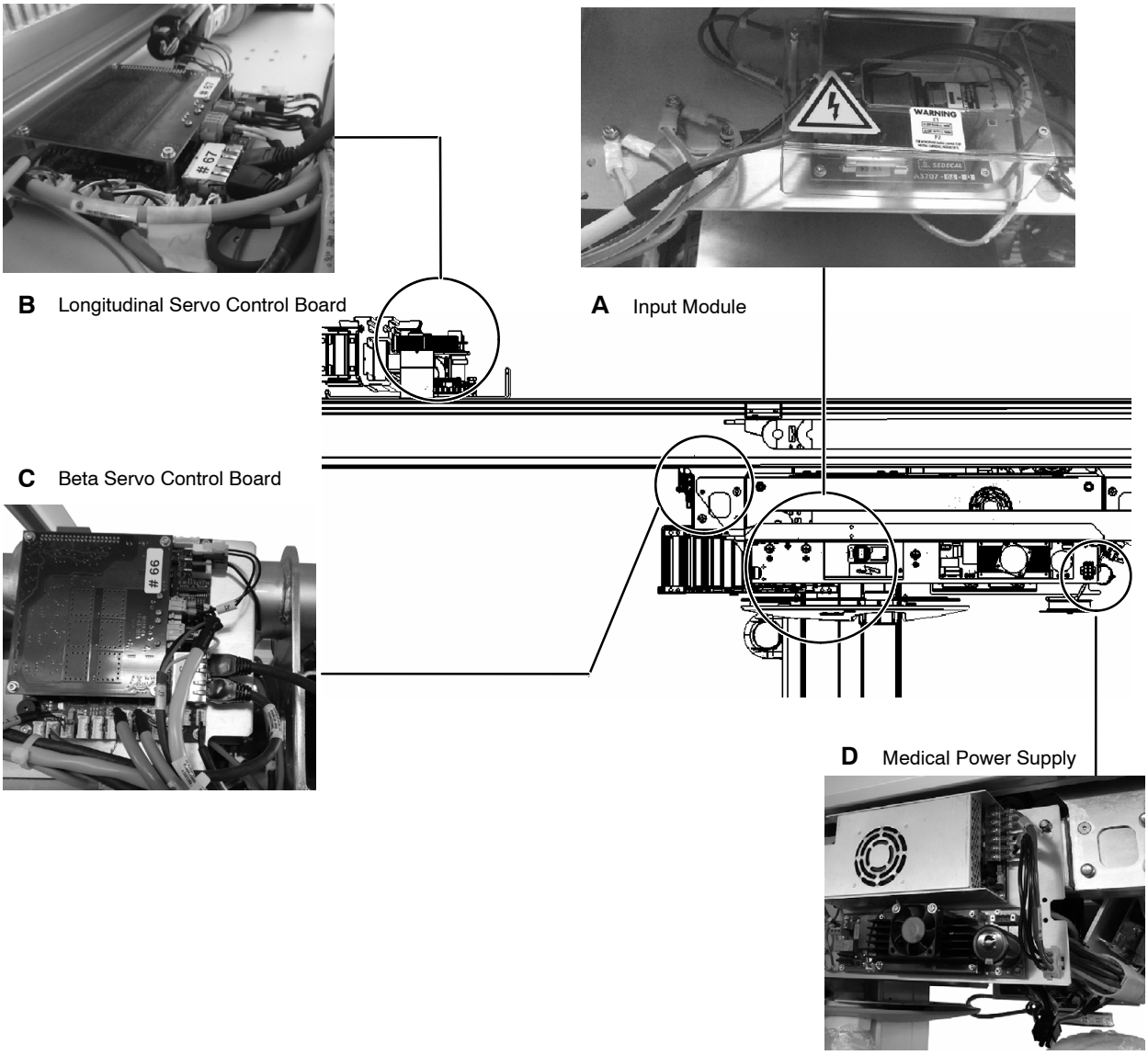
Note ☞ *Refer to the Schematics Section of the Overhead Tube Crane Manual for further details about system interconnections.*

6.2.1 OVERHEAD TUBE CRANE CABLES CONNECTION

6.2.1.1 ELECTRONIC COMPONENTS AND CONNECTIONS OF THE OVERHEAD TUBE CRANE

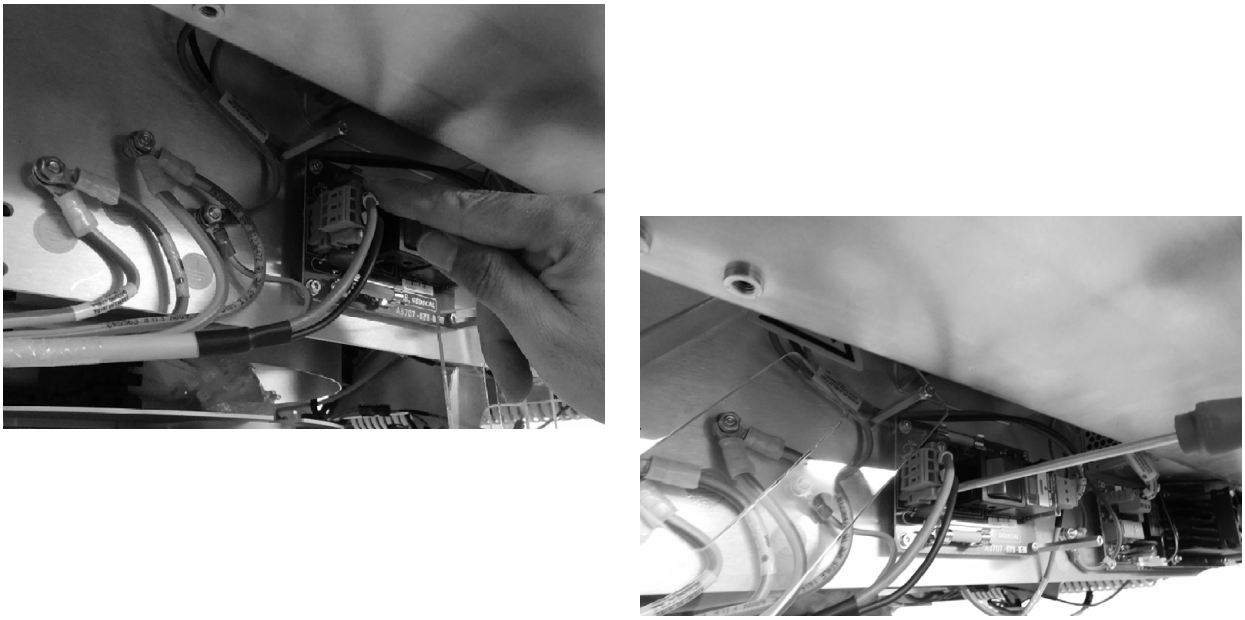
The cables are already connected in most of the cases, except in some cases that the cables can not be shipped already connected. There are four different connection areas:

Illustration 6-11
Overhead Tube Crane Connection Areas



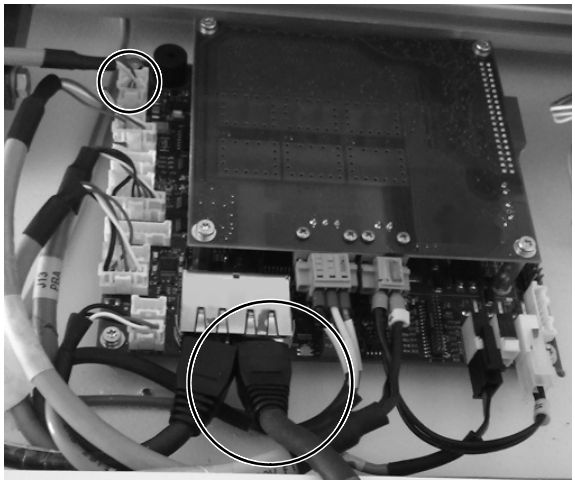
a. In the **Input Module** connect the A15223-XX Power Supply Cable and ground cables. For further details refer to *Section 6.2.1.2 Power and Ground Cables*.

Illustration 6-12
Input Module Connection



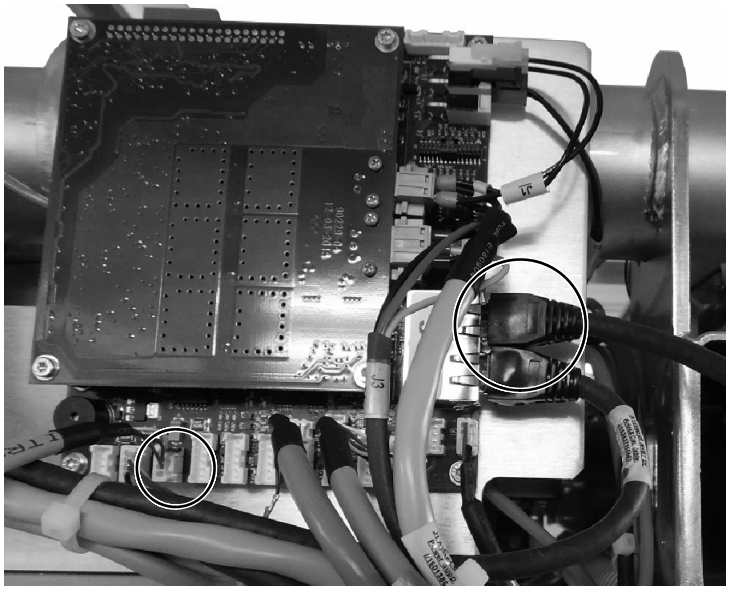
b. In the A3624-02 **Servo Control Board for the Longitudinal Axis** connect the CAN BUS Cables (black shielding) to the free RJ45 Adapter and the A15330-XX Service Mode Cable in connector J18 of the board.

Illustration 6-13
Servo Control Board for the Longitudinal Axis



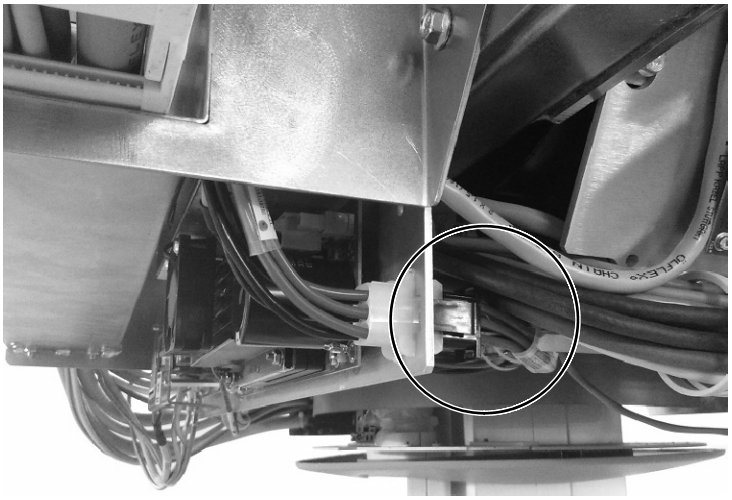
c. In the A3624-02 **Servo Control Board for the Beta Axis** connect the A15090-XX CAN BUS Cable (black shielding) to the RJ45 Adapter and the A15330-XX Service Mode Cable in connector J17 of the board.

Illustration 6-14
Servo Control Board for the Beta Axis



d. Connect the A15317 B2 DF Power Supply Out Cable to the connector located at the back of the supporting plate of the **Medical Power Supply**.

Illustration 6-15
Medical Power Supply Connection



6.2.1.2 OVERHEAD TUBE CRANE POWER CABLE AND GROUND CONNECTION

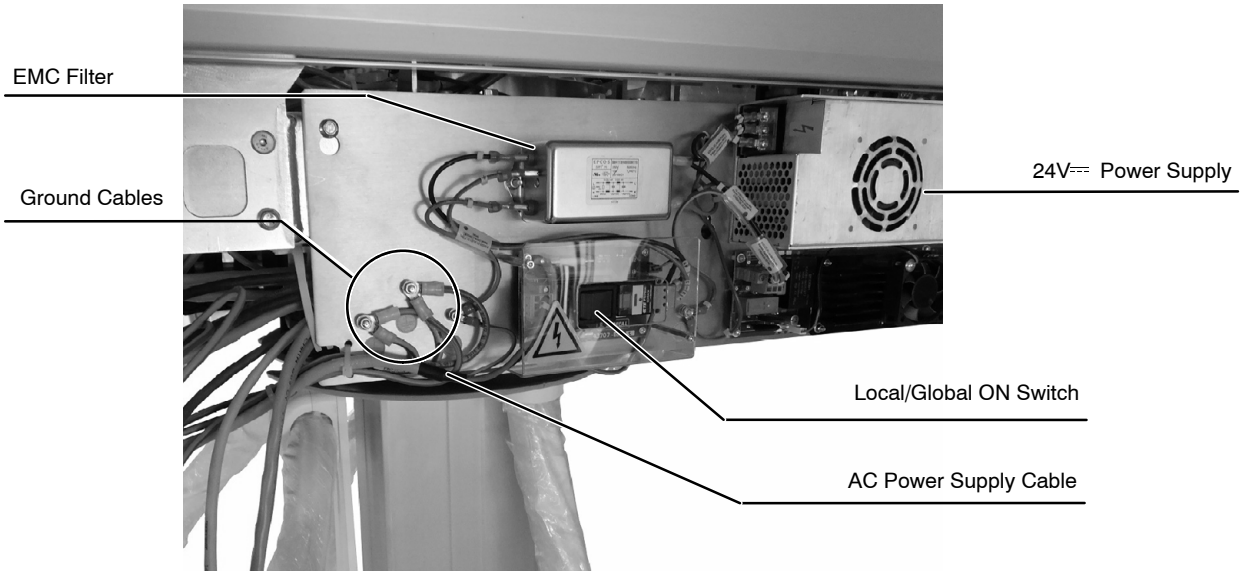
The **Overhead Tube Crane** should be powered by the same Room Electrical Cabinet to which the X-ray Generator and the rest of the positioners of the X-ray Room are connected. When the Room Electrical Cabinet is turned ON/OFF, the equipment will be turned ON/OFF.

The Overhead Tube Crane is designed to be connected by default to a single phase power supply of 100–240 V~, and supplied by a voltage working at 50Hz or 60Hz.

In the Case of the Overhead Tube Crane, the Power and ground cables are shipped already routed through the Hose but disconnected from the device. Therefore, it is just required to connect them to the equipment and to the Room Electrical Cabinet.

- AC Power Supply Cable (A15223-XX) from J1 in Input Module (A3707-01).
- Ground Cable (S008719-02).

Illustration 6-16
Input Module Connections



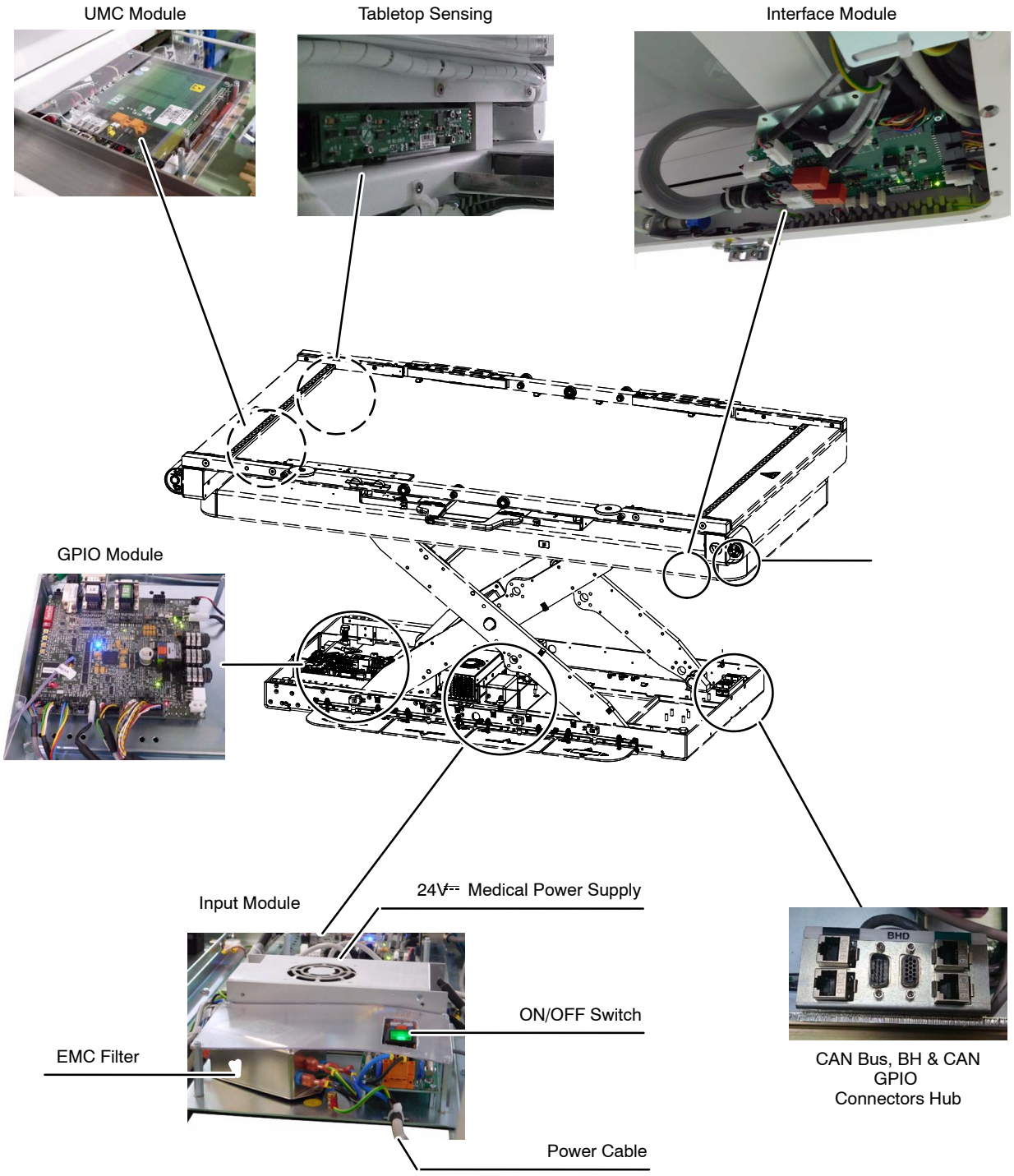
6.2.2 RAD TABLE CABLES CONNECTIONS

6.2.2.1 ELECTRONIC COMPONENTS AND CONNECTIONS OF THE RAD TABLE

The electronic components of the Table are:

- Input Module Assembly. This is the Power Module connecting the Table to the mains, it is composed by:
  - Input Module
  - EMC Filter
  - 230 V~/24V⎓ Medical Power Supply
- CAN GPIO Module of the Table, composed by:
  - GPIO Board (A3697-XX)
  - The Connectors Hub which holds the CAN GPIO, CAN Bus & Hardware Bus Connectors.
- Interface Table Module (A3698-XX)
- UMC Table Module composed by:
  - Control Board (A3624-XX)
  - Power Board (A3625-XX)
- Tabletop Sensing Assembly. An specific module for the Table which allows to control the position of the Tabletop.

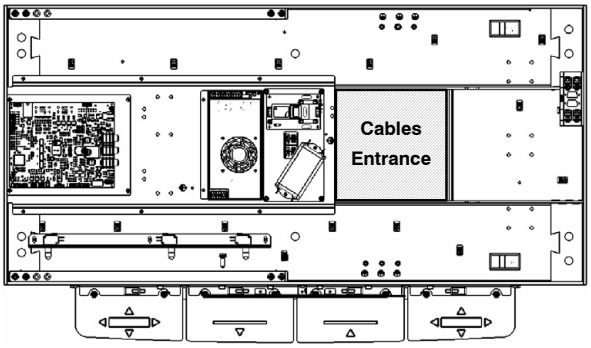
Illustration 6-17
Electronic Components of the RAD Table



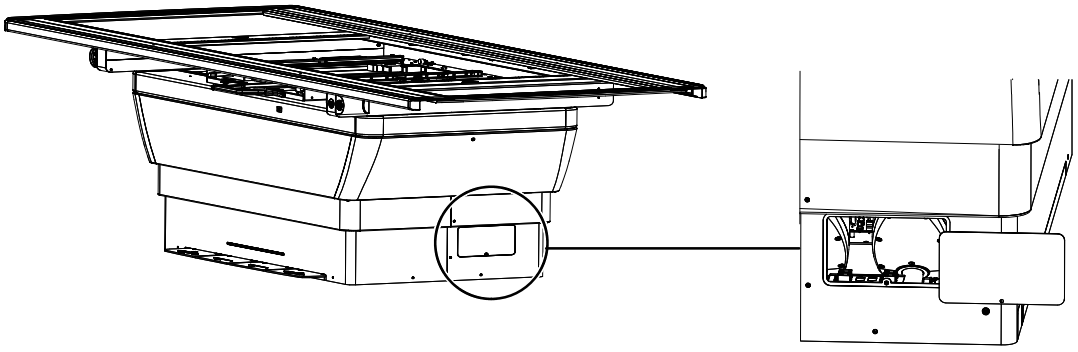
By default it is recommendable to route the cables under the Elevating table and insert them through the Cables Entrance area, indicated in the Image below. If required it is also possible to route the cables outside the Table and insert them through the windows for the Cables entrance of the Base covers.

Illustration 6-18
Cables Routing inside the Table

Table Base
(both models)



Elevating Table 500



6.2.2.2 POWER CABLE AND GROUND CONNECTION

The **X-ray Elevating Table** should be powered by the same Room Electrical Cabinet to which the X-ray Generator and the rest of the positioners of the X-ray room are connected. When the Room Electrical Cabinet is turned ON/OFF, the Elevating Table will be turned ON/OFF.

The X-ray Elevating Table is designed to be connected by default to a single phase power supply of 100–240 V~, and supplied by a voltage working at 50Hz or 60Hz.

Power and ground cables are shipped already connected to the device. So it is just required to connect them to the Room Electrical Cabinet.

- AC Power Supply Cable (A15223-XX) from J1 in Input Module (A3707-01).
- Ground Cable (S008719-02) from stud near the Input Module (A3707-01).

Illustration 6-19
Input Module Connections

6.2.3 RAD WALL STAND CABLES CONNECTION

6.2.3.1 ELECTRONIC COMPONENTS OF THE WALL STAND

The electronic components of the Wall Stand are:

- Input Module Assembly. This is the Power Module connecting the Wall Stand to the mains, it is composed by:
  - Input Module
  - EMC Filter
  - 230 V~/24V⎓ Medical Power Supply
- CAN GPIO Module of the Wall Stand, composed by:
  - GPIO Board (A3697-XX)
  - The Connectors Hub which holds the CAN GPIO, CAN Bus & Hardware Bus Connectors.
- Vertical and Tilting Modules:
- UMC Wall Stand Module composed by:
  - Control Board (A3624-XX)
  - Power Board (A3625-XX)
- Rotation Module (A3657-XX)
- Adapter Module (A40049-01)

6.2.3.2 POWER CABLE AND GROUND CONNECTION

The **Wall Stand** should be powered by the same Room Electrical Cabinet to which the X-ray Generator and the rest of the positioners of the X-ray room are connected. When the Room Electrical Cabinet is turned ON/OFF, the Wall Stand will be turned ON/OFF.

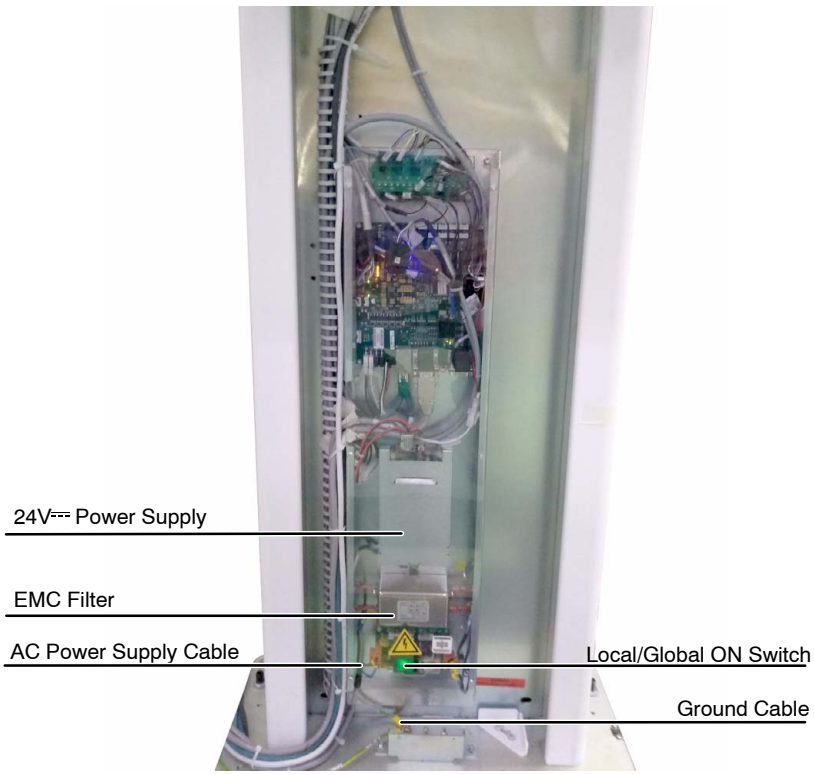
It is provided with an Status Indicator located at the top of the Column. When the Wall Stand is ON, it is lighted in green.

The Wall Stand is designed to be connected by default to a single phase power supply of 100–240 V~, and supplied by a voltage working at 50Hz or 60Hz.

Inside the front lower cover of the Wall Stand *(refer to Section 3.2), p*ower and ground cables are shipped already connected to the device, so it is just required to connect them to the Room Electrical Cabinet.

- AC Power Supply Cable (A15223-XX) from J1 in Input Module (A3707-01).
- Ground Cable from stud near the Input Module (A3707-01).

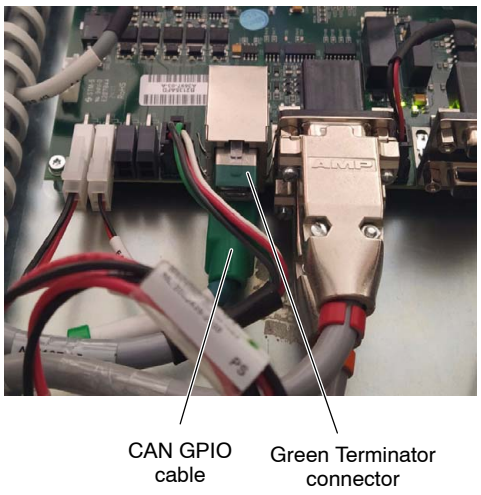
Illustration 6-20
Input Module Connections



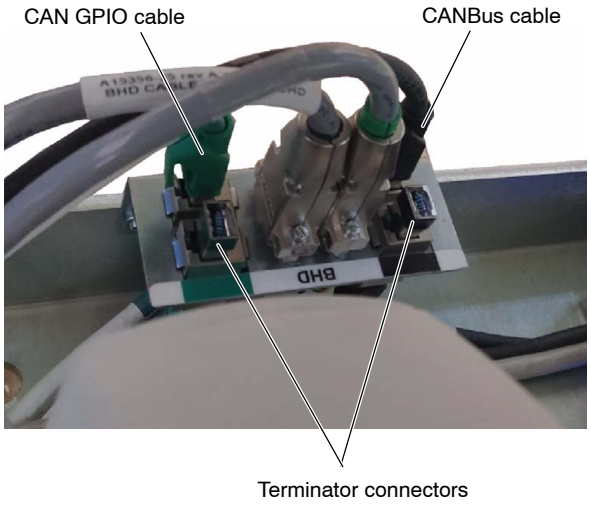
6.2.4 CANBUS & CAN GPIO TERMINATORS CONNECTION

At the end of the CANBus and CAN GPIO wiring, in the last positioner of the circuit (Table or Wall Stand), a Terminator connector must be plugged in to close the circuit *(refer to Illustration 6-10)*. Each connector is identified with a different color and they are not interchangeable.

When the Wall Stand is the last positioner of the circuit, the Terminator connectors should be connected to it (the black one to the available RJ45 connector of the Interconnection Pannel for the CANBus cable and the green one to the A3697-XX GPIO Interface Board for the CAN GPIO cable).



When the Table is the last positioner of the circuit, the Terminator connectors should be connected to the available RJ45 connectors of the Interconnection Pannel (the black one for the CANBus cable and the green one for the CAN GPIO cable).



6.2.5 GENERATOR INTERCONNECTION CABLES

This section identifies the cables and runs needed for Generator Interconnection. Route and connect the interconnection cables from each component installed in the system to the A3674-XX Interface board as indicated in *Illustration 6-21.*

CAUTION

Interconnection cables should not be routed into the same conduit or cable raceway as the Power or High Voltage cables.

Illustration 6-21
Interface Board TS1, TS2 and TS3 Connections

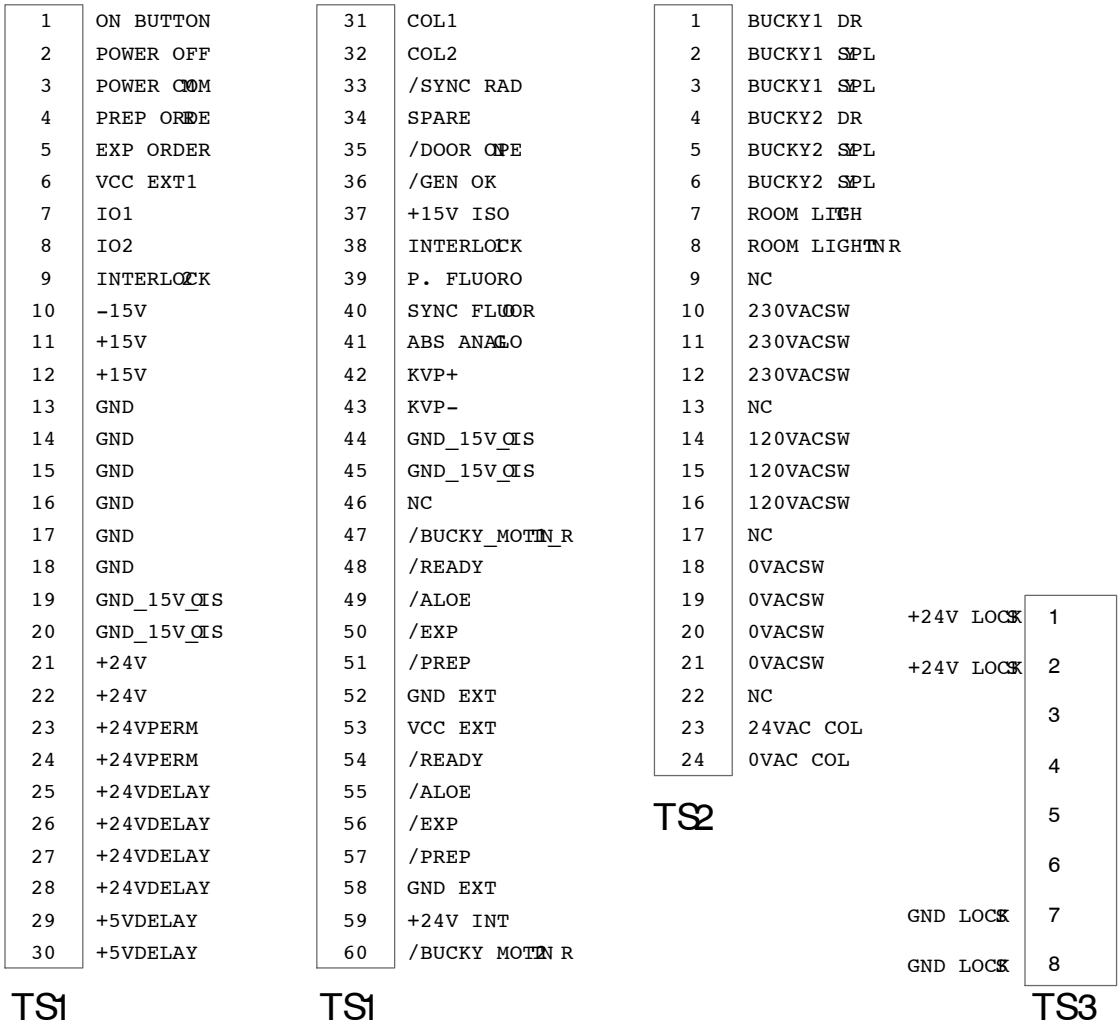
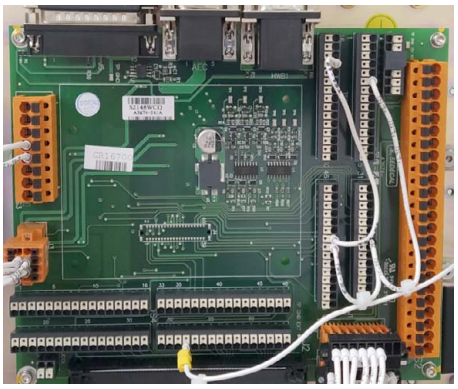


Illustration 6-22
Interface Board on the Generator



6.2.5.1 DOOR OPEN INTERLOCK SIGNAL

Connect two wires from the Room Door Interlock Switch(es) to Terminal Strip TS1-35 (/Door open) and TS1-14 (GND) of the A3674-XX Interface board.

(Refer to the Configuration document for Door Open Switch Interlock configuration.)

6.2.5.2 WARNING LIGHT SIGNAL

Room Warning Lamp(s) are lighted when the Handswitch is pressed halfway (prep. position), during X-ray operation.

Room Warning Lamp(s) can be externally powered or internally by the Terminal Strips TS1 and TS2 of the A3674-XX Interface board. Room Lamp(s) must be connected through the Terminal Strips TS1 and TS2 to enable the Generator switches to power on/off the Room Warning Lamps.

Connect the cables as indicated in the table below, according to the needed voltage:

Table 6-1
Room Warning Lamps cables connections

VOLTAGE	GENERATOR ON		X-RAYS		
	WIRE 1	WIRE 2	WIRE 1	WIRE 2	JUMPER
230 V~	TS2-12*	TS2-20	TS2-12*	TS2-7	TS2-8 — TS2-21
110 V~	TS2-16*	TS2-20	TS2-16*	TS2-7	TS2-8 — TS2-21
24 V⎓	TS1-21	TS1-14	TS1-22	TS2-7	TS2-8 — TS1-13
** Connect both wires to the same connector or use TS2-10 or TS2-11 for 230 V~ and TS2-14 or TS2-15 for 110 V~ if not in use for the Table and Wall Stand receptors.*					

6.2.5.3 DETECTOR CABINET FANS

To supply power from the Generator to the Detector Cabinet Fans (if needed when using a 4343 Detector in the Table and/or Wall Stand) connect the wires to Terminal Strip TS3-1 (+24 V⎓) and TS3-7 (0 V⎓) or to TS3-2 (+24 V⎓) and TS3-8 (0 V⎓) of the A3674-XX Interface board.

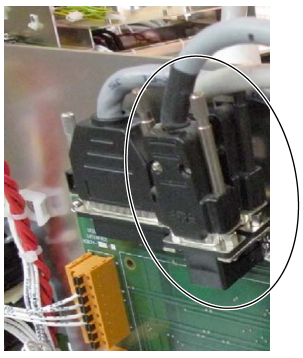
Illustration 6-23
Detector Cabinet Fans connections

6.2.5.4 ION CHAMBERS FOR AEC

For one Ion Chamber connection, connect the cable to the front AEC connector (configured in the Service Console as AEC 1) on the Interface board. Connect the second Ion Chamber cable to the back AEC connector (configured in the Service Console as AEC 2) when using two Ion Chambers.

Claymount, Vacutec and AID Ion Chambers are compatible with the Generator *(refer to schematic 6011002 in the Schematics document).*

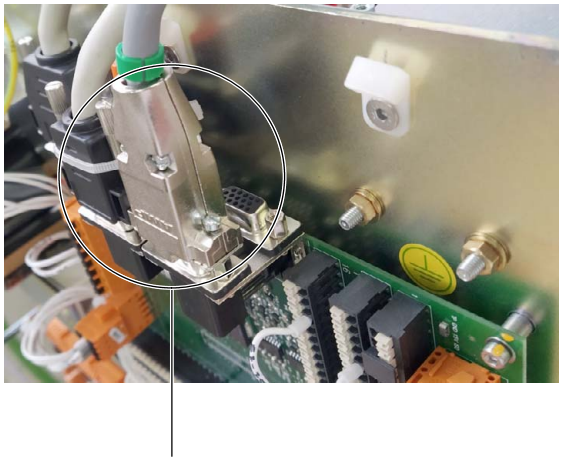
Illustration 6-24
AEC connections



6.2.5.5 HARDWARE BUS

Connect the Hardware BUS cable (grey) to the male connector of the HWB1 connectors according to the position of each component of the System in the X-ray Room *(refer to Illustration 6-10 and to the corresponding Interconnection map 6005011, 6070158 or 6070159).*

Illustration 6-25
Hardware Bus connectors



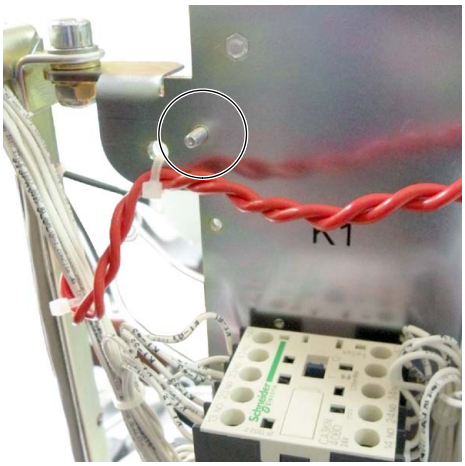
6.2.5.6 RECEPTORS

Connect the power supply cable of the receptor to the A3674-XX Interface board as indicated in the table below:

RECEPTOR CABLE	WIRE 1		WIRE 2
	For 230 V~ connection	For 120 V~ connection	0 V~
Table cable	TS2-10	TS2-14	TS2-18
Wall Stand cable	TS2-11	TS2-15	TS2-19

Note ☞ *Refer to the Schematics document or to the corresponding Service note to check the respective Receptor interconnection map for complete wiring connection.*

Illustration 6-26
Earth ground stud in the rear side of the front door for detector cables

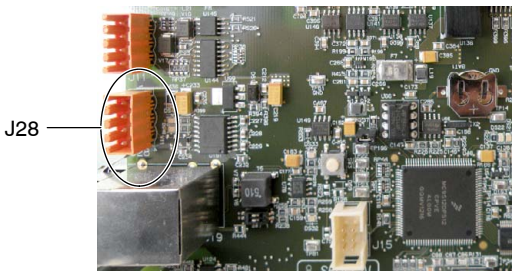


6.2.5.7 INTERNAL DOSIMETRY

For Dosemeter connection, use the A15212-XX cable connected to J28 of the A3640-XX Control board *(refer to schematic 6005007 in the Schematics document).*

Note ☞ *Refer to the Configuration document for the Dosemeter configuration.*

Illustration 6-27
Dosemeter connector



6.2.6 CABLES AND INTERCONNECTIONS OF THE PC INTERFACE BOX

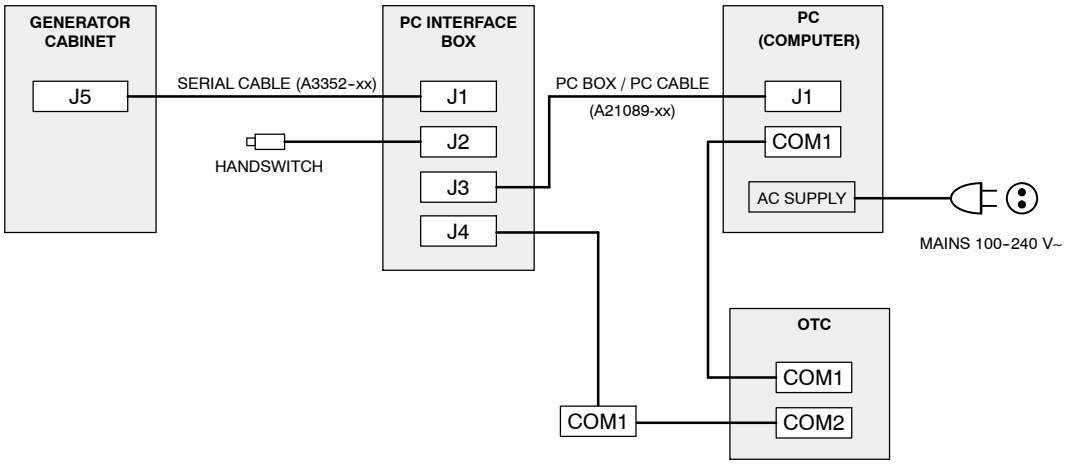
Perform the following connections:

1. Remove the Back Cover of the PC Interface Box.
2. Connect the Serial Interconnection Cable (A3352-xx) from J5 of the Interface board of the Generator to J1 of the PC Interface Box.
3. Connect the Handswitch Cable to J2 of the PC Interface Box.
4. Connect the PC Interface Box-Computer Cable (A21089-xx) to J3 and J4 of the PC Interface Box and the other end (2 connectors) to J1 (Auto ON/OFF) of the Computer connectors and to COM1 (Communication) of the RS232 adapter connected to the RS232 cable from COM2 of the OTC.

Note ☞ *J1 connector is only available in Computers provided with Auto ON/OFF board inside (factory installed).*

5. Finally, connect the RS232 cable from COM1 of the OTC to COM1 of the Computer connectors.
6. Re-install the Back Cover of the PC Interface Box.
7. Check to set proper Line Voltage on PC. Plug the Power Line cable for the Computer to a 100 V~ or 240 V~ socket.

Illustration 6-28
Interconnections with the A16296-XX Interface Box



6.2.7 X-RAY FOOTSWITCH

Optionally, radiographic exposures can be initiated with the Footswitch, which can be connected to the Radiographic Table *(refer to schematics 6070085):*

- To connect the Footswitch to the Table, connect the Footswitch cable (A21119-01) to J12 of the A3696-XX GPIO board.

Illustration 6-29
Footswitch

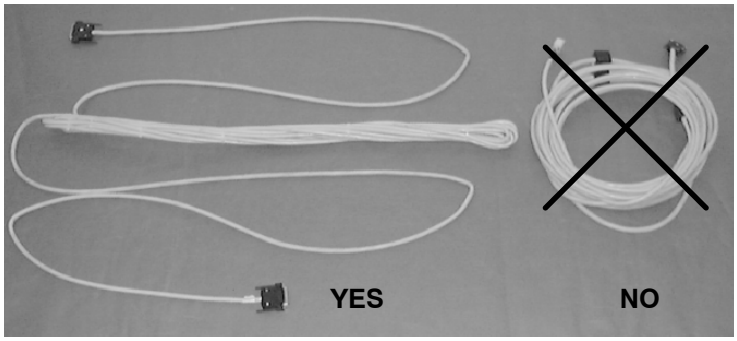
6.3 CABLE FASTENING AND COVERS

Note ☞ *Before re-installing cabinet covers, perform the rest of the required Calibration procedures (i.e. AEC, Fluoro, ABC).*

Check that all electrical connections are firm and secure. Cables should be correctly routed. *(Refer to Section 6.1.2.)*

CAUTION

In order to avoid signal interferences, it is strongly recommended to fold and fasten close to the Generator Cabinet the portion of cables not routed (see picture below). Never wrap in circles.

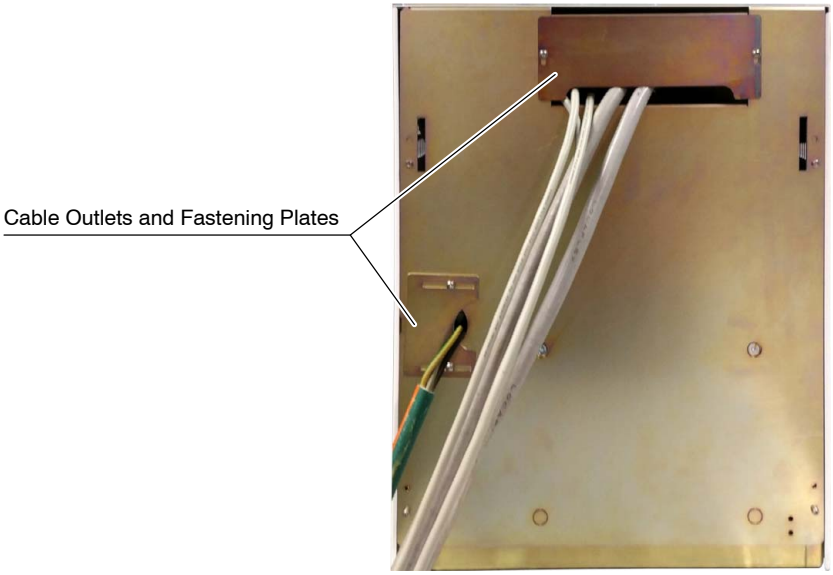


Re-install the Cabinet covers and connect its internal ground wires.

Illustration 6-30
Internal ground wires

Power line, High Voltage and Interconnection cables must go through the cover cable outlet and be fixed with their fastening plates.

Illustration 6-31
Cable Outlets and Fastening Plates on the Rear Cover



6.4 SYSTEM INTERCONNECTION SIGNALS

All input signals are active low. This means the inputs must be pulled to ground (chassis ground of the Generator) thru relay contacts, by a transistor or other switching device. The current requirement of the switch is less than 10 mA.

Do not apply 115/220 V~ logic signals to any of the logic inputs. If 115/220 V~ logic signals are used in the X-ray table (i.e. fluoro command), these signals must be converted to a contact closure by a relay.

The outputs signals from the Generator to the subsystem devices are usually active low (switched to chassis ground of the Generator). The outputs are open collector transistor drivers *(refer to the A3640-XX Control board schematics for their maximum current).*

Table 6-2
System Interconnection Signals

SIGNAL NAME	SIGNAL DIRECTION	SIGNAL DESCRIPTION
CT	Internal	Tank Feedback Connector Plugged in. This signal is low when the switch in the high voltage transformer is in the RAD position. This is a safety interlock which prevents an exposure if the high voltage switch (in the HV Transformer) is in the wrong position.
/LINE CONT		A low signal energizes the main line contactor K2 in the Power Module.
/CHRG_DR		Shorts the Precharge resistors of the DC-BUS.
TANK PRESOSTAT		This signal acts as an interlock when the tank gets automatically opened due to overheat.
ABC_FDBK	Input	This analog input is the output from Imaging System. A DC level signal is used for systems that use an Imaging System for Brightness level. When a DC level is used, an input range of 0 to 10 volts is required. The stabilized value of the input will be between 5 and 7 volts.
VCC_EXT	Input	External voltage supply required for the Bucky motion, when this voltage is not +24 V⎓
/BUCKY MOT1 RTN	Input	This active low signal from Bucky-1 indicates Bucky-1 motion, and therefore the exposure is enabled.
/BUCKY MOT2 RTN	Input	This active low signal from Bucky-2 indicates Bucky-2 in motion, and therefore the exposure is enabled.
/SYNCFL_EXT	Input	Sync. signal from Imaging System. This signal is used for timing in the Generator.
/DOOR_OPEN	Input	This low signal is the interlock for the Door of the X-ray room.
/SYNC RAD	Input	Sync. signal from the DSI device. This signal is used for timing in the Generator.

Table 6-2 (cont.)
System Interconnection Signals

SIGNAL NAME	SIGNAL DIRECTION	SIGNAL DESCRIPTION
/FLUORO_ORDER	Input	This active low signal indicates the Fluoro exposure command. It is needed for Pulsed Fluoro at variable rate.
RAMP1	Input	This input is the output of the Ion Chamber 1 (normally the Table Ion Chamber).
RAMP2	Input	This input is the output of the Ion Chamber 2 (normally the Wall Stand Ion Chamber).
/kV_DWN_EXT	Input	A low signal is a command for the Control board to drive the Fluoro kVp DOWN during a Fluoro exposure in ABC mode.
/kV_UP_EXT	Input	A low signal is a command for the Control board to drive the Fluoro kVp UP during a Fluoro exposure in ABC mode.
/TERMOSTATO	Input	Thermostat. This signal from X-ray Tube indicates the overheat of the Tube.
SCAN	Input	Analog input signal proportional to a kV or mA value when the SCAN mode of the Generator is active.
SCOPE_INPUT	Input	J30 on the Control board. Analog input connection only for signals up to 25V referenced to the Control board ground.
INTERLOCK_1	Input	Active low signal configurable to inhibit X-ray exposures and even to abort them.
INTERLOCK_2	Input	
INTERLOCK_3	Input	
INTERLOCK_4	Input	
/KEY_NC	Input	Active low signal for the Key Interlock configurable to inhibit X-ray exposures.
/ALOE	Output	This active low signal indicates the Actual Length Of Exposure. This signal is used to interface to some Spot Film systems and is used to advance the Spot Film device to the next position when multi-exposures are made on the same film.
/ALOE_DIG	Output	This active low signal indicates the Actual Length Of Exposure. This signal is used to interface to some Spot Film systems which require a minimum length of ALOE and is used to advance the Spot Film device to the next position when multi-exposures are made on the same film.
BUZZER	Output	A low signal energizes the Fluoro buzzer.
/BUCKY DR1	Output	A low signal to the Control board as a command to output a Bucky-1 (normally the Table Bucky) drive signal.
/BUCKY DR2	Output	A low signal to the Control board as a command to output a Bucky-2 (normally the Wall Stand) drive signal.
BUCKY1 SPLY	Output	Voltage supply required for the Bucky 1 drive command.
BUCKY2 SPLY	Output	Voltage supply required for the Bucky 2 drive command.
/FLD1 CAM1	Output	A low signal to select the right field in the Ion Chamber 1.
/FLD2 CAM1	Output	A low signal to select the left field in the Ion Chamber 1.
/FLD3 CAM1	Output	A low signal to select the center field in the Ion Chamber 1.
/FLD1 CAM2	Output	A low signal to select the right field in the Ion Chamber 2.
/FLD2 CAM2	Output	A low signal to select the left field in the Ion Chamber 2.
/FLD3 CAM2	Output	A low signal to select the center field in the Ion Chamber 2.
/PREP	Output	Commands to the Control board to boost X-ray Tube Filament to the value of mA selected and to start the X-ray Tube Rotor if RAD Tube is selected.

Table 6-2 (cont.)
System Interconnection Signals

SIGNAL NAME	SIGNAL DIRECTION	SIGNAL DESCRIPTION
/READY	Output	This active low signal indicates the system is ready to make an exposure (Prep cycle complete). This signal is used to interface to certain peripheral devices such as Film Changers, etc.
/ROOM_LIGHT	Output	This low going signal indicates the X-ray preparation or exposure. This signal is used to interface to the Room X-ray warning light.
START_DR1	Output	A low signal to indicate the start of an exposure to the Ion Chamber 1.
START_DR2	Output	A low signal to indicate the start of an exposure to the Ion Chamber 2.
/GEN_OK	Output	This active low signal indicates that the Generator is not initializing or it is in error condition.
/EXP	Output	Active low signal to the Control board. If /PREP is low, then a Spot Film, RAD exposure or a Fluoro exposure is made.
READY_ISO	Output	Output to digital systems that require it.
ALOE_ISO	Output	
EXP_ISO	Output	
PREP_ISO	Output	
J25	Input/Output	Serial communications port on the Control board. Configurable for RS232, RS422 or RS485.
J28		Serial port on the Control board. Configurable either for general use or for the Dosemeter.
CAN0		J9 connector on the Control board. This signal is used for software upgrade and for external communications.
CAN2		J19 connector on the Control board.

6.5 SYSTEM INTERCONNECTION MAPS

Refer to the Schematics document for the system interconnection maps.

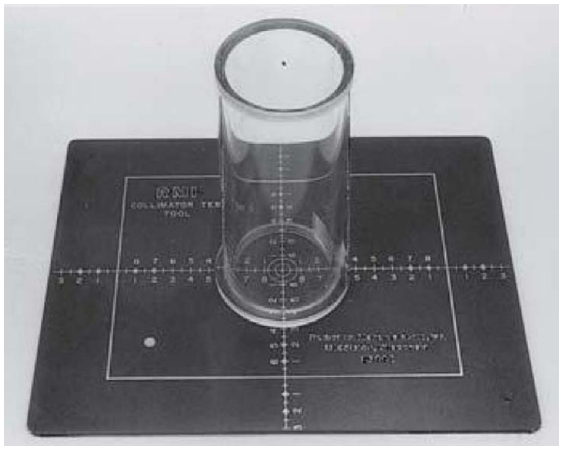
SECTION 7 SYSTEM ALIGNMENT AND ADJUSTMENT

7.1 RAD WALL STAND AND OTC PERPENDICULARITY ADJUSTMENT

Required Tools:

- Collimation Test Tool.
- Beam Alignment Test Tool.

Illustration 7-1
Collimation and Beam alignment Test Tools



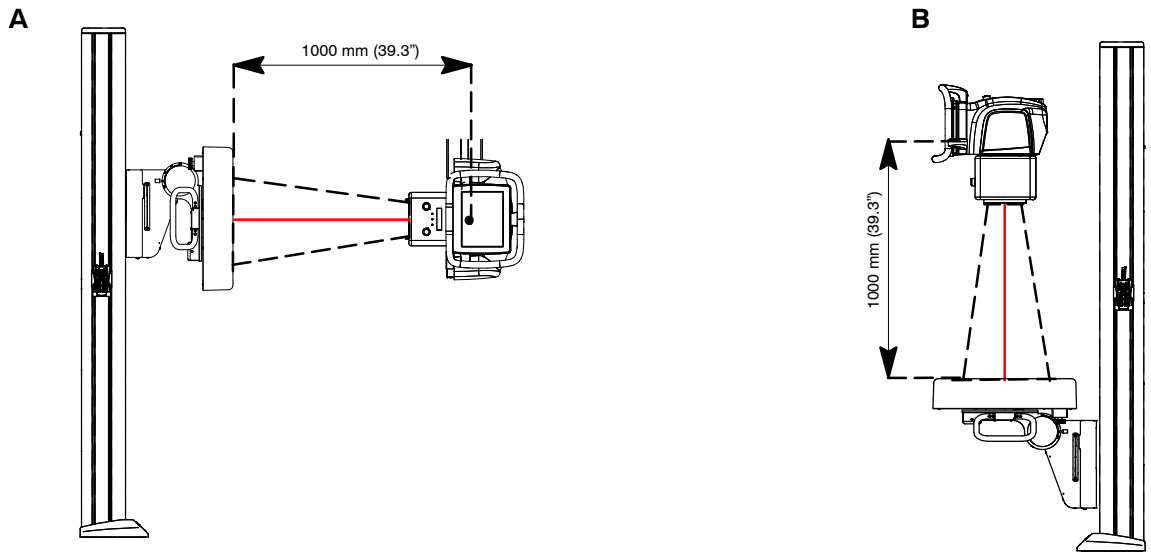
It is necessary to complete one exposition for the perfect perpendicularity or x-ray beam adjustment:

1. The OTC tube and collimator Assembly must face the Receptor, which can be in horizontal position or vertical. In the case of Double Panel System proceed just with the Receptor tilted at 0º, but for Single Panel Systems proceed also with the Receptor at 90º. The Tube and Collimator Assembly must be perfectly centered with the Receptor.

2. Install the Collimator Testing Tool and the Beam Alignment Tool in the Wall Stand as indicated in its own technical documentation. Refer to *Illustration 7-1*.

3. Place the OTC at a SID of 1000 mm from the Wall Stand.

Illustration 7-2
RAD Wall Stand and Overhead Tube Crane Perpendicularity Checking



   a. **Position A** is required for both system configurations, Single and Double Panel.

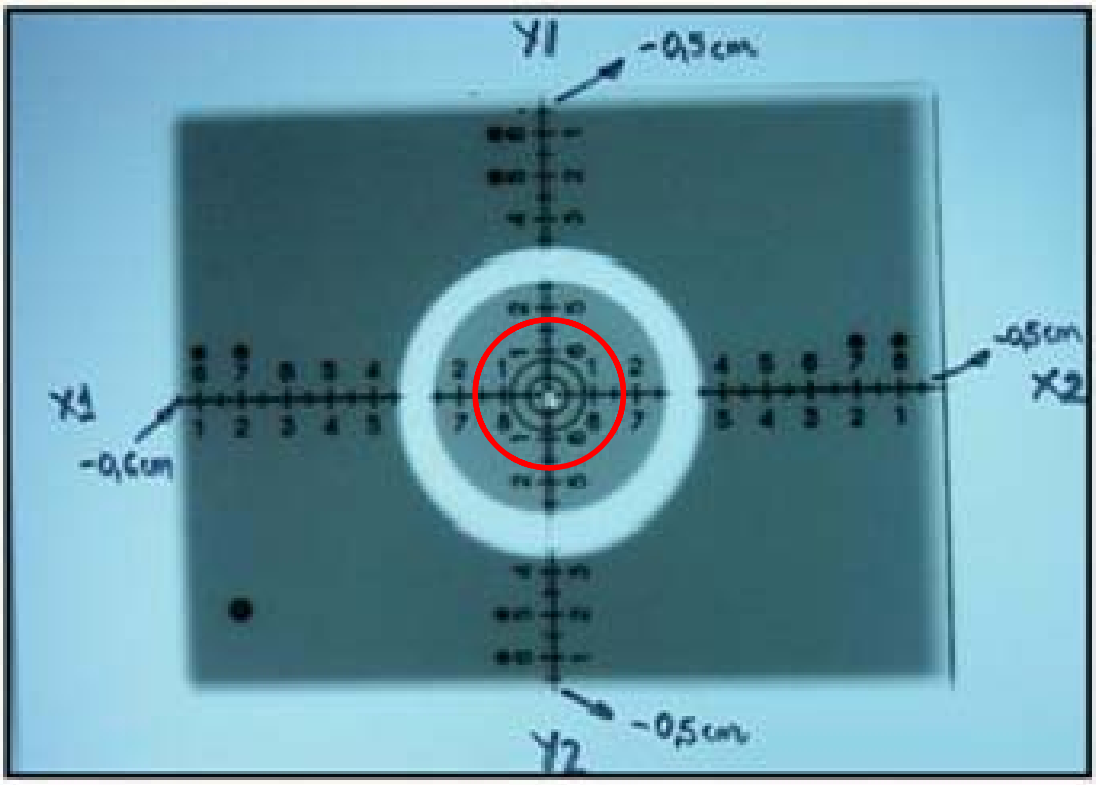
   b. **Position B** is mandatory just for Single Panel Systems.

4. Turn the Collimator light on and, by means of the Collimator Control Knobs, center the Collimator Test Tool with the light axes projected by the Collimator Lamp.

5. Repeat different exposures until getting the satisfactory results.

6. Check the results of the exposure. Refer to *Illustration 7-3*.

Illustration 7-3
Collimation Testing Tool



7. If the result is not correct, move the Wall Stand until getting the correct and perpendicular to the OTC position. Proceed to another exposure to check it.

8. When the result is correct, fix definitely the Wall Stand.

Note ☞ *The exact perpendicularity is required for a correct precision of the X-ray System. If required, check again the alignment and perpendicularity with the X-ray tube after the definitive fixation.*

7.2 ADJUSTMENT OF THE TABLE PARALLELISM TO RAILS AND OTC

Once the Table has been located in its position but NOT fixed definitely:

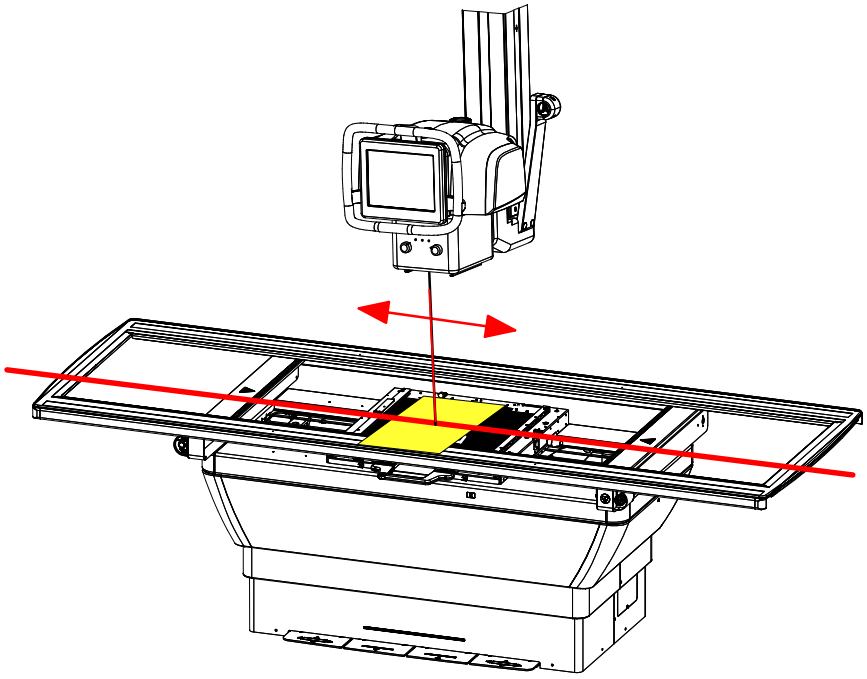
1. Define the longitudinal axis of the Table. Mark it on the Tabletop with a masking tape (it must be totally straight) or use any element of the Table as the edge of the Tabletop.

2. Switch On the collimator light.

3. Release the longitudinal brake.

4. Move the OTC with the collimator light passing along the longitudinal axis of the Table. It must be parallel to the Table axes; if not, change the Table position until getting it totally parallel.

Illustration 7-4
Table parallelism Checking Procedure



5. Once it is totally parallel to the Table, fix it to the floor.

7.3 TABLE AND OTC PERPENDICULARITY ADJUSTMENT

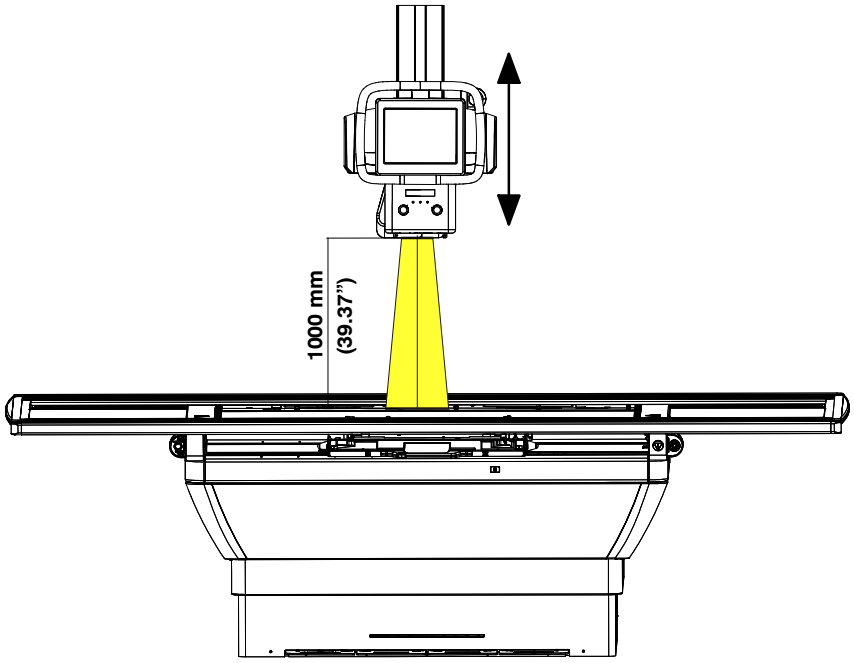
Proceed as indicated for the Table:

1. The OTC tube and collimator Assembly must face the Table Receptor. The Tube and Collimator Assembly must be perfectly centered with the DR Receptor.

2. Install the Collimator Testing Tool and the Beam Alignment Tool in the Receptor as indicated in its own technical documentation. Refer to *Illustration 7-1*.

3. Position the Overhead Tube Crane at a SID of 1000 mm from the Table.

Illustration 7-5
Perpendicularity Adjustment Checking

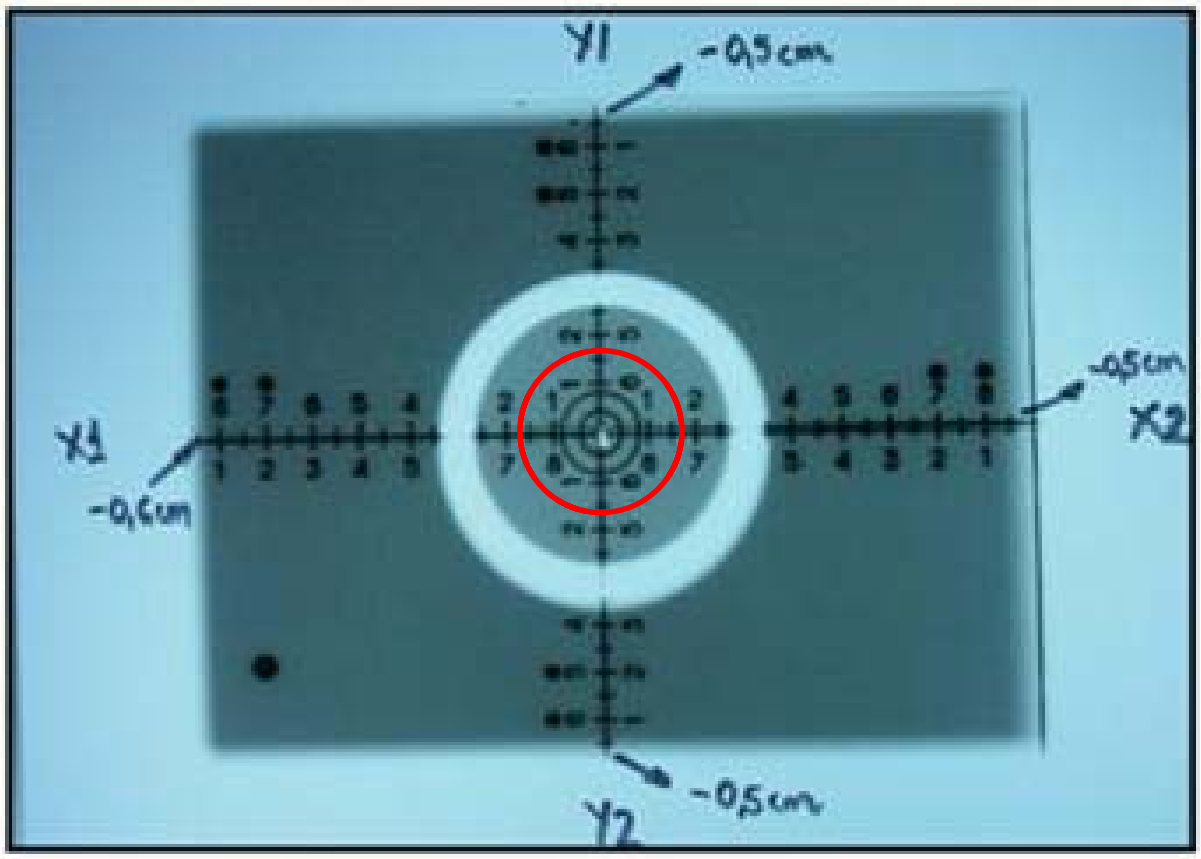


4. Repeat different exposures until getting the satisfactory results.

5. Check the results of the exposure. Refer to *Illustration 7-3*.

Note ☞ *Exact perpendicularity is required for a correct precision of the X-ray System. If required, check again the alignment and perpendicularity with the X-ray tube after the definitive fixation.*

Illustration 7-6
Collimation Testing Tool



SECTION 8 FUNCTIONAL CHECKS & DEFINITIVE INSTALLATION

THE USER MANUAL SHOULD BE THOROUGHLY READ AND UNDERSTOOD BEFORE ATTEMPTING TO PLACE THIS EQUIPMENT IN OPERATION. STUDY THE USER MANUAL CAREFULLY BEFORE USING THE EQUIPMENT AND KEEP IT AT HAND FOR QUICK REFERENCE.

The functional check describes the necessary procedures to determine if the equipment is operating correctly, their functions are conform to safety regulations and performing within specifications.

Functional checks are divided as follows:

- **Operational checks:** Only indicate that the positioners are working correctly at an operational level. They do not indicate that the unit is performing under specifications.

- **Performance checks:** Verify that the room equipment is performing under specifications. It is recommended to complete these checks during as well as after installation, during periodic maintenance and when the equipment is replaced or modified.

8.1 OVERHEAD TUBE CRANE FUNCTIONAL CHECKS

Proceed to complete the next procedures:

Table 8-1
Functional Checking Procedure List

FUNCTION	CONDITIONS	PERFORMANCE
LONGITUDINAL MOVEMENT	Longitudinal movement activated and moving effort, measured at a velocity of 25 mm/s on the Control Console Handle. 1. Overhead Tube Crane positioned at right end of Longitudinal travel, moving to left. 2. Overhead Tube Crane positioned at left end of Longitudinal travel, moving to right.	2 kg maximum required to move longitudinally the OTC.
	3. Overhead Tube Crane positioned at right end of Longitudinal travel, moving to left, and with longitudinal cable concealment. 4. Overhead Tube Crane positioned at left end of Longitudinal travel, moving to right, and with longitudinal cable concealment.	Longitudinal movement is correct along the whole travel.
LONGITUDINAL BRAKE	Longitudinal lock ON. Holding force to be measured at the Console Handle. 1. Overhead Tube Crane positioned 300 mm or ±1ft. from right end of longitudinal travel. 2. Overhead Tube Crane positioned in center of longitudinal travel.	15 kg minimum required to move longitudinally the OTC with the brake ON.
	3. Overhead Tube Crane positioned 300 mm or ±1ft. from left end of longitudinal travel.	There are not mechanical frictions.

Table 8-1 (cont.)
Functional Checking Procedure List

FUNCTION	CONDITIONS	PERFORMANCE
TRANSVERSAL MOVEMENT	Longitudinal movement activated and moving effort, measured at a velocity of 25 mm/s on the Control Console Handle.	2 kg maximum required to move transversally the OTC. Transversal movement is correct along the whole travel.
TRANSVERSAL BRAKE	Transversal lock ON. Holding force to be measured On the Control Console Handle. 1. Overhead Tube Crane positioned 150 mm from back End Stops. 2. Overhead Tube Crane positioned in the center of the Transversal Travel 3. Overhead Tube Crane positioned 150 mm from the front End Stops.	Minimum 15 kg required to move longitudinally the OTC with brake ON. There are not mechanical frictions.
VERTICAL ASSISTED MOVEMENT	Vertical travel of focal spot must be the indicated in Equipment Specifications.	Refer to *Section 1.4* 2 kg maximum required to move transversally the OTC. There are not mechanical frictions.
	Vertical Locks OFF. Moving effort measured at a velocity of 25 mm/s on the Control Console Handle. 1Tube UP – Moving Down 2Tube DOWN – Moving UP	
VERTICAL BRAKE	Vertical Lock ON. Holding force to be measured on the Console Handle. SID of 100 mm.	Minimum 15 kg required to move vertically the OTC with lock ON.
IMPACT SECURITY STOP	Vertical Lock OFF. Moving effort measured at a velocity of 25 mm/s on the Control Console Wheel. 1Get any box or obstacle on the Tabletop 2Tube over the Table – moving Down 3Pass through the obstacle	Impact Security Stop activates correctly. The OTC must lift automatically once it finds the obstacle.

Table 8-1 (cont.)
Functional Checking Procedure List

FUNCTION	CONDITIONS	PERFORMANCE
TUBE ANGULAR MOVEMENT (Alpha Axis)	Tube Angulation lock OFF. The Tube & Collimator Assembly shall rotate freely when grasped at Control Console Handle. Detents shall position the X-ray beam at 0º and at ±90º or at the previously configured degrees. When the Brake is released there will not be any detecting action at any angled position of the Tube.	±1º
TUBE ANGULATION LOCK	Tube Angulation lock ON. The tube & collimator assembly will be held at any desired rotational angle.	
TUBE ROTATION MOTION	The rotational detent will position the tube about the vertical centerline of the telescopic column at 0º, ±90º and ±180º.	
COMPATIBILITY WITH RAD TABLES	Check that the value displayed by the SID display is the same as the one manually measured.	
COMPATIBILITY WITH WALL STANDS	Check that the value displayed by the SID display is the same as the one manually measured.	
* These are delivered as options, check just in case that you are provided of them.		

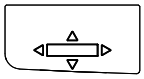
8.2 RAD TABLE FUNCTIONAL CHECKS AND ADJUSTMENTS

8.2.1 TABLETOP MOVEMENTS CHECKS

The Tabletop can be moved horizontally (longitudinal and transversal movements) and vertically (raised and lowered), depending on the control pedal that is pressed.

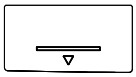
HORIZONTAL MOVEMENTS OF THE TABLETOP

1. With the Table switched off, verify that the Tabletop moves freely, longitudinally as well as transversally.
2. Power the Table on and verify that the Tabletop is locked in its position.



3. Press either of the outer control pedals and check that the Tabletop movements are smooth.
4. Release the control pedal; the Tabletop will be automatically locked in that position.

VERTICAL MOVEMENTS OF THE TABLETOP



LOWERING RAISING

1. Press the raising/lowering control pedal. Check that the Tabletop raises/lowers and stops when it reaches the maximum, intermediate and minimum height or when the pedal is released.
2. If the height limit has not been reached, keep on raising/lowering the Tabletop until the height is reached.
3. Verify that all the movements and stops are smooth and that the stops and the starts are not sharp.

THE TABLE INCLUDES A SAFETY SYSTEM WHICH STOPS THE VERTICAL MOVEMENT OF THE TABLETOP WHEN AN OBSTACLE IS FOUND.

8.2.2 RECEPTOR MOVEMENT CHECKS

1. With the Table switched off, verify that the Receptor moves freely.
2. Power the Table on and verify that the Receptor is locked in its position.
3. Press the Receptor control switch placed at the Receptor handle and move it longitudinally.
4. Release the control switch, Receptor will be locked in that position.
5. Check that the Receptor movements and stops are smooth.

8.2.3 PERFORMANCE CHECKS

8.2.3.1 TRAVEL CHECKS

Verify that the travel of the Receptor is the correct one. Depending on the Receptor Assembly, its total travel changes. Verify that the Tabletop travel is:

LONGITUDINAL TRAVEL			TRANSVERSAL TRAVEL			VERTICAL TRAVEL		
HEAD-END	FOOT-END	TOTAL	FRONT	BACK	TOTAL	MAXIMUM	MINIMUM	TOTAL
600 mm	600 mm	1200 mm	150 mm	150 mm	300 mm	900 mm	500 mm	400 mm
23.6”	23.6”	47.2”	5.9”	5.9”	11.8”	35.4”	19.7”	15.7”

8.2.3.2 TABLETOP AND RECEPTOR LOCKS CHECKS

1. Power the table on.
2. Try to move the Tabletop transversely and longitudinally applying some force to check that the brakes are correctly adjusted. If the brake does not put up enough resistance, the lock must be adjusted.
3. Repeat the same check with the longitudinal movement of the Receptor. If the brake does not put up enough resistance, the lock must be adjusted.

8.2.3.3 FREE MOVEMENT CHECKS

1. With the Table switched off, the locks are released.
2. Move the Tabletop backwards and forwards. The motion must be smooth and unhindered. If the motion is not satisfactory, the lock must be adjusted.
3. Move the Receptor longitudinally. The movement must be smooth and unhindered. If the motion is not satisfactory, the lock must be adjusted.

8.3 RAD WALL STAND FUNCTIONAL CHECKS AND ADJUSTMENTS

8.3.1 COUNTERWEIGHT AND RECEPTOR COUNTERBALANCE CHECK

Even though the Receptor carriage is factory balanced for fixed Detectors, this procedure must be carried out during the installation procedure.

For Portable Detectors, the Receptor carriage is balanced with an excess of weight equal to half the weight of the Detector. It is needed to remove this excess so the carriage is properly balanced when the detector is inserted.

In the case of previously installed equipment and due to maintenance task, it is mandatory to remove the column front covers *(refer to Section 8.5).*

Be careful with the covers handling to avoid scratches.

Check that all elements of the equipment installed on the Column Carriage and Receptor Cabinet are installed:

1. Install the Overhead Arm Support when available.
2. In the case of removable Grids install them too.
3. In the case of portable Receptors proceed to complete this procedure with the Detector or Cassette installed in the Cabinet.

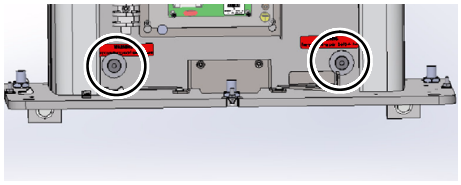
IT IS STRONGLY RECOMMENDED TO PROCEED TO THE COUNTERBALANCE CHECK WITH THE COMPLETE WEIGHT OF ALL THE ELEMENTS WHICH ARE INSTALLED ON THE RECEPTOR CABINET AND/OR THE COLUMN CARRIAGE.

Note ☞

Remember that when removing or adding any element of the Cabinet as Overhead Arm Support, Detector or Cassette, the weight of the whole assembly will be reduced or increased and it may cause the movement of the Column Carriage and Receptor.

4. Remove the counterbalance screws at the lower part of the column.

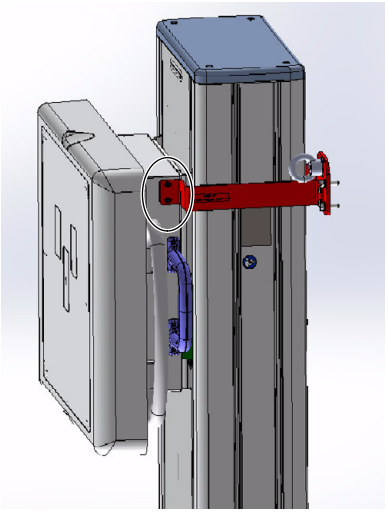
Illustration 8-1
Counterbalance screws



5. Remove the bracket from the back of the column (3 screws) and from the Receptor carriage (2 screws). Hold firmly the Vertical Brake Handle in order to avoid any unexpected movement.

6. Once the bracket is removed, the vertical movement is free. Reinstall the two screws of the Receptor carriage without the bracket.

Illustration 8-2
Bracket fixations



PROCEED CAREFULLY, INJURIES MAY BE CAUSED TO THE SERVICE ENGINEER DUE TO THE RECEPTOR UNEXPECTED MOVEMENT IN CASE THE EQUIPMENT IS NOT PROPERLY COUNTERBALANCED.

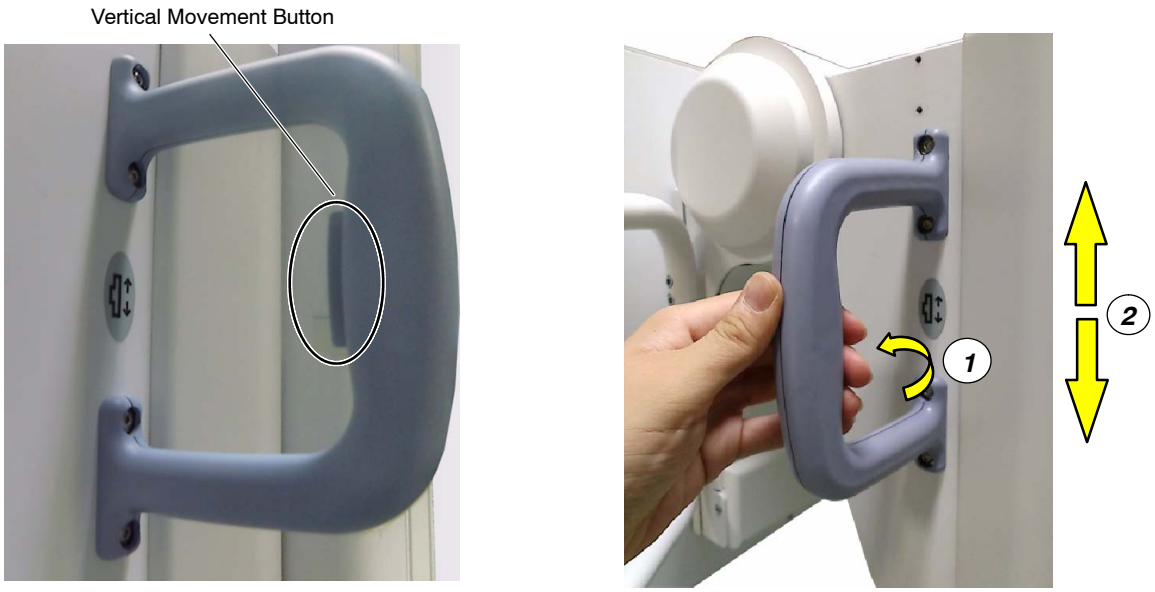
7. In the case of portable Receptors, move the Receptor assembly to a position where the counterweights can be easily accessible and remove as much as half the weight of the Detector *(refer to the Field Replacement document).*

8. Check if the counterweight and Receptor carriage are well balanced. **With the system ON,** press the Vertical Movement Button to release the electromechanical brake and check that:

   a. The Receptor does not make any unexpected movement

   b. the Receptor carriage can be moved easily in the vertical direction.

Illustration 8-3
Vertical Movement Handle



Note ☞ *Remember that the Electromechanical Brakes, although they are negative, must lock the equipment when it is OFF.*

If the counterweight and the Receptor Carriage are not well balanced, it may be necessary to add or remove more counterweights (*refer to the Field Replacement document*).

CAUTION

If Receptor vertical displacement suddenly gets more difficult and goes harder, please stop operating and get in contact with technical service.

8.4 FINAL INSTALLATION TASKS & COVERS INSTALLATION

8.4.1 FINAL STEPS OF THE INSTALLATION

Once all functional checkings have been completed, proceed with the final steps of the Installation:

1. Check all Rails Fixations to the Ceiling and of the Transversal Rails to the Longitudinal Rails.
2. Once the RAD Wall Stand has been properly aligned and leveled it is possible to fix definitely the Column of the RAD Wall Stand to the floor.
3. Once the RAD Table has been properly aligned and leveled it is possible to fix Definitely the Base of the RAD Table to the Floor.
4. Install all covers, refer to *Section 8.4.2*.
5. Proceed to remove all shipping material, installation tools, spare components and elements that already remain in the room.
6. Proceed to clean all the room and devices in accordance to the procedures described in the Maintenance section of the documentation of the X-ray System.

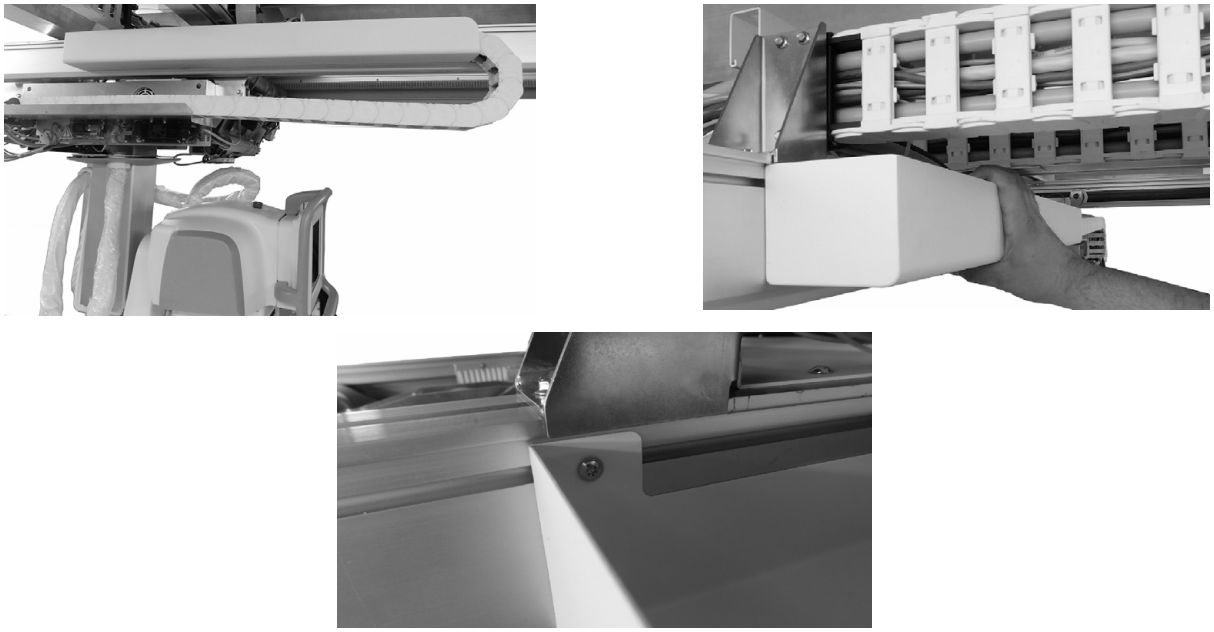
8.4.2 OVERHEAD TUBE CRANE COVERS

1. Instal the Transversal Trays covers. Tighten all the screws that fix both covers to the trays.

Illustration 8-4
Fix the bottom covers of the Transversal Trays

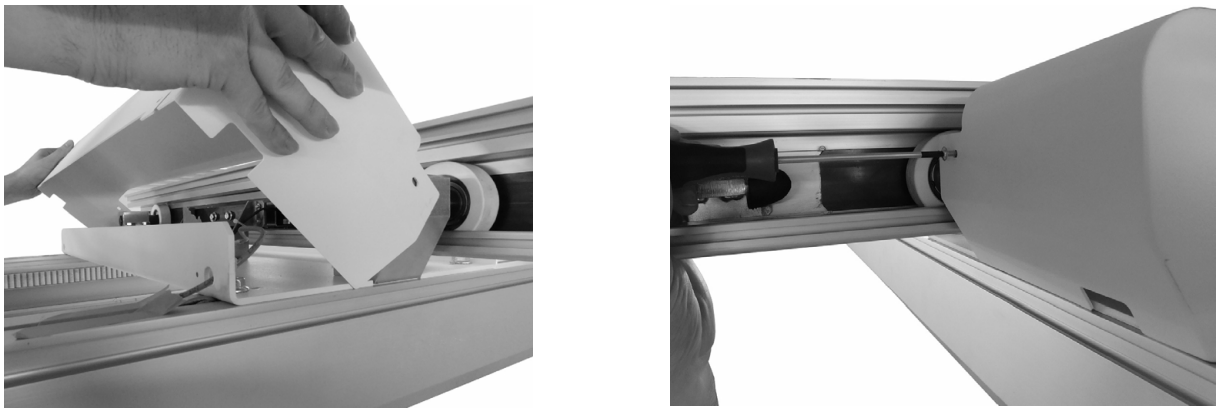
2. Install the Cover for the Transversal Hose: Adjust the position of the Transversal Hose Cover. Move the OTC as back as possible and mount the Cover in the Lateral Sliding Track. Check that the Cover does not block the movement of the Hose and fix definitely the Cover to the Rail.

Illustration 8-5
Installation of the Hose Covers



3. Install both Transversal Trays Covers. Adjust the cover to the Wheels Assembly and mount them. Then tighten all the screws of the Tray covers.

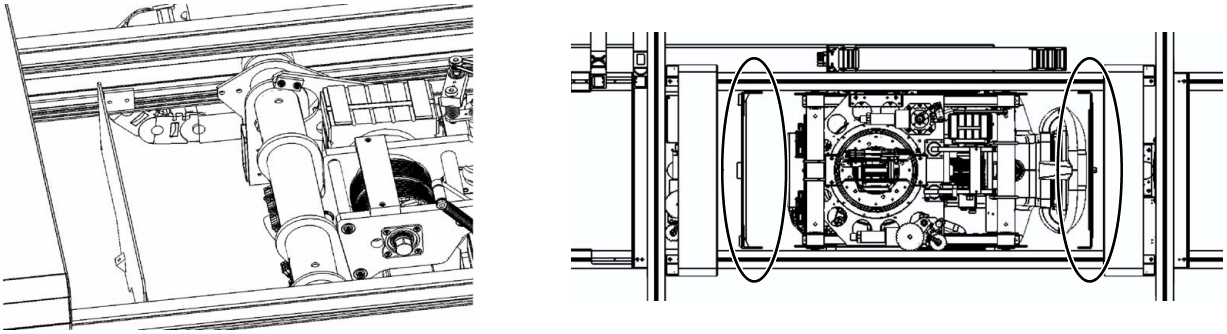
Illustration 8-6
Installation of the top covers of the Transversal Trays



4. Install the Carriage Covers.

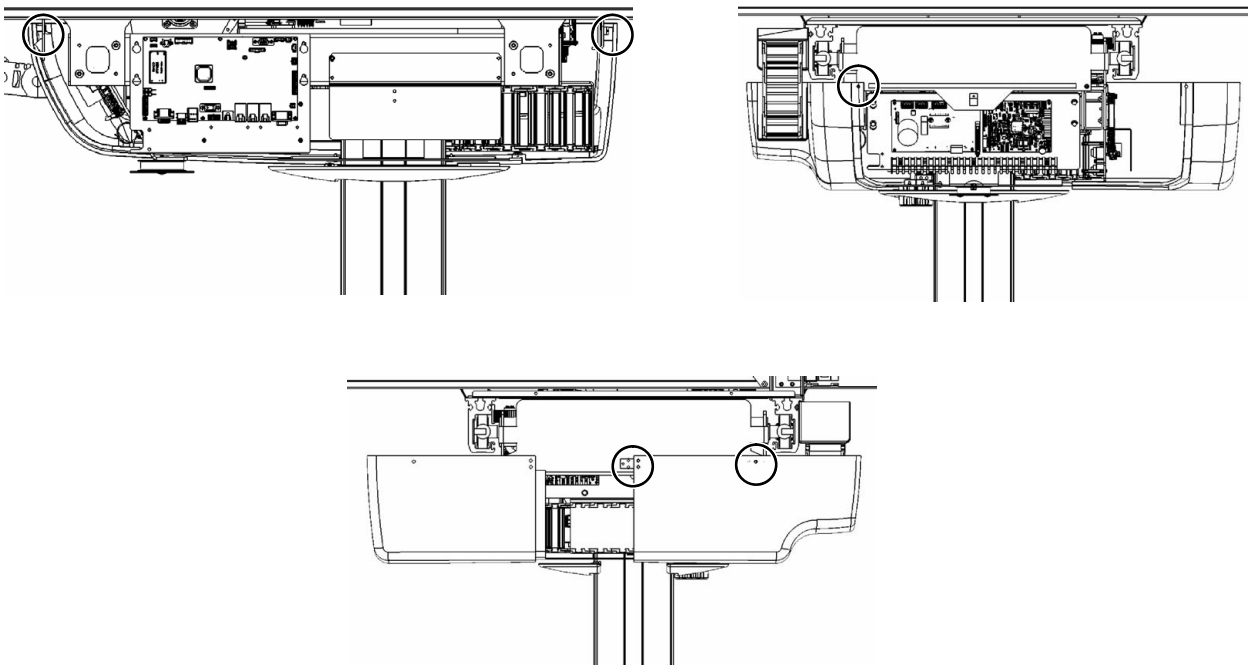
   a. For the fixation of the Covers to the front and the back of the Carriage, install both Adaptation Plates at the front and back of the Carriage.

Illustration 8-7
Adaptation Plates for Carriage Covers Installation



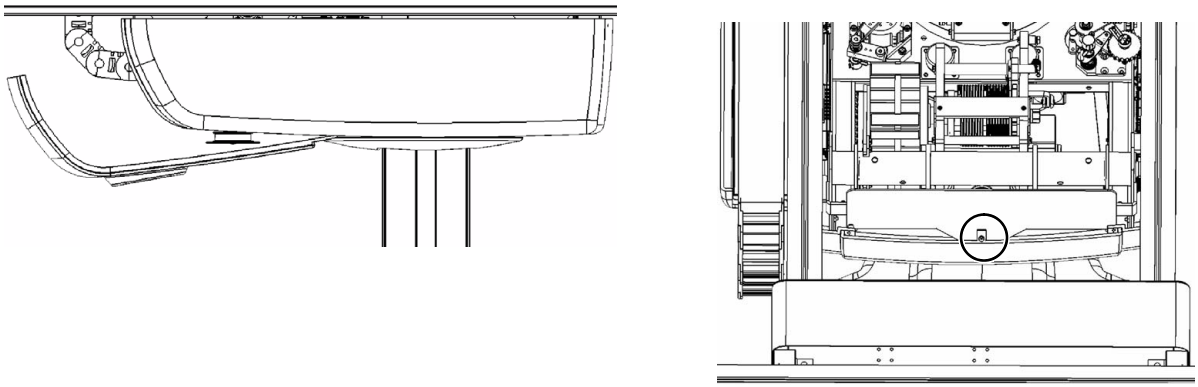
   b. Tighten both Lateral Covers to the front and back Adaptation Plates.

Illustration 8-8
Carriage Covers Fixation



5. Fit the front Cover to the Column and to both lateral Covers and tighten it to the front Adaptation Plate.

Illustration 8-9
Front Cover Fixation



8.5 RAD WALL STAND COVERS INSTALLATION

All the covers are shipped factory installed, but the front and base covers have to be removed during the installation of the equipment. Fix them now again to the column. *(Refer to Section 3.2.)*

8.6 RAD TABLE COVERS INSTALLATION

MAKE SURE THAT COVERS ARE PLACED IN THEIR CORRECT POSITION DURING INSTALLATION, AS THEY ARE NOT INTERCHANGEABLE.

Install definitively the telescopic covers. They are shipped already mounted but it is necessary to have them disassembled to complete the Table installation and adjustment.

Proceed in reverse order of the disassembly procedure indicated in *Section 4.2.1 Table Base Covers Disassembly*.

CONNECT ALL GROUND CABLES CORRECTLY. CHECK THE GENERAL WIRING SCHEMATIC.

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