

Technical Publication

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Field Replacement

X-ray System

REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	OCT 03, 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 HEHEDED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.



ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEHEDED 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.

TABLE OF CONTENTS

Section		Page
1	OVERHEAD TUBE CRANE PROCEDURES	1
	Job Card 1.1: Removal of the Tray Top Cover	5
	Job Card 1.2: Removal of the Tray Bottom Cover	7
	Job Card 1.3: Removal of the Carriage Covers	8
	Job Card 1.4: Removal of the Circular Cover	10
	Job Card 1.5: Removal of the Tube-collimator Assembly Covers	11
	Job Card 2.1: Replacement of the Collimator	12
	Job Card 2.2: Replacement of the X-ray Tube	17
	Job Card 3.1: Replacement of the Displacement Stop	24
	Job Card 3.2: Replacement of the Brake Side Roller Assembly	26
	Job Card 3.3: Replacement of the Longitudinal Brake	29
	Job Card 3.4: Replacement of the Motor Side Roller Assembly	32
	Job Card 3.5: Replacement of the Longitudinal Motor	34
	Job Card 3.6: Replacement of the Longitudinal Hybrid Assembly	38
	Job Card 3.7: Replacement of the Longitudinal Potentiometer	41
	Job Card 3.8: Replacement of the Longitudinal Potentiometer's Belt	43
	Job Card 3.9: Replacement of the Transversal Potentiometer's Belt	45
	Job Card 3.10: Replacement of the Vertical Servo UMC 24V	47
	Job Card 3.11: Replacement of the Vertical Universal Motor Controller	49
	Job Card 3.12: Replacement of the Transversal Servo UMC 24V	51
	Job Card 3.13: Replacement of the Transversal Universal Motor Controller	53
	Job Card 3.14: Replacement of the Longitudinal Servo UMC 24V	56
	Job Card 3.15: Replacement of the Longitudinal Universal Motor Controller	58
	Job Card 3.16: Replacement of the Room Master Board	60

Section	Page
Job Card 4.1: Replacement of the Alpha Servo UMC 24V	62
Job Card 4.2: Replacement of the Alpha Universal Motor Controller	64
Job Card 4.3: Replacement of the Beta Servo UMC 24V	66
Job Card 4.4: Replacement of the Beta Universal Motor Controller	68
2 GENERATOR PROCEDURES	71
Job Card 1.1: Replacement of the Inverter Module	74
Job Card 1.2: Replacement of the Input Rectifier	82
Job Card 1.3: Replacement of the Rectifiers	85
Job Card 1.4: Replacement of the Main Storage Capacitors of the High Voltage Inverter	88
Job Card 1.5: Replacement of the Charge/Discharge Board	91
Job Card 1.6: Replacement of the IPM Driver Board	94
Job Card 1.7: Replacement of the IGBT	97
Job Card 2.1: Replacement of the High Voltage Tank	104
Job Card 3.1: Replacement of the Control Board	107
Job Card 3.2: Replacement of the Interface Board	111
Job Card 4.1: Replacement of the Dual Speed Starter	112
Job Card 4.2: Replacement of the Booster Module	115
Job Card 4.3: Replacement of the Booster IGBT	118
Job Card 4.4: Replacement of the Supply Board	121
Job Card 4.5: Replacement of the Power Supply	122
3 RAD TABLE PROCEDURES	125
Job Card 1.1: Motor Replacement	127
Job Card 1.2: Double Pedals Set Installation (Option)	131
Job Card 1.3: Control Pedals Kit Replacement	135
Job Card 1.4: Input Module Replacement	138
Job Card 1.5: AC Power Supply Cable Replacement	141

Section	Page
Job Card 2.1: Additional Emergency OFF Switch (Option)	143
Job Card 2.2: Vertical Height Potentiometer Replacement	148
4 RAD WALL STAND PROCEDURES	151
Job Card 1.1: Adding or Removing Counterweights	153

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SECTION 1 OVERHEAD TUBE CRANE PROCEDURES

This chapter covers the service procedures which provide information for making adjustments to the Overhead Tube Crane (OTC) after installation on field. It also provides service and repair instructions so that the equipment functions properly and meets the functional check specifications.

If the Overhead Tube Crane fails to meet any of these Functional checks, refer to its specific chapter. Then, the reference to this Section should be followed and the service adjustment made to correct the “out of specification” condition.

It is mandatory to follow the security procedures before any mechanical or electrical intervention:

- **Electrical Safety Procedures:** Isolate all the electrical sources.
- **Mechanical Safety Procedures.** It is mandatory when required in the job cards.



ALWAYS PROCEED TO ACCOMPLISH THESE PROCEDURES WITH THE OTC SWITCHED OFF. IF IT IS REQUIRED TO TURN IT ON, USE ALWAYS SAFE ELECTRICAL PRACTICES TO SAFEGUARD FROM THE UNEXPECTED ENERGIZATION OR START UP OF THE EQUIPMENT, OR THE RELEASE OF HAZARDOUS ENERGY DURING SERVICE OR MAINTENANCE ACTIVITIES.



PERSONAL PROTECTION EQUIPMENT IS A REQUIREMENT WHEN PROCEEDING TO ACCOMPLISH ALL THESE PROCEDURES.



After accomplishing any of these procedures, proceed to check the Overhead Tube Crane correct operation. For further information refer to the Functional Checks Section of the Installation document.

X-ray System

Field Replacement

Note 

Most of these Service Maintenance procedures can be carried out without lowering the Overhead Tube Crane, except in those cases where the opposite is indicated.

Note 

It is highly recommended to work with the Overhead Tube Crane located in the center of both longitudinal and transverse axes, without rotation and angulation, except in those cases where the opposite is indicated.

Some of the procedures described in this section require the replacement of one or more of the boards of the OTC. When this is the case, check that the position of the switches in the new board are according to the table below:

Note 

For Vertical, Transversal, Longitudinal, Alpha and Beta movements, check DIP switch SW2 in the corresponding A3624-XX board (there is one board to control each movement).

If the A3665-XX GPIO board is replaced, check DIP switch SW3.

Table 1-1
OTC switches position

BOARD FUNCTION	SWITCH POSITION							
	1	2	3	4	5	6	7	8
Vertical	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Transversal	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
Longitudinal	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
Alpha (Angulation)	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Beta (Rotation)	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
GPIO	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF

The Job Cards of this Section are intended to be guides to the most common problems that arise, but not all of them, and to give the instructions for replacing the spare parts included in *the Renewal Parts document, RP-1235RX*. Refer to *Job Card 1.1 to Job Card 1.5* for Covers removal information.

JOB CARD LIST	
JOB CARD	DESCRIPTION
COVERS	
Job Card 1.1	Tray Top Cover
Job Card 1.2	Tray Bottom Cover
Job Card 1.3	Carriage Covers
Job Card 1.4	Circular Cover
Job Card 1.5	Tube-Collimator Assembly Covers
TUBE-COLLIMATOR ASSEMBLY	
Job Card 2.1	Collimator
Job Card 2.2	X-ray Tube
RAIL SYSTEM & LONGITUDINAL/TRANSVERSE MOVEMENT	
Job Card 3.1	Displacement Stop
Job Card 3.2	Brake Side Roller Assembly
Job Card 3.3	Longitudinal Brake
Job Card 3.4	Motor Side Roller Assembly
Job Card 3.5	Longitudinal Motor
Job Card 3.6	Longitudinal Hybrid Assembly
Job Card 3.7	Longitudinal Potentiometer
Job Card 3.8	Longitudinal Potentiometer's Belt
Job Card 3.9	Transversal Potentiometer's Belt
Job Card 3.10	Vertical Servo UMC 24V
Job Card 3.11	Vertical Universal Motor Controller
Job Card 3.12	Transversal Servo UMC 24V
Job Card 3.13	Transversal Universal Motor Controller
Job Card 3.14	Longitudinal Servo UMC 24V

X-ray System

Field Replacement

JOB CARD LIST	
RAIL SYSTEM & LONGITUDINAL/TRANSVERSE MOVEMENT	
Job Card 3.15	Longitudinal Universal Motor Controller
Job Card 3.16	Room Master Board
ALPHA/BETA MOVEMENT	
Job Card 4.1	Alpha Servo UMC 24V
Job Card 4.2	Alpha Universal Motor Controller
Job Card 4.3	Beta Servo UMC 24V
Job Card 4.4	Beta Universal Motor Controller

JOB CARD 1.1: REMOVAL OF THE TRAY TOP COVER

SUBASSEMBLY: TRAY TOP COVERS ON TRANSVERSE RAILS

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

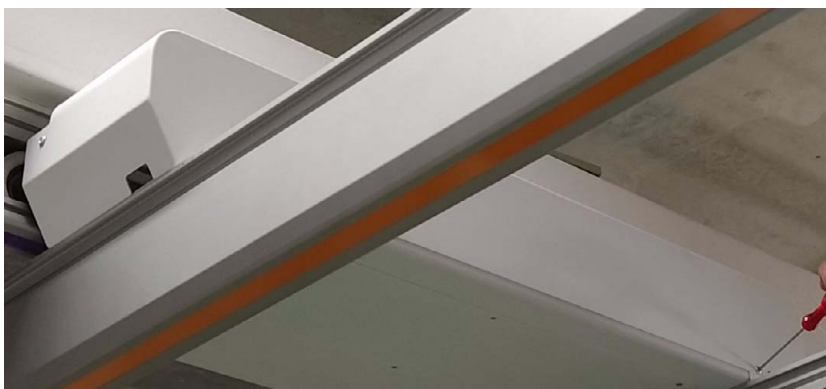
PROCEDURE




Note 

This procedure applies to both Top Covers of the Transverse Trays.

1. Unscrew the four screws of the Tray Top Cover (two on the front and one on each side).



2. Remove the Top Cover and install the new one by tightening the previously removed screws.

Note 

In the brake side, the Top Cover must be installed with caution to avoid pinching the Longitudinal brake cable.



JOB CARD 1.2: REMOVAL OF THE TRAY BOTTOM COVER

SUBASSEMBLY: TRAY BOTTOM COVERS ON TRANSVERSE RAILS

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

Note 

This procedure applies to both Bottom Covers of the Transverse Trays.

1. Unscrew the six screws of the Tray Bottom Cover.



2. Remove the Bottom Cover and install the new one by tightening the previously removed screws.

JOB CARD 1.3: REMOVAL OF THE CARRIAGE COVERS

SUBASSEMBLY: CARRIAGE COVERS

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

1. Unscrew the screw that fix the Front Cover to the front Adaptation Plate (*refer to the OTC Covers section of the Installation document*).
2. Unscrew the two screws that fix the Front Cover to the Lateral Covers.



3. Remove the Front Cover and put it aside.



4. Unscrew the screws that fix the Left Cover to the front and back Adaptation Plates.
5. Remove the Left Cover from the Cover Fixing Plate that fix it to the Right Cover and put it aside.



6. Unscrew the screws that fix the Right Cover to the front and back Adaptation Plates.



7. Remove the Right Cover and install the new Carriage Covers (*refer to the OTC Covers section of the Installation document*).

JOB CARD 1.4: REMOVAL OF THE CIRCULAR COVER

SUBASSEMBLY: **CIRCULAR COVER**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Unscrew the screws that fix the Circular Cover to the upper base of the column.



4. Remove the Circular Cover and replace it with the new one (*refer to the OTC Covers section of the Installation document*).

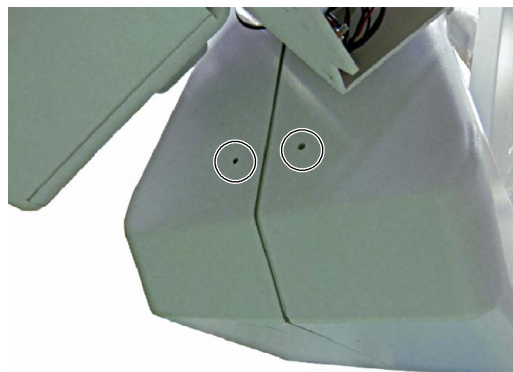
JOB CARD 1.5: REMOVAL OF THE TUBE-COLLIMATOR ASSEMBLY COVERS

SUBASSEMBLY: TUBE-COLLIMATOR ASSEMBLY COVERS

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

1. Place the Tube-Collimator Assembly at a comfortable position.
2. Turn off the OTC and isolate it from mains.
3. Use a Torx T20 wrench to remove the Tube-Collimator assembly covers by unscrewing the 5 screws that fix it to the OTC.
 - a. One on the upper side.
 - b. Two on the back of the assembly.
 - c. Two on the front. Rotate the Tube-Collimator assembly to easily access these two screws.



Do not hold the Control Console Wheel when rotating the Tube-Collimator assembly with the equipment disconnected from mains. Always rotate it holding the X-ray Tube with both hands.

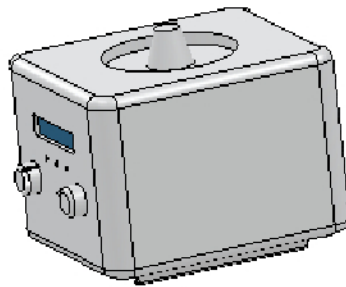
4. Put the new covers of the Tube-Collimator assembly in place and screw it using the five previously removed screws.

JOB CARD 2.1: REPLACEMENT OF THE COLLIMATOR

SUBASSEMBLY: **COLLIMATOR**

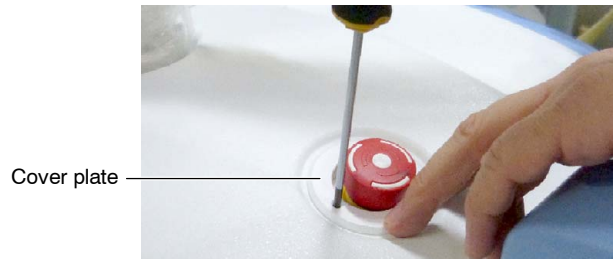
TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE



PLACE THE TUBE-COLLIMATOR ASSEMBLY AT A COMFORTABLE POSITION AND TURN OFF THE SWITCH LOCATED AT THE ROOM ELECTRICAL CABINET TO ISOLATE THE EQUIPMENT FROM MAINS.

5. Unscrew the Cover plate of the Emergency Off Switch and put it aside.



6. Remove the X-ray Tube cover by unscrewing the 4 screws that fix it to the bottom cover and 2 more screws on the back. Lift the cover carefully and put it aside.



7. Rotate the Tube-Collimator assembly 180 degrees to easily access the Collimator back cover.

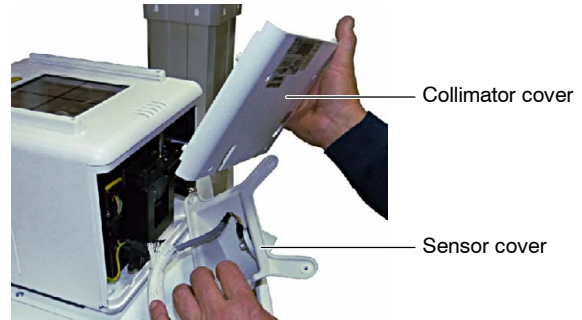


Do not hold the Control Console Wheel when rotating the Tube-Collimator assembly with the equipment disconnected from mains. Always rotate it holding the X-ray Tube with both hands.

X-ray System

Field Replacement

8. Remove the Focus-Skin Distance Sensor cover (if installed) and the back cover of the Collimator (4 screws) and put it aside.

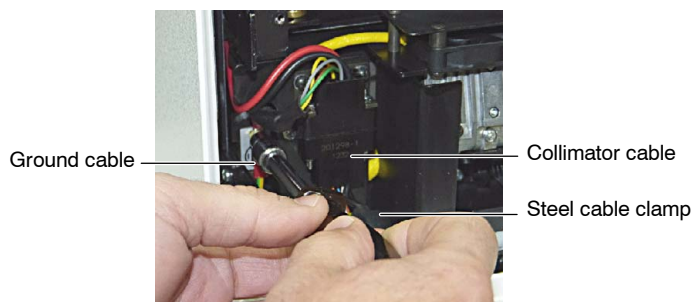


9. Disconnect the sensor cable from the sensor connector (if installed) and put the cover aside.



10. Disconnect the Collimator and ground cables.

11. Loosen the steel cable clamp that holds both cables to move them away from the Collimator.



12. Fully loosen the Collimator screws and carefully remove the Collimator.

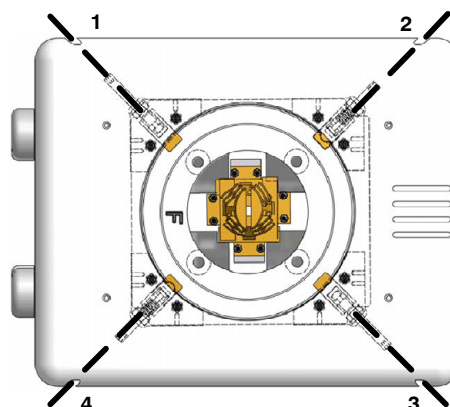


13. Unbox the new Collimator.
14. Remove the back cover of the Collimator.
15. Remove both red label screws that retain the Collimator windows.

Note 

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

16. Install the Collimator as indicated in the Collimator Installation manual. Screw the four Allen screws as follows:
 - Position 1 & 3 = 6 ¹/₂ turns
 - Position 2 & 4 = 5 ¹/₂ turns



17. Connect the Collimator and ground cables.
18. Screw the steel cable clamp to hold both cables to the Collimator.

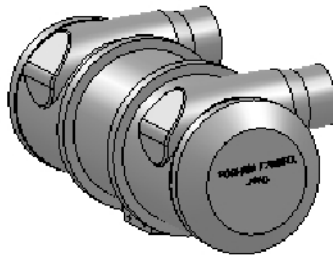
19. Connect the cable of the Focus-Skin Distance Sensor (if installed) to the connector of the sensor cover.
20. Install the back cover of the Collimator and the Focus-Skin Distance Sensor cover (if installed) with the previously removed screws.
21. To check whether it is properly fixed, try pulling and shaking it and, in case of rotating collimator, verify that it can rotate without any problem too.
22. With the X-ray Tube at 0° position, check that the collimator is properly leveled.
23. Perform the procedures explained in the *System Alignment and Adjustment* and in the *Functional Checks & Definitive Installation* Sections of the Installation document of the Service manual.
24. Reinstall the X-ray Tube cover and the Cover plate of the Emergency Off Switch.

JOB CARD 2.2: REPLACEMENT OF THE X-RAY TUBE

SUBASSEMBLY: X-RAY TUBE

TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE

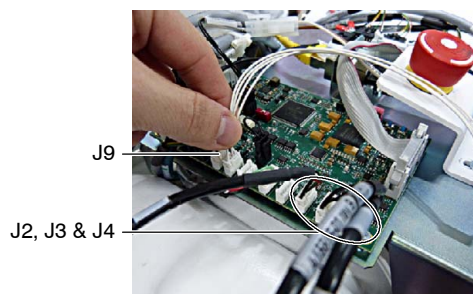


1. Follow the procedure described in steps 5. to 12. of *Job Card 2.1, Replacement of the Collimator*, to remove the Collimator.
2. Rotate the Tube-Collimator assembly 180 degrees to its original position.



Do not hold the Control Console Wheel when rotating the Tube-Collimator assembly with the equipment disconnected from mains. Always rotate it holding the X-ray Tube with both hands.

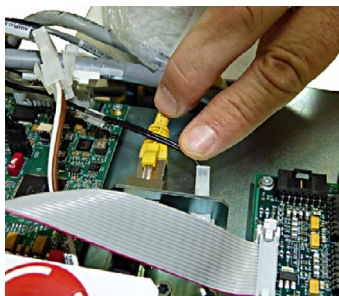
3. Disconnect J2, J3, J4 (servos) and J9 (flywheel) from the A3665-XX board.



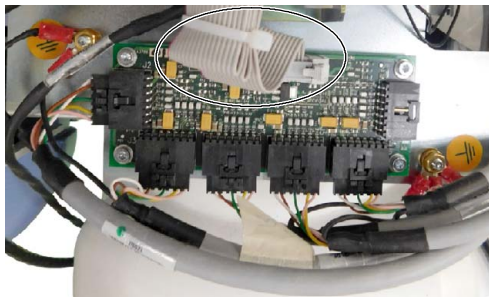
4. Disconnect the J5 moxex connector (collimator supply) behind the X-ray Tube.



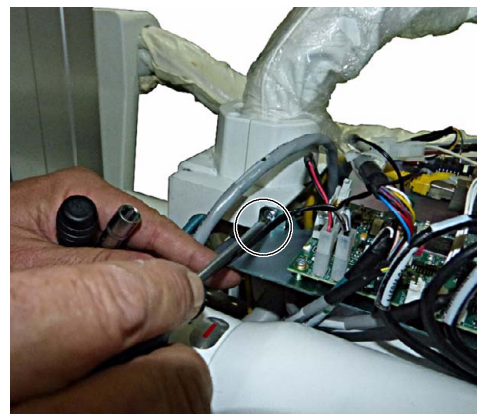
5. Disconnect the ethernet and PC supply cables.



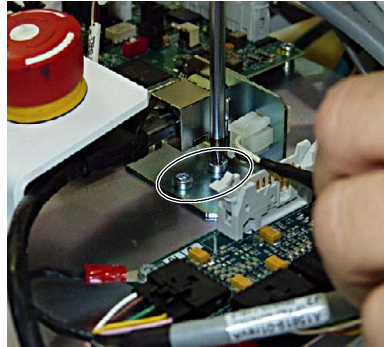
6. Disconnect the ribbon cable from the A3708-XX board.



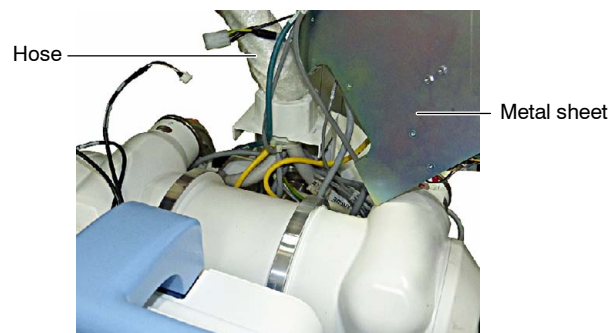
7. Unscrew the screws from the top metal sheet (2 on each side and 2 on the back).



8. Unscrew the metal plate with the ethernet and PC supply connectors from the top metal sheet (2 screws).



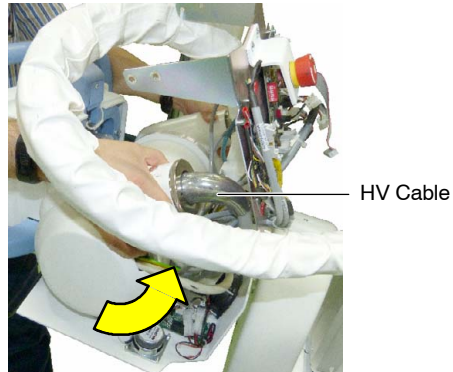
9. Lift the metal sheet and hold it to the hose with a tie-wrap to keep it lifted.



10. Remove the Adaptation Ring and the two spacers by unscrewing the 4 screws that fix the Ring and the Tube.



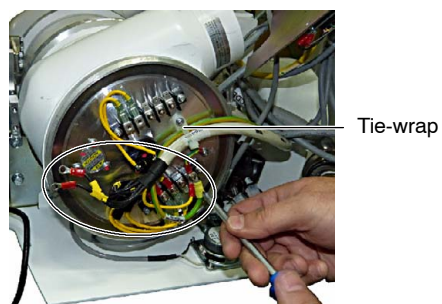
11. Slightly rotate the X-ray Tube to easily access the High Voltage cables and disconnect them.



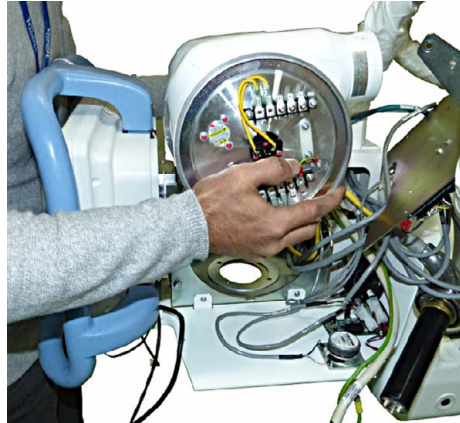
12. Remove the 3 screws from the lateral plate of the Tube.



13. Unscrew the stator cables and the tie-wrap that fixes them and remove the Tube.



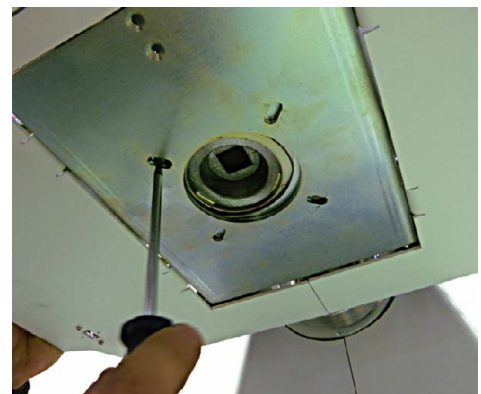
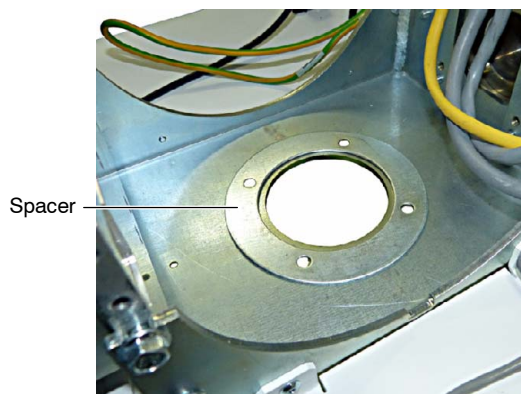
14. Remove the lateral plate of the new Tube and install it.



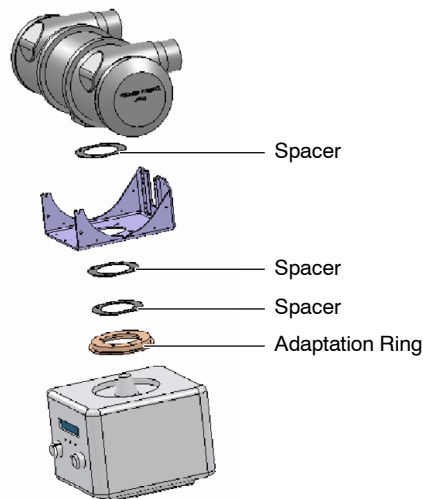
Note 

When installing the X-ray Tube, take care not to pinch any cable.

15. Install the High Voltage cables in the new Tube.
16. Adjust the spacer underneath the Tube using a screwdriver or something similar to make it match with the bores.

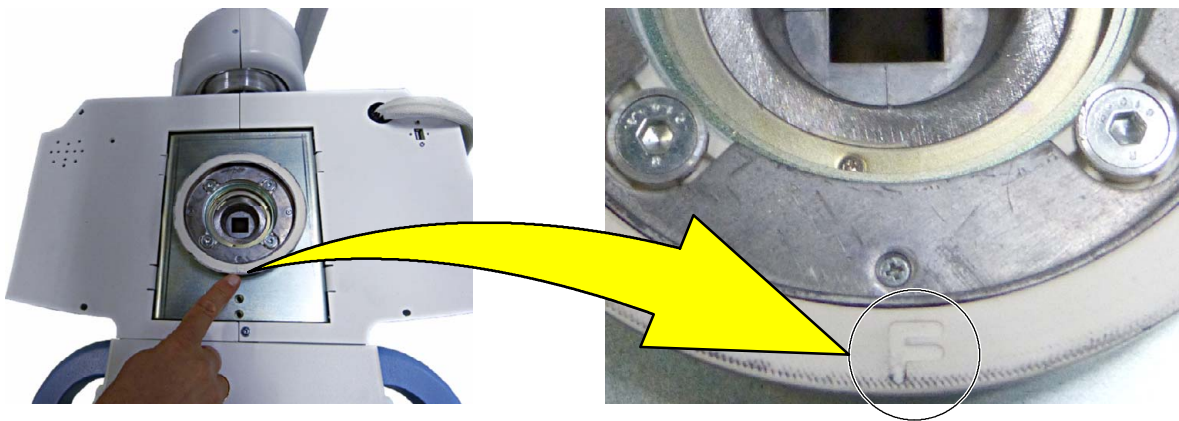


17. Reinstall the Adaptation Ring and the two spacers using the previously removed screws (4).



Note 

Make sure to install the Adaptation Ring with the “F” mark facing to the front.



18. Install the stator cables and the tie-wrap to hold them.
19. Install the lateral plate of the Tube.
20. Cut the tie-wrap that is holding the top metal sheet to the hose and screw it in place (2 screws on each side and 2 on the back).
21. Screw the metal plate with the ethernet and PC supply connectors on the top metal sheet (2 screws).

22. Reconnect all the previously removed cables and hold them using tie-wraps:
 - J2, J3, J4 (servos) and J9 (flywheel) of the A3665-XX board.
 - The J5 molex connector (collimator supply) behind the X-ray Tube.
 - The ethernet and PC supply cables on the metal plate screwed to the top metal sheet.
 - The ribbon cable of the A3708-XX board.
23. Rotate the Tube-Collimator assembly 180 degrees to proceed with the Collimator installation.



Do not hold the Control Console Wheel when rotating the Tube-Collimator assembly with the equipment disconnected from mains. Always rotate it holding the X-ray Tube with both hands.

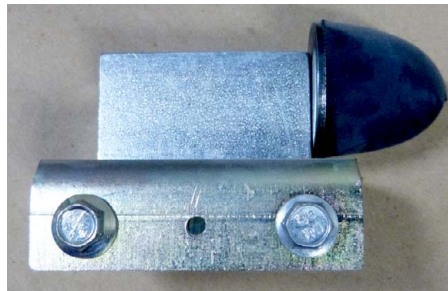
24. Proceed with steps 13. to 24. of Job Card 2.1, *Replacement of the Collimator.*

JOB CARD 3.1: REPLACEMENT OF THE DISPLACEMENT STOP

SUBASSEMBLY: **DISPLACEMENT STOPS ON LONGITUDINAL AND TRANSVERSE RAILS**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

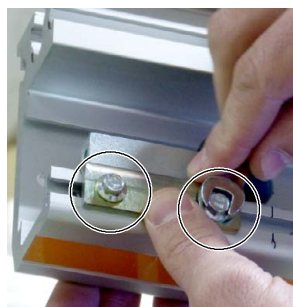
PROCEDURE



Note 

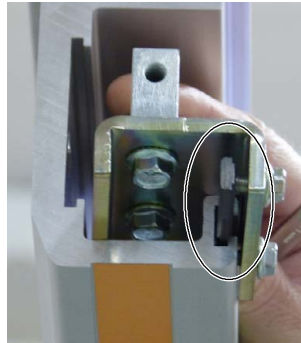
This procedure applies to all the Displacement Stops of the Overhead Tube Crane, 2 on each Longitudinal Rail and 2 more on each Transverse Rail.

1. Mark the position of the Displacement Stop in the Rail using a permanent marker.
2. Loosen the Displacement Stop screws using an Hex Key (M8).



3. Remove the Displacement Stop by sliding it out from the Rail.

4. Loosen the screws of the new Displacement Stop and install it in the Rail making sure that the T-slot nut of the Displacement Stop slides into the T-slot track of the Rail.



5. Place the Displacement Stop in the same position as the previously removed one and screw it tightly.
6. Move the OTC to check that it is stopped by both Displacement Stops (one on each rail) at the same time.





JOB CARD 3.2: REPLACEMENT OF THE BRAKE SIDE ROLLER ASSEMBLY

SUBASSEMBLY: BRAKE SIDE ROLLER ASSEMBLIES

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

Note  *This procedure applies to both Brake Side Roller Assemblies, 1 on each side of the front Transverse Tray.*

Note  *In case of both Brake Side Roller Assemblies need to be replaced, the procedure must be done separately (one at a time).*

1. Move the OTC to the back of the Transverse axis (Y).



2. Turn off the OTC and isolate it from mains.
3. Remove the front Tray Top cover (*refer to Job Card 1.1, Removal of the Tray Top Cover*).
4. Use a 17 mm hex wrench to unscrew the two screws that fix the Brake Side Roller Assembly to the front Transverse Tray.



5. Displace the Roller Assembly to the end of the longitudinal rail and remove the Displacement Stop (refer to Job Card 3.1, Replacement of the Displacement Stop).



6. Slide out the Roller Assembly from the rail.
7. Slide into the rail the new Brake Side Roller Assembly and put it back into place by tightening the previously removed screws.



Note 

It is necessary to push down the front Transverse Tray slightly until being able to insert the screws manually in their place.

8. Reinstall the Tray Top cover (*refer to Job Card 1.1, Removal of the Tray Top Cover*) and the Displacement Stop (*refer to Job Card 3.1, Replacement of the Displacement Stop*).
9. Turn on the OTC and verify that Longitudinal movement axis (X) works properly.

JOB CARD 3.3: REPLACEMENT OF THE LONGITUDINAL BRAKE

SUBASSEMBLY: LONGITUDINAL BRAKE

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE



1. Move the OTC to the back of the Transverse axis (Y).
2. Remove the front Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).
3. Disconnect the Longitudinal brake from the Longitudinal Motor cable connector.



4. Unscrew the four screws that fix the brake to the front Transverse Tray.



5. Remove the Longitudinal brake.

Note 

Some force has to be applied to remove the Longitudinal brake as it is a negative brake.

6. Adjust the position of the new Longitudinal Brake to the front Longitudinal Rails.

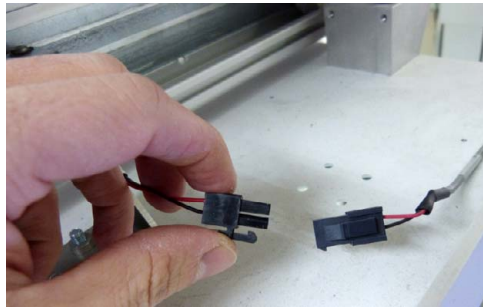
Note 

When approaching the plate, the Longitudinal brake offers a certain resistance. Therefore, some force has to be applied to put it in place.

7. Tighten the four fixing screws to fix the Longitudinal Brake to the front Transverse Tray.



8. Connect the Longitudinal brake cable to the Longitudinal Motor cable connector.




9. Check the brake operation by activating and deactivating the Longitudinal axis in the OTC Control Console and trying to move the OTC. The OTC must move when the Longitudinal axis is selected and the Capacitive wheel is held with the Hands, and must be braked when the wheel is released and when the Longitudinal axis is deselected in the Console.
10. Reinstall the front Transverse Tray cover (*refer to the OTC Covers section of the Installation document*).


JOB CARD 3.4: REPLACEMENT OF THE MOTOR SIDE ROLLER ASSEMBLY

SUBASSEMBLY: MOTOR SIDE ROLLER ASSEMBLIES

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

Note  This procedure applies to both Motor Side Roller Assemblies, 1 on each side of the back Transverse Tray.

Note  In case of both Motor Side Roller Assemblies need to be replaced, the procedure must be done separately (one at a time).

1. Move the OTC to the front of the Transverse axis (Y).
2. Turn off the OTC and isolate it from mains.
3. Remove the back Tray Top cover (refer to Job Card 1.1, Removal of the Tray Top Cover).
4. Use a 17 hex wrench to unscrew the two screws that fix the Motor Side Roller Assembly to the back Transverse Tray.



5. Displace the Roller Assembly to the end of the longitudinal rail and remove the Displacement Stop (*refer to Job Card 3.1, Replacement of the Displacement Stop*).
6. Slide out the Roller Assembly from the rail.
7. Slide into the rail the new Motor Side Roller Assembly and put it back into place by tightening the previously removed screws (*refer to Job Card 3.2, Replacement of the Brake Side Roller Assembly*).

Note 

It is necessary to push down the back Transverse Tray slightly until being able to insert the screws manually in their place.

8. Reinstall the back Tray Top cover (*refer to Job Card 1.1, Removal of the Tray Top Cover*) and the Displacement Stop (*refer to Job Card 3.1, Replacement of the Displacement Stop*).
9. Turn on the OTC and verify that Longitudinal movement axis (X) works properly.

JOB CARD 3.5: REPLACEMENT OF THE LONGITUDINAL MOTOR

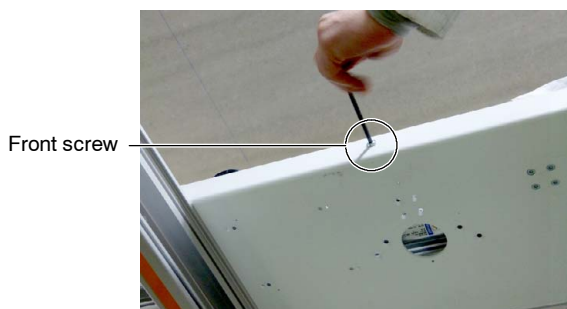
SUBASSEMBLY: **LONGITUDINAL MOTOR**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE



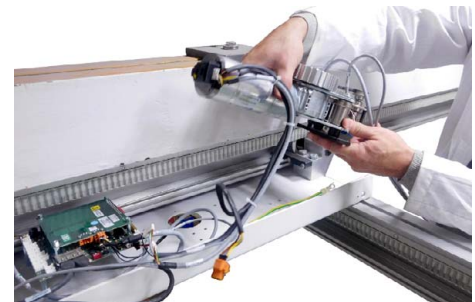
1. Move the OTC transversely up to a position that allows to access the back Transverse Tray easily.
2. Turn off the OTC and isolate it from mains.
3. Remove the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).
4. Unscrew the Tray's front screw, holding the inner nut with a wrench, and remove the Motor tensor in order to free the Motor assembly.



5. Disconnect the Potentiometer and Hybrid cables from the A3624-XX Servo Control board; and the Motor cables from the A3624-XX Servo Control board and A3625-XX Servo Power board. Use a screwdriver to unscrew the Motor cable from the Servo Power board.



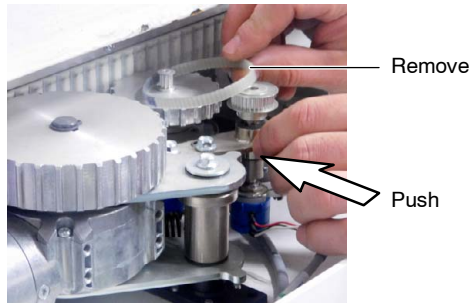
6. Unscrew the four Motor screws from the Tray and remove the Motor assembly.



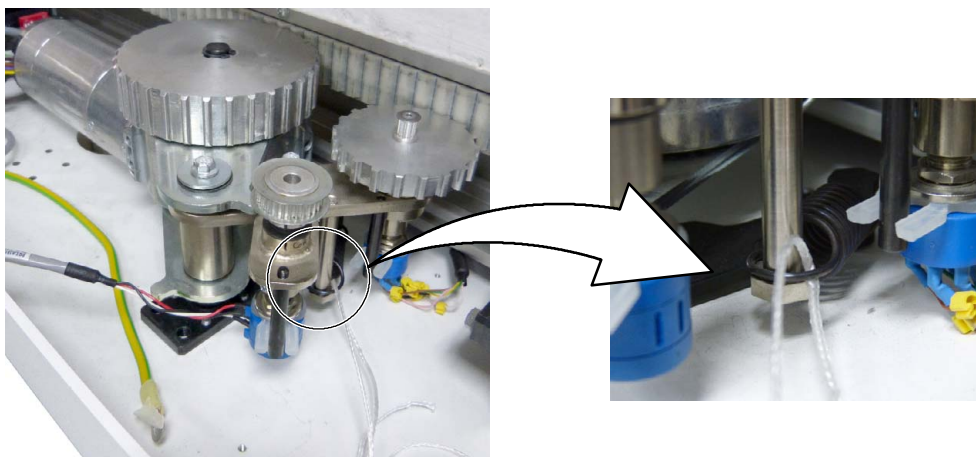
7. To install the new Motor assembly, it is necessary to allow the free movement of the Potentiometer and Hybrid so the Motor can be screwed to the Tray without forcing its components. To do so:
 - a. Loosen both screws of the Longitudinal Potentiometer to allow its movement.



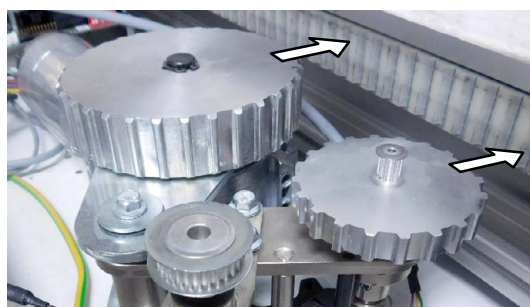
- b. Slightly push the Potentiometer to release the toothed belt. Remove it from the Potentiometer and Hybrid Assembly and put it aside.



- c. Tie a thread to the spring which joins the Motor base to the piece that holds the Hybrid in position and pull to release the spring from it.



- 8. Screw the Motor assembly to the Tray.
- 9. Move the OTC to the middle of its Longitudinal travel.
- 10. Engage the pulleys of the Motor and Hybrid with the notched belt.



11. Put the spring back in place using the thread tied to it, and untie and remove the thread.
12. Reinstall the Motor tensor previously removed in step 4.
13. Turn the Potentiometer halfway, install the previously removed toothed belt around the Potentiometer and Hybrid, and tighten the Potentiometer screws.
14. Connect the cables of the Potentiometer and Hybrid to J8 and J16 of the A3624-XX Servo Control board, respectively; and the Motor cables to J13 of the A3624-XX Servo Control board and to J3 of the A3625-XX Servo Power board. Use a screwdriver to screw the Motor cable to the Servo Power board.
15. Calibrate the Longitudinal axis (X) of the Overhead Tube Crane and the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
16. Check that the OTC manual and automatic movements are correct and that the longitudinal displacement covers the full Rail length.
17. Reinstall the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).

JOB CARD 3.6:	REPLACEMENT OF THE LONGITUDINAL HYBRID ASSEMBLY
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SUBASSEMBLY: HYBRID ON THE LONGITUDINAL MOTOR ASSEMBLY

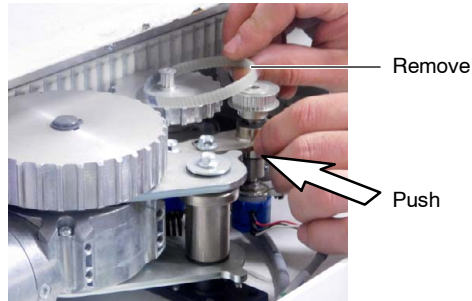
TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

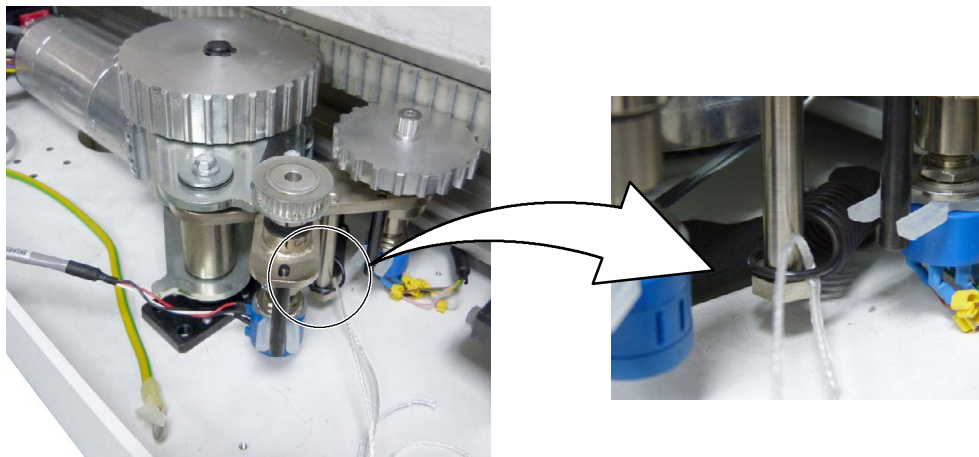
1. Move the OTC transversely up to a position that allows to access the back Transverse Tray easily.
2. Turn off the OTC and isolate it from mains.
3. Remove the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).
4. Disconnect the Hybrid cable from J16 of the A3624-XX Servo Control board.
5. Loosen both screws of the Longitudinal Potentiometer to allow its movement.



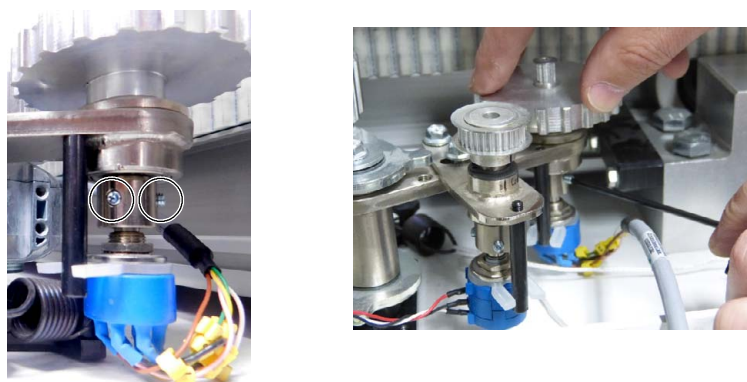
6. Slightly push the Potentiometer to release the toothed belt and remove it from the Potentiometer and Hybrid Assembly.



7. Tie a thread to the spring which joins the Motor base to the piece that holds the Hybrid in position and pull to release the spring from it.



8. Loosen both threaded rods of the Hybrid assembly.



9. Loosen the four screws which fix the Motor to the Tray to enable the raising of the Motor assembly just enough to release the Hybrid.



10. Remove the Hybrid assembly and install the new one.



11. Tighten the threaded rods.
12. Tighten the Motor screws.
13. Put the spring back in place using the thread tied to it, and untie and remove the thread.
14. Install the toothed belt around the Potentiometer and Hybrid, and tighten the Potentiometer screws.
15. Connect the Hybrid cable to J16 of the A3624-XX Servo Control board.
16. Calibrate the Longitudinal axis (X) of the Overhead Tube Crane and the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
17. Check that the OTC manual and automatic movements are correct and that the longitudinal displacement covers the full Rail length.
18. Reinstall the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).

JOB CARD 3.7: REPLACEMENT OF THE LONGITUDINAL POTENTIOMETER

SUBASSEMBLY: POTENTIOMETER ON THE LONGITUDINAL MOTOR ASSEMBLY

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

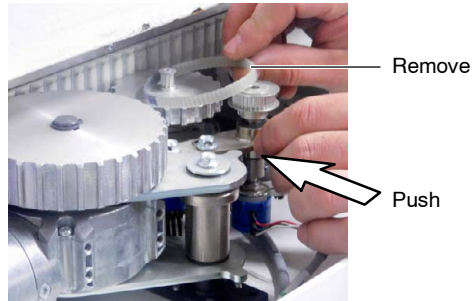
PROCEDURE



1. Move the OTC transversely up to a position that allows to access the back Transverse Tray easily.
2. Turn off the OTC and isolate it from mains.
3. Remove the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).
4. Loosen both screws of the Longitudinal Potentiometer to allow its movement.



5. Slightly push the Potentiometer to release the toothed belt and remove it from the Potentiometer and Hybrid Assembly.



6. Disconnect the Potentiometer cable from J8 of the A3624-XX Servo Control board.



7. Completely unscrew the Potentiometer screws and remove the Potentiometer.
8. Move the OTC to the middle of its Longitudinal travel.
9. Turn the new Potentiometer halfway.
10. Install the new Potentiometer without fully tightening the two screws.
11. Connect the Potentiometer cable to J8 of the A3624-XX Servo Control board.
12. Install the toothed belt around the Potentiometer and Hybrid, and tighten the Potentiometer screws.
13. Calibrate the Longitudinal axis (X) of the Overhead Tube Crane and the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
14. Check that the OTC manual and automatic movements are correct and that the longitudinal displacement covers the full Rail length.
15. Reinstall the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).

**JOB CARD 3.8: REPLACEMENT OF THE LONGITUDINAL
 POTENTIOMETER'S BELT**

SUBASSEMBLY: **LONGITUDINAL POTENTIOMETER'S BELT**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

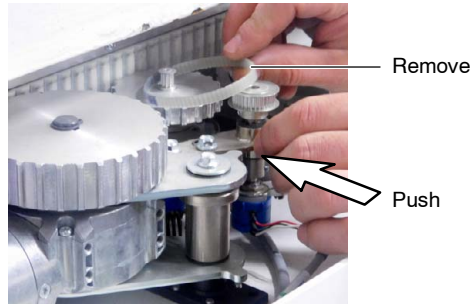
PROCEDURE



1. Move the OTC halfway between both longitudinal rails.
2. Turn off the OTC and isolate it from mains.
3. Remove the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).
4. Loosen both screws of the Longitudinal Potentiometer to allow its movement.



5. Slightly push the Potentiometer to release the toothed belt and remove it from the Potentiometer and Hybrid Assembly.



6. Turn the Potentiometer halfway.
7. Install the new toothed belt around the Potentiometer and Hybrid, and tighten the Potentiometer screws.
8. Turn on the OTC.
9. Calibrate the Longitudinal axis (X) of the Overhead Tube Crane and the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
10. Check that the OTC manual and automatic movements are correct and that the longitudinal displacement covers the full Rail length.
11. Reinstall the back Transverse Tray cover (*refer to the Overhead Tube Crane Covers section of the Installation document*).

**JOB CARD 3.9: REPLACEMENT OF THE TRANSVERSAL
 POTENTIOMETER'S BELT**

SUBASSEMBLY: **TRANSVERSAL POTENTIOMETER'S BELT**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

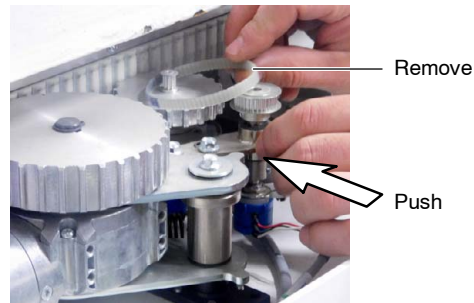
PROCEDURE



1. Move the OTC halfway between both longitudinal rails.
2. Turn off the OTC and isolate it from mains.
3. Loosen both screws of the Transversal Potentiometer to allow its movement.



4. Slightly push the Potentiometer to release the toothed belt and remove it from the Potentiometer and Hybrid Assembly.



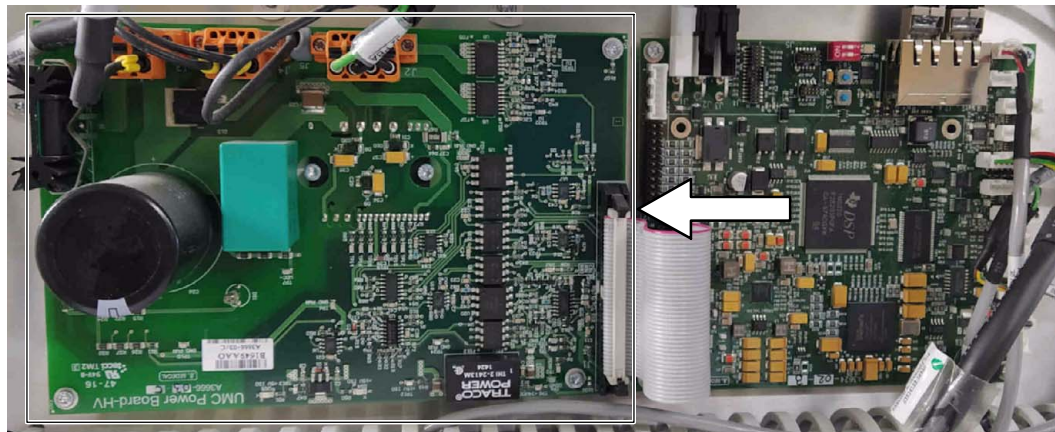
5. Turn the Potentiometer halfway.
6. Install the new toothed belt around the Potentiometer and Hybrid, and tighten the Potentiometer screws.
7. Turn on the OTC.
8. Calibrate the Transversal axis (X) of the Overhead Tube Crane and the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
9. Check that the OTC manual and automatic movements are correct and that the transversal displacement covers the full Rail length.

JOB CARD 3.10: REPLACEMENT OF THE VERTICAL SERVO UMC 24V

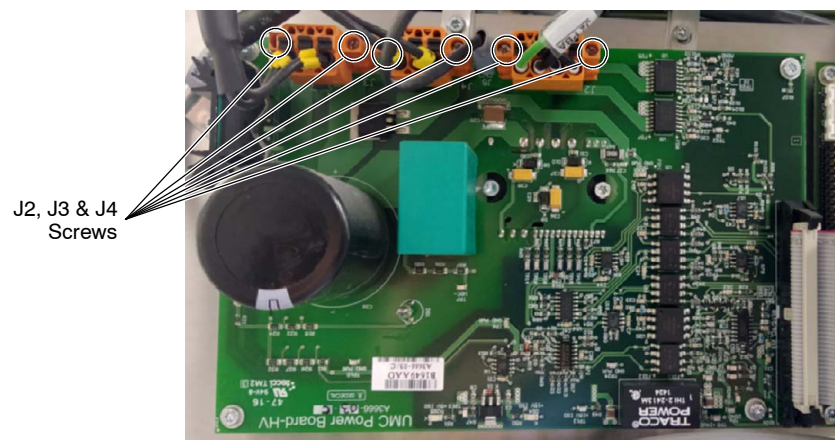
SUBASSEMBLY: VERTICAL SERVO UMC 24V (A3666-XX)

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

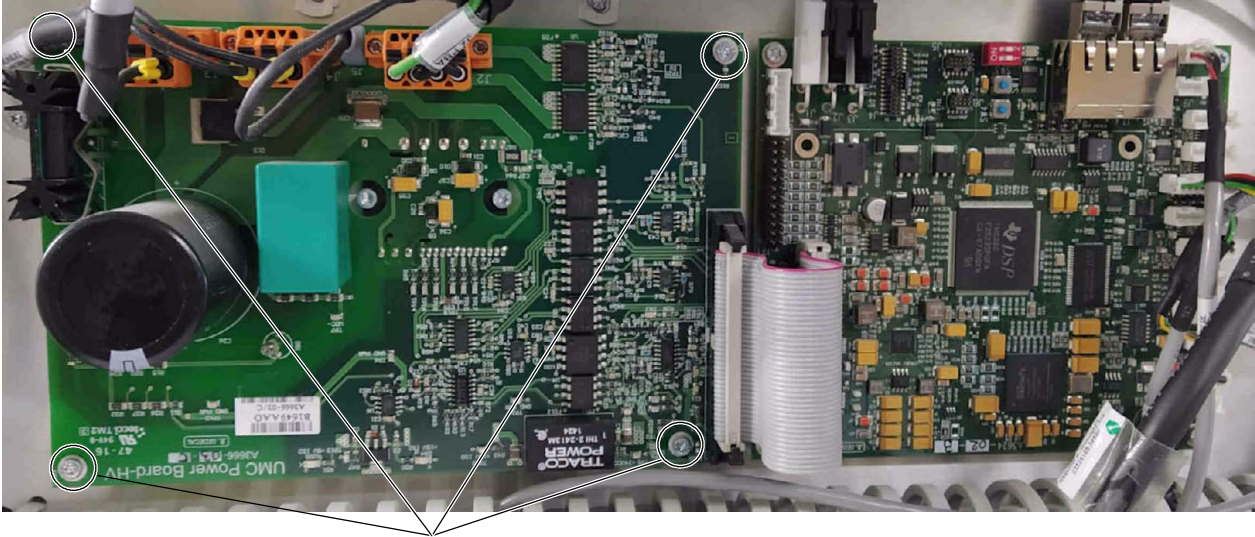
PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Mark and unplug all the connectors from the board.
4. Remove the J2, J3 and J4 cables by loosening their screws (two in each connector) with a flat-head screwdriver.



5. Remove the four Torx screws that fix the Servo UMC 24V board to the OTC.



Torx Screws

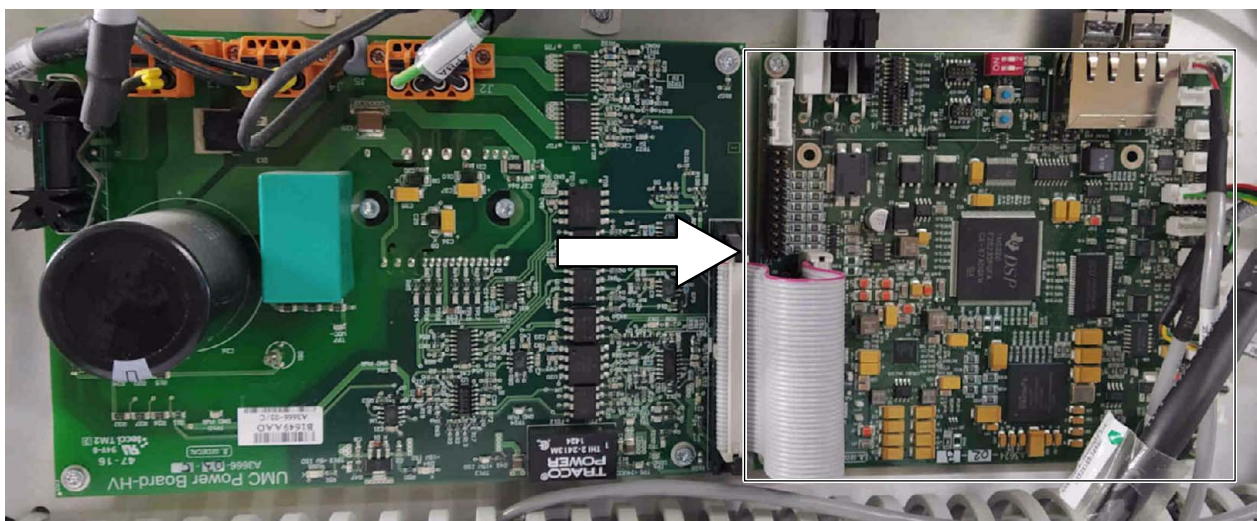
6. Remove the board and install the new Servo UMC 24V by screwing the previously removed screws.
7. Plug the previously removed connectors and screw the J2, J3 & J4 cables.
8. Turn on the OTC and calibrate the Vertical movement axis (Z). (*Refer to the Positioner Setup section of the Configuration and Calibration document.*)
9. Calibrate the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document.*)
10. Verify that the OTC movements work properly.
11. Reinstall the Carriage Covers (*refer to the OTC Covers section of the Installation document.*)

JOB CARD 3.11: REPLACEMENT OF THE VERTICAL UNIVERSAL MOTOR CONTROLLER

SUBASSEMBLY: VERTICAL UNIVERSAL MOTOR CONTROLLER (A3624-XX)

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

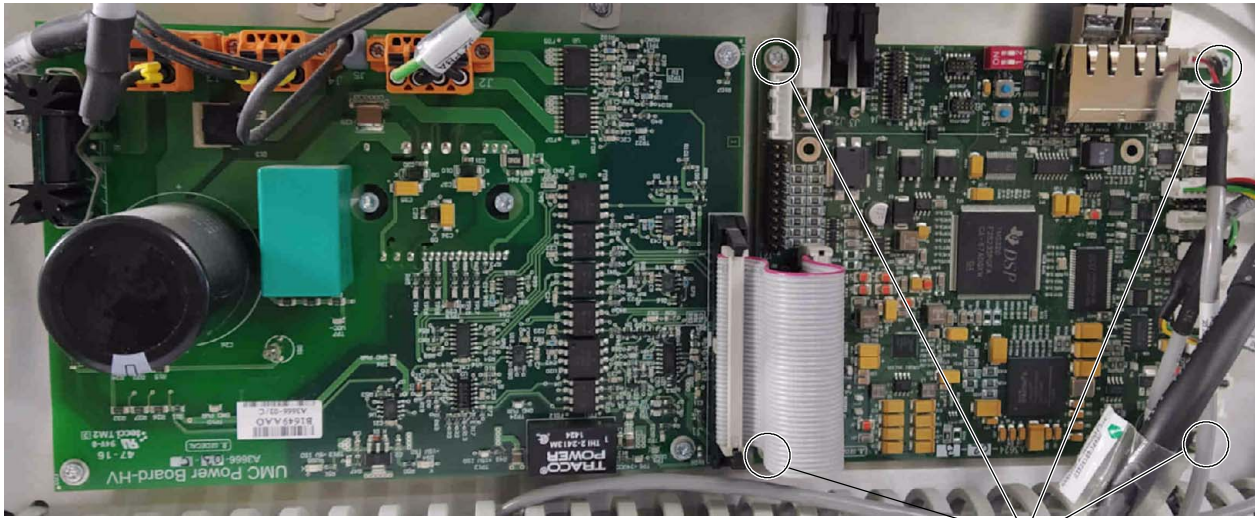
PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Mark and unplug all the connectors from the board.
4. Unscrew the four Torx screws that fix the Universal Motor Controller board to the OTC.

X-ray System

Field Replacement



Torx Screws

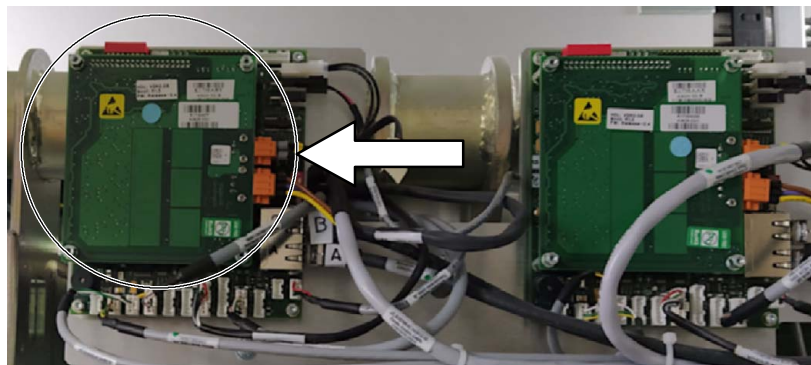
5. Remove the board and install the new Universal Motor Controller by screwing the previously removed screws.
6. Plug the previously removed connectors.
7. Check that the switches SW2 and SW3 are set in the new Universal Motor Controller as in the previously removed board (*refer to Job Card 3.13, Replacement of the Transversal Universal Motor Controller*).
8. Turn on the OTC and calibrate the Vertical movement axis (Z). (*Refer to the Positioner Setup section of the Configuration and Calibration document.*)
9. Calibrate the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
10. Verify that the OTC movements work properly.
11. Reinstall the Carriage Covers (*refer to the OTC Covers section of the Installation document*).

JOB CARD 3.12: REPLACEMENT OF THE TRANSVERSAL SERVO UMC 24V

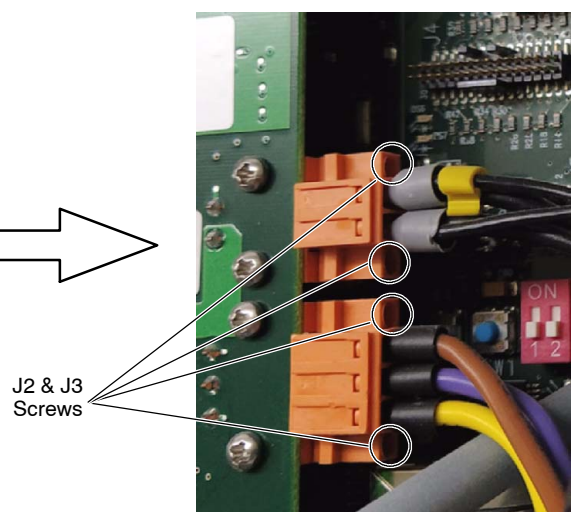
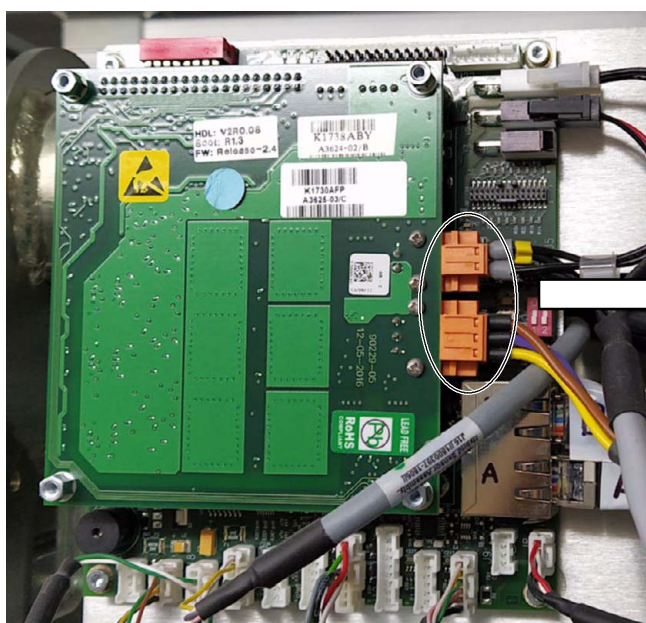
SUBASSEMBLY: TRANSVERSAL SERVO UMC 24V (A3625-XX)

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

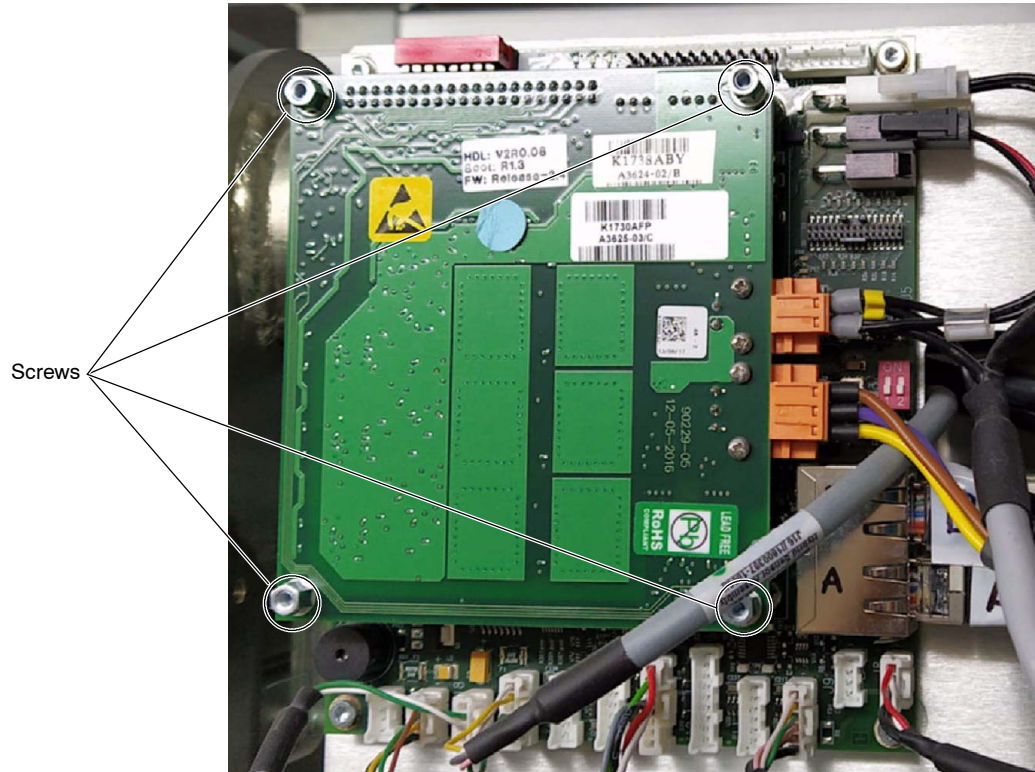
PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Remove the J2 and J3 cables by loosening their screws (two in each connector) with a flat-head screwdriver.



4. Remove the four screws that fix the Servo UMC 24V board to the Universal Motor Controller board.



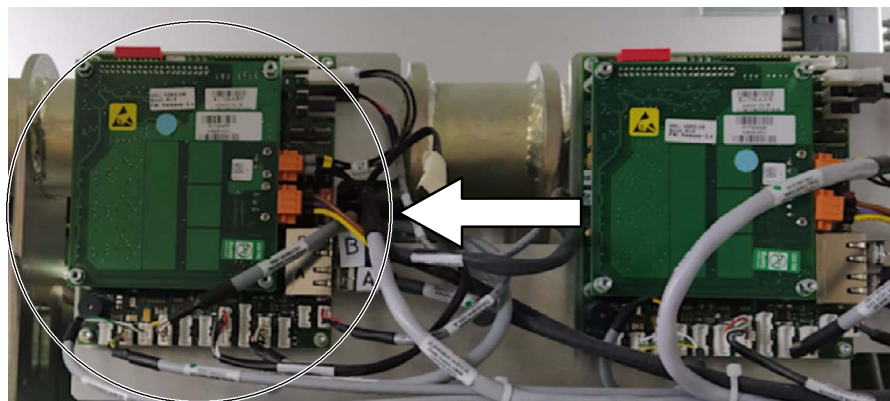
5. Remove the Servo UMC 24V and install the new board by screwing the previously removed screws.
6. Plug the previously removed connectors by tightening their screws.
7. Turn on the OTC and calibrate the Transversal movement axis (Y). *(Refer to the Positioner Setup section of the Configuration and Calibration document.)*
8. Calibrate the Room Layout *(refer to the Positioner Setup section of the Configuration and Calibration document).*
9. Verify that the OTC movements work properly.
10. Reinstall the Carriage Covers *(refer to the OTC Covers section of the Installation document).*

JOB CARD 3.13: REPLACEMENT OF THE TRANSVERSAL UNIVERSAL MOTOR CONTROLLER

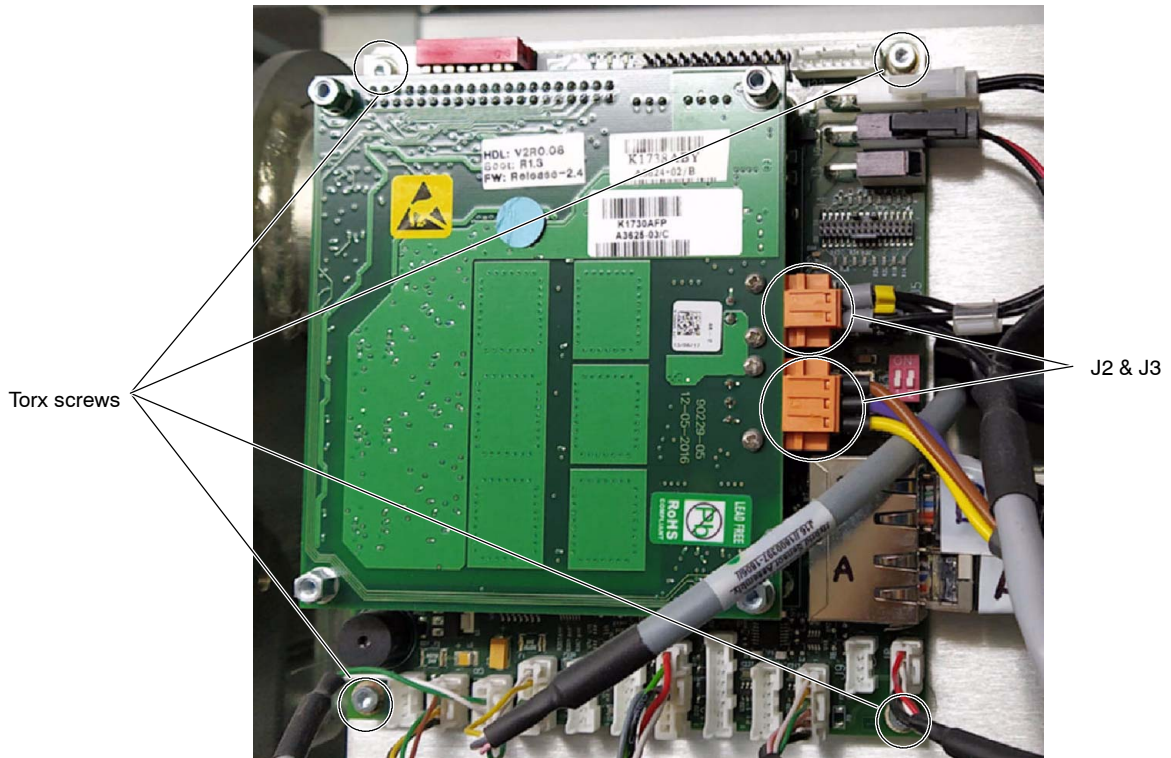
SUBASSEMBLY: TRANSVERSAL UNIVERSAL MOTOR CONTROLLER (A3624-XX)

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

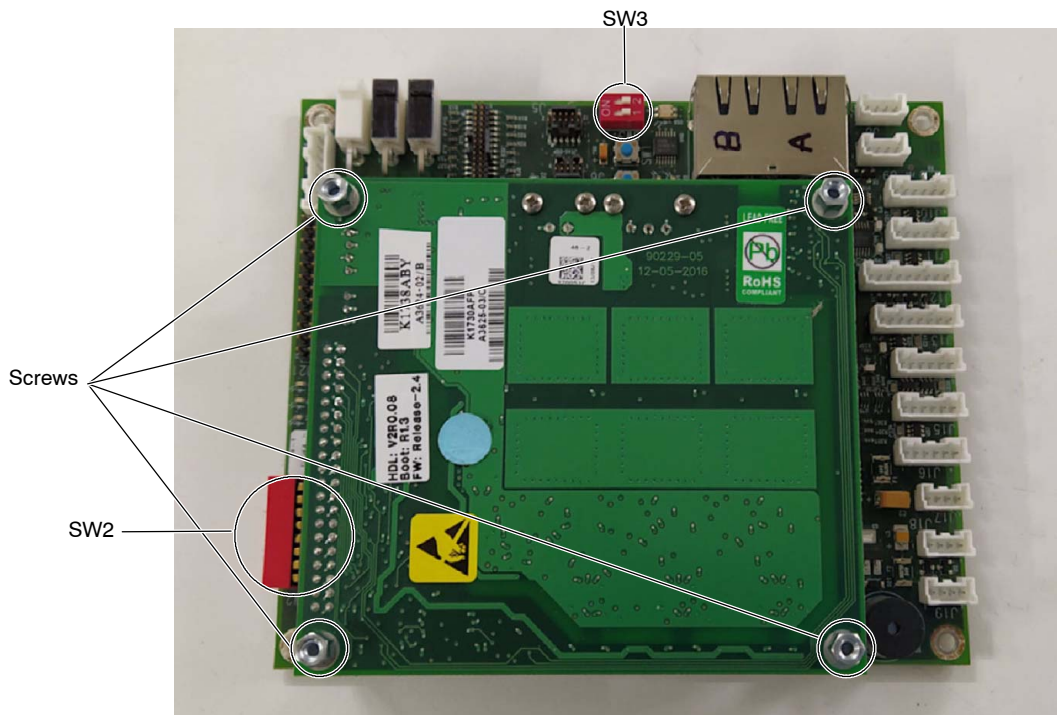
PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Mark and unplug all the connectors from the Universal Motor Controller.
4. Remove the J2 and J3 cables from the Servo UMC 24V board by loosening their screws with a flat-head screwdriver (*refer to Job Card 3.12, Replacement of the Transversal Servo UMC 24V*).
5. Unscrew the four Torx screws that fix the Universal Motor Controller board to the OTC.



6. Unscrew the four screws that fix the Servo UMC 24V to the Universal Motor Controller and remove this board.



7. Check that SW2 and SW3 are set in the new Universal Motor Controller as in the previously removed board.
8. Assemble the new Universal Motor Controller and the former Servo UMC 24V by screwing the screws previously removed in step 6.
9. Mount the assembly on the OTC with the previously removed Torx screws.
10. Plug the previously removed connectors and screw the J2 and J3 cables.
11. Turn on the OTC and calibrate the Transversal movement axis (Y). *(Refer to the Positioner Setup section of the Configuration and Calibration document.)*
12. Calibrate the Room Layout *(refer to the Positioner Setup section of the Configuration and Calibration document).*
13. Verify that the OTC movements work properly.
14. Reinstall the Carriage Covers *(refer to the OTC Covers section of the Installation document).*

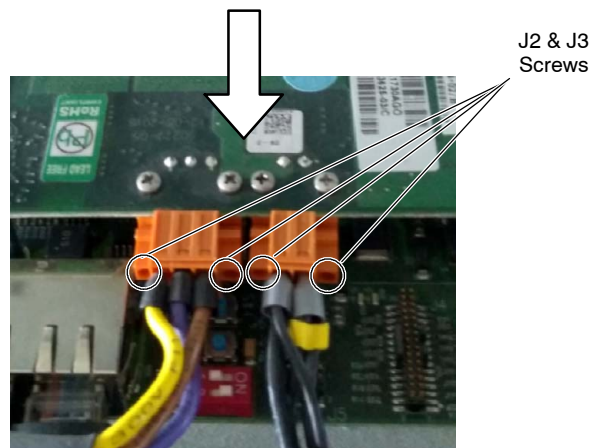
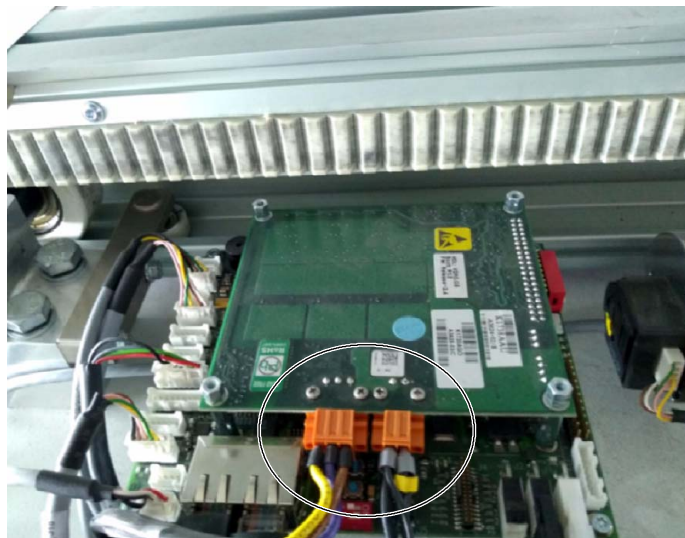
JOB CARD 3.14: REPLACEMENT OF THE LONGITUDINAL SERVO UMC 24V

SUBASSEMBLY: LONGITUDINAL SERVO UMC 24V (A3625-XX)

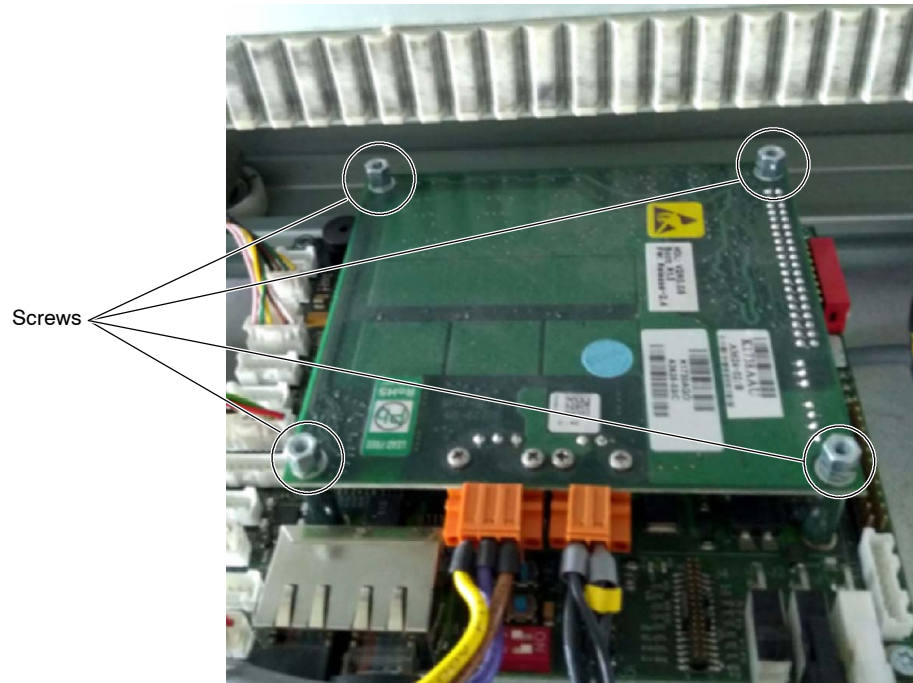
TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

1. Turn off the OTC and isolate it from mains.
2. Remove the back Tray Top Cover (*refer to Job Card 1.1, Removal of the Tray Top Cover*).
3. Remove the J2 and J3 cables by loosening their screws (two in each connector) with a flat-head screwdriver.



4. Remove the four screws that fix the Servo UMC 24V board to the Universal Motor Controller board.



5. Remove the Servo UMC 24V and install the new board by screwing the previously removed screws.
6. Plug the previously removed connectors by tightening their screws.
7. Turn on the OTC and calibrate the Longitudinal movement axis (X). *(Refer to the Positioner Setup section of the Configuration and Calibration document.)*
8. Calibrate the Room Layout *(refer to the Positioner Setup section of the Configuration and Calibration document).*
9. Verify that the OTC movements work properly.
10. Reinstall the back Tray Top Cover *(refer to the OTC Covers section of the Installation document).*

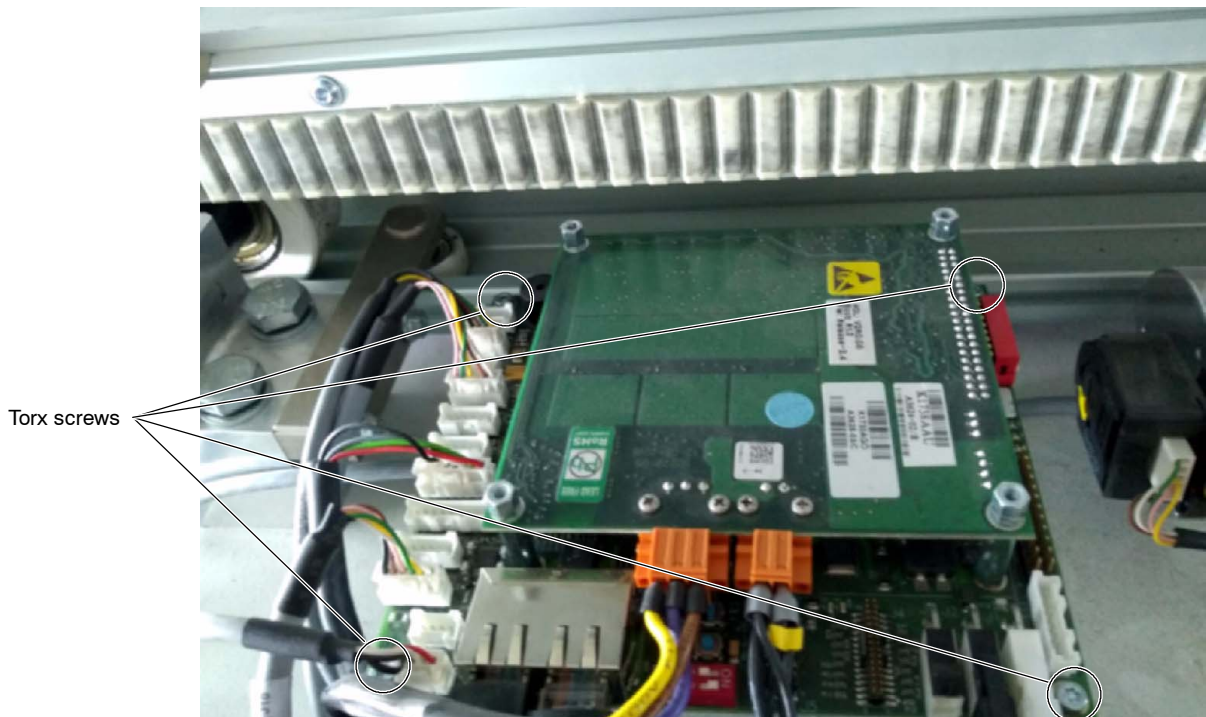
JOB CARD 3.15: REPLACEMENT OF THE LONGITUDINAL UNIVERSAL MOTOR CONTROLLER

SUBASSEMBLY: LONGITUDINAL UNIVERSAL MOTOR CONTROLLER (A3624-XX)

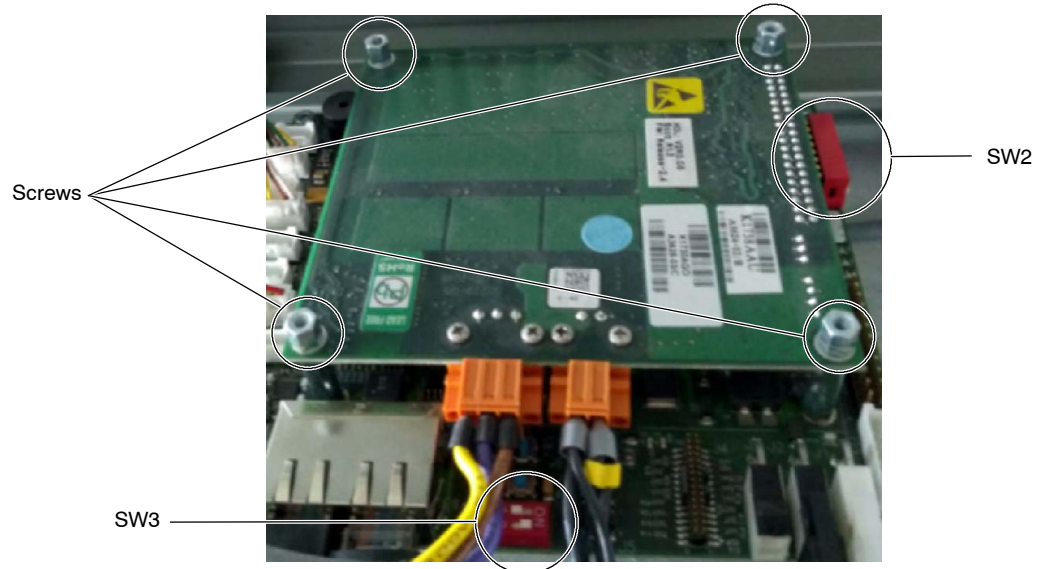
TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

1. Turn off the OTC and isolate it from mains.
2. Remove the back Tray Top Cover (*refer to Job Card 1.1, Removal of the Tray Top Cover*).
3. Mark and unplug all the connectors from the Universal Motor Controller.
4. Remove the J2 and J3 cables from the Servo UMC 24V board by loosening their screws with a flat-head screwdriver (*refer to Job Card 3.14, Replacement of the Longitudinal Servo UMC 24V*).
5. Unscrew the four Torx screws that fix the Universal Motor Controller board to the back Transversal Tray.



6. Unscrew the four screws that fix the Servo UMC 24V to the Universal Motor Controller and remove this board.



7. Check that SW2 and SW3 are set in the new Universal Motor Controller as in the previously removed board.
8. Assemble the new Universal Motor Controller and the former Servo UMC 24V by screwing the screws previously removed in step 6.
9. Mount the assembly on the back Transverse Tray with the previously removed Torx screws.
10. Plug the previously removed connectors and screw the J2 and J3 cables.
11. Turn on the OTC and calibrate the Longitudinal movement axis (X). *(Refer to the Positioner Setup section of the Configuration and Calibration document.)*
12. Calibrate the Room Layout *(refer to the Positioner Setup section of the Configuration and Calibration document).*
13. Verify that the OTC movements work properly.
14. Reinstall the Tray Top Cover *(refer to the OTC Covers section of the Installation document).*

JOB CARD 3.16: REPLACEMENT OF THE ROOM MASTER BOARD

SUBASSEMBLY: ROOM MASTER BOARD (A3633-XX)

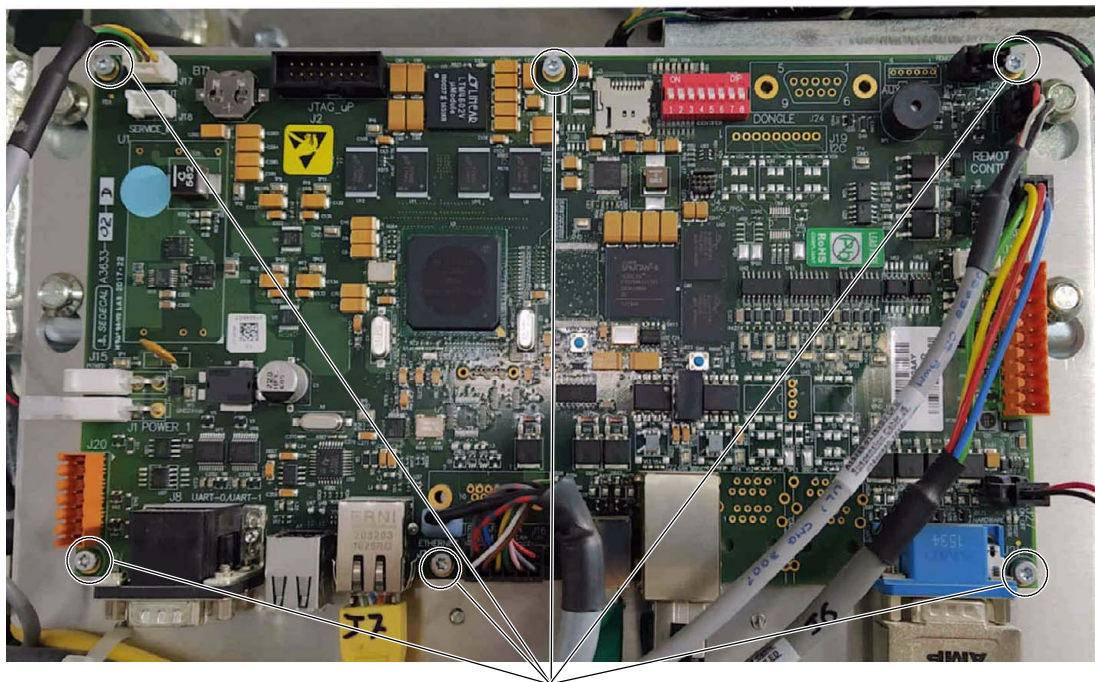
TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE

Note 

Whenever possible, a system backup must be done before replacing the Room Master Board in order to save all the settings (refer to the Maintenance section of the Configuration and Calibration document).

1. Remove the Carriage Covers (refer to Job Card 1.3, Removal of the Carriage Covers).
2. Turn off the OTC and isolate it from mains.
3. Unplug all the connectors from the board.
4. Unscrew the six Torx screws that fix the board to the OTC.



Torx screws

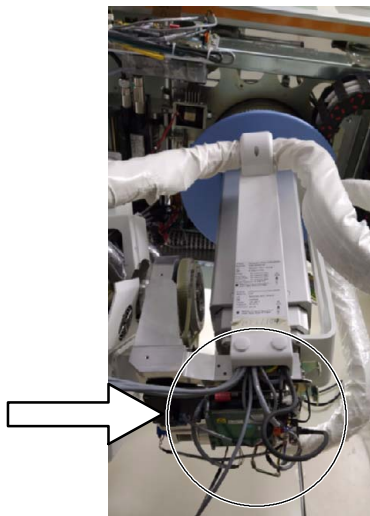
5. Install the new board by screwing the previously removed screws.
6. Check that all the switches are set as in the previously removed board.
7. Plug the previously removed connectors.
8. Turn on the OTC.
9. If a backup was made, restore the previously stored configuration (*refer to the Configuration and Calibration document*).
10. If a backup was not made, configure the system settings and calibrate the movement axis of the OTC (*refer to the Configuration and Calibration document*). After that, verify the optimum performance of the equipment.
11. Reinstall the Carriage Covers (*refer to the OTC Covers section of the Installation document*).

JOB CARD 4.1: REPLACEMENT OF THE ALPHA SERVO UMC 24V

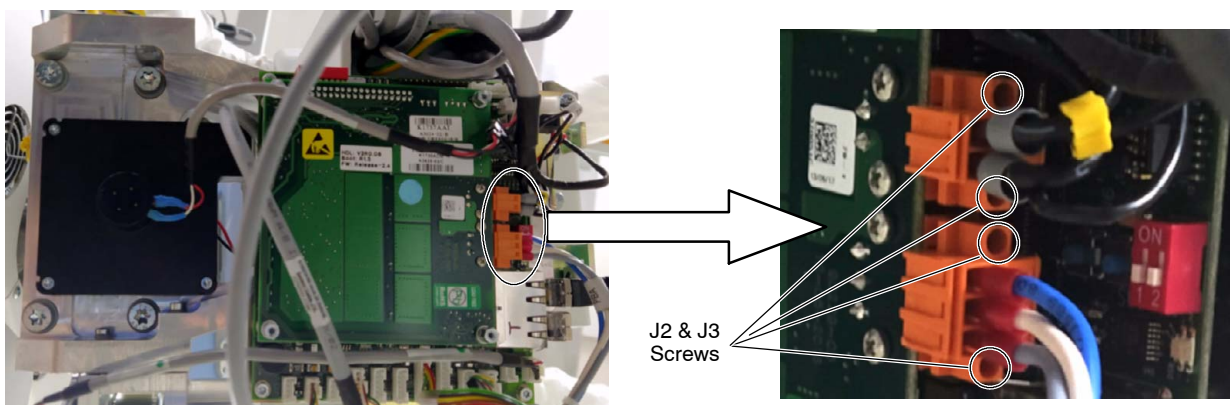
SUBASSEMBLY: ALPHA SERVO UMC 24V (A3625-XX)

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

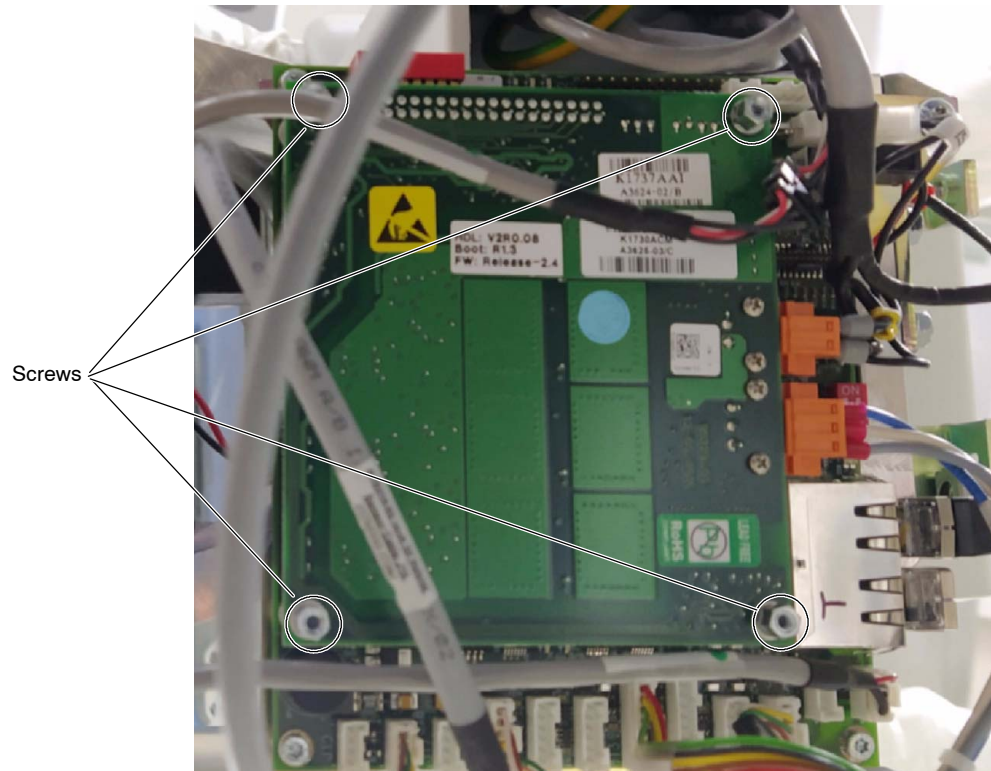
PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Tube-Collimator Assembly Covers (*refer to Job Card 1.5, Removal of the Tube-Collimator Assembly Covers*).
3. Remove the J2 and J3 cables by loosening their screws (two in each connector) with a flat-head screwdriver.



4. Remove the four screws that fix the Servo UMC 24V board to the Universal Motor Controller board.



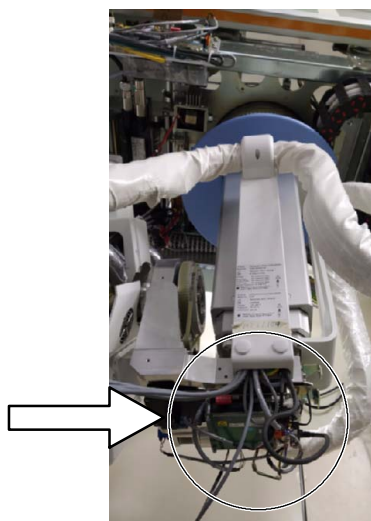
5. Remove the Servo UMC 24V and install the new board by screwing the previously removed screws.
6. Plug the previously removed connectors by tightening their screws.
7. Turn on the OTC and calibrate the Alpha movement axis (*refer to the Positioner Setup section of the Configuration and Calibration document*).
8. Calibrate the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
9. Verify that the OTC movements work properly.
10. Reinstall the Tube-Collimator Assembly Covers (*refer to Job Card 1.5, Removal of the Tube-Collimator Assembly Covers*).

JOB CARD 4.2: REPLACEMENT OF THE ALPHA UNIVERSAL MOTOR CONTROLLER

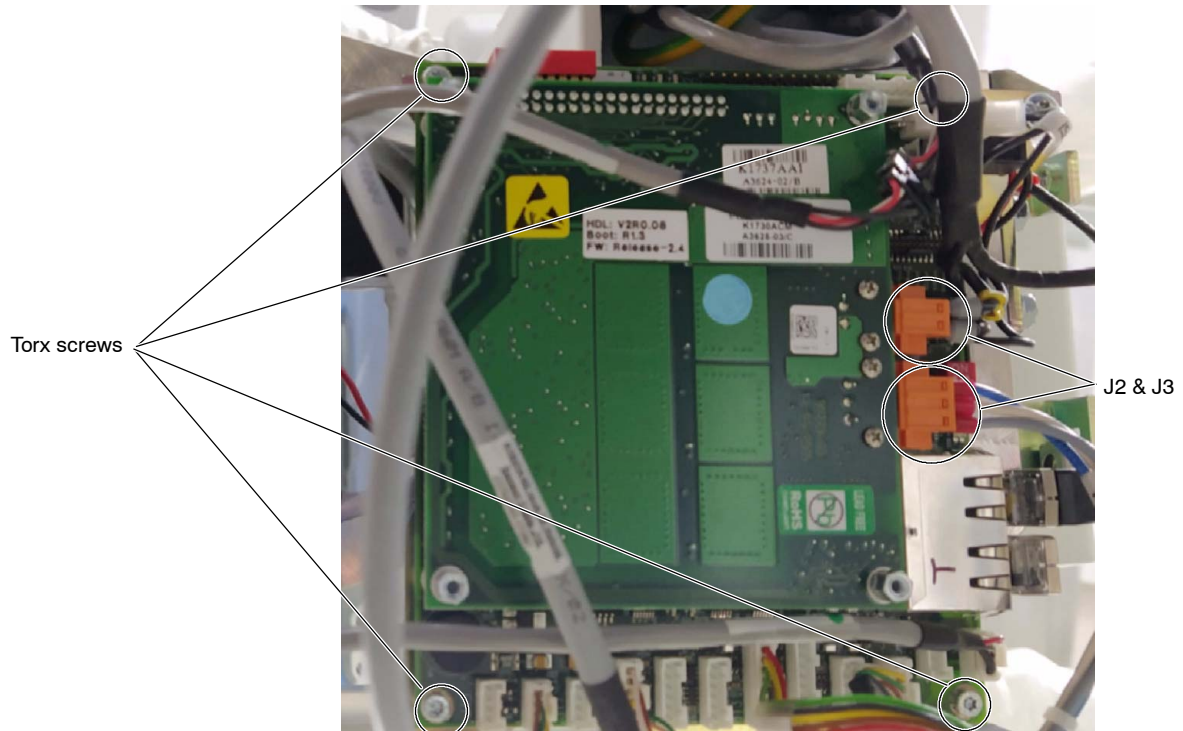
SUBASSEMBLY: **ALPHA UNIVERSAL MOTOR CONTROLLER (A3624-XX)**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Tube-Collimator Assembly Covers (*refer to Job Card 1.5, Removal of the Tube-Collimator Assembly Covers*).
3. Mark and unplug all the connectors from the Universal Motor Controller.
4. Remove the J2 and J3 cables from the Servo UMC 24V board by loosening their screws with a flat-head screwdriver (*refer to Job Card 4.1, Replacement of the Alpha Servo UMC 24V*).
5. Unscrew the four Torx screws that fix the Universal Motor Controller board to the OTC.



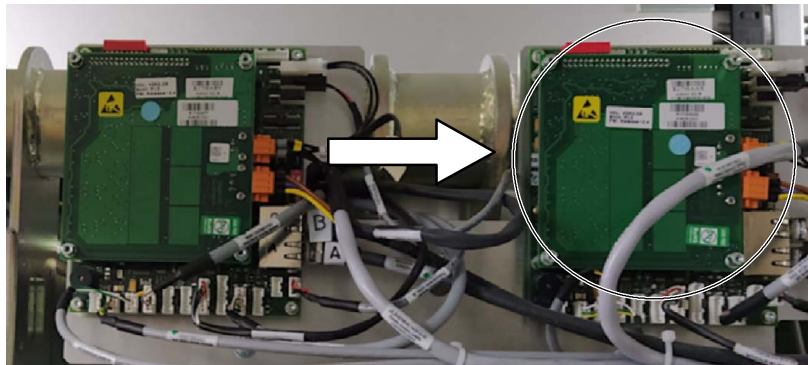
6. Unscrew the four screws that fix the Servo UMC 24V to the Universal Motor Controller and remove this board (*refer to Job Card 4.1, Replacement of the Alpha Servo UMC 24V*).
7. Check that SW2 and SW3 are set in the new Universal Motor Controller as in the previously removed board (*refer to Job Card 3.13, Replacement of the Transversal Universal Motor Controller*).
8. Assemble the new Universal Motor Controller and the former Servo UMC 24V by screwing the screws previously removed in step 6.
9. Mount the assembly on the OTC with the previously removed Torx screws.
10. Plug the previously removed connectors and screw the J2 and J3 cables.
11. Turn on the OTC and calibrate the Alpha movement axis (*refer to the Positioner Setup section of the Configuration and Calibration document*).
12. Calibrate the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
13. Verify that the OTC movements work properly.
14. Reinstall the Tube-Collimator Assembly Covers (*refer to Job Card 1.5, Removal of the Tube-Collimator Covers*).

JOB CARD 4.3: REPLACEMENT OF THE BETA SERVO UMC 24V

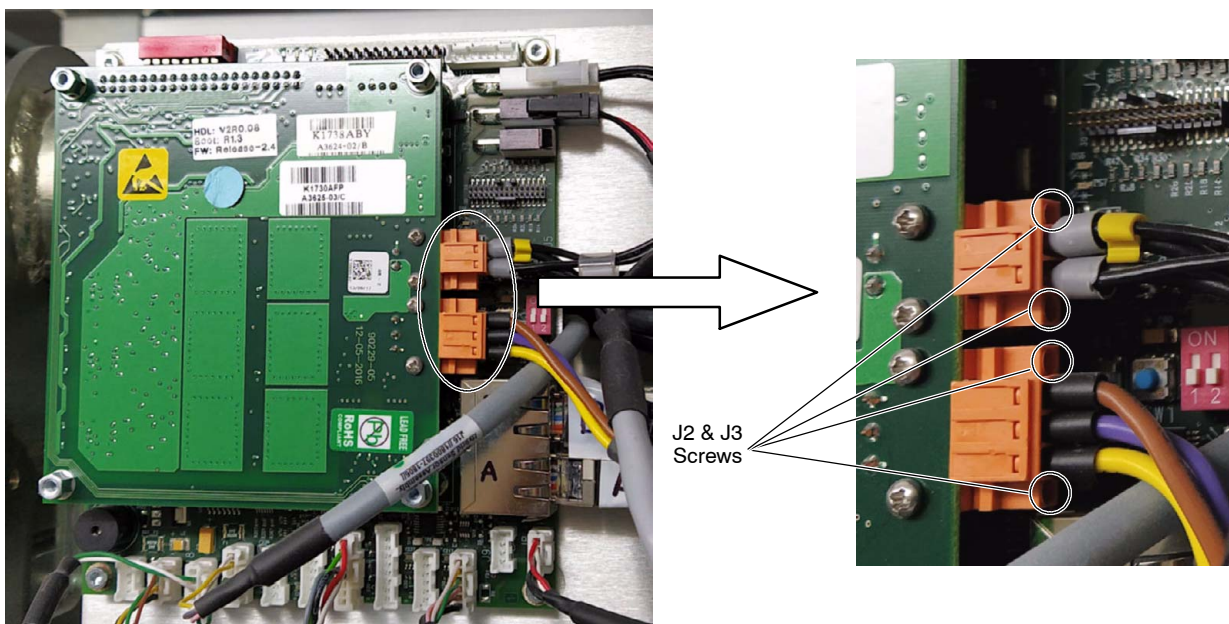
SUBASSEMBLY: BETA SERVO UMC 24V (A3625-XX)

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

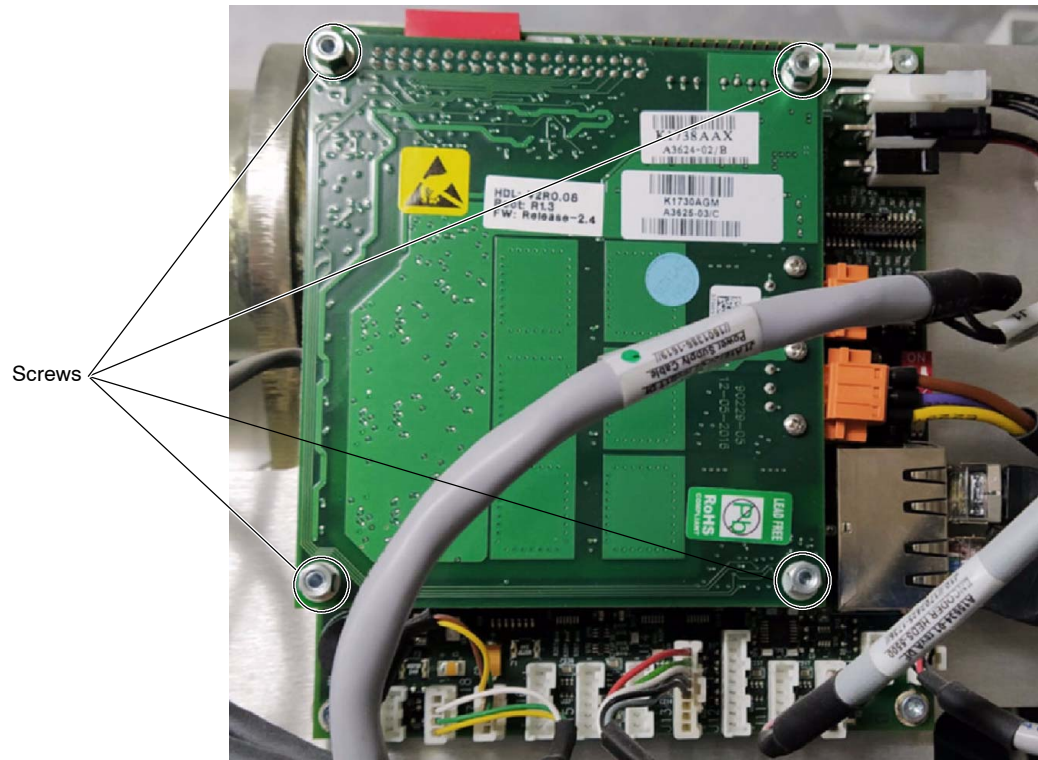
PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Remove the J2 and J3 cables by loosening their screws (two in each connector) with a flat-head screwdriver.



4. Remove the four screws that fix the Servo UMC 24V board to the Universal Motor Controller board.



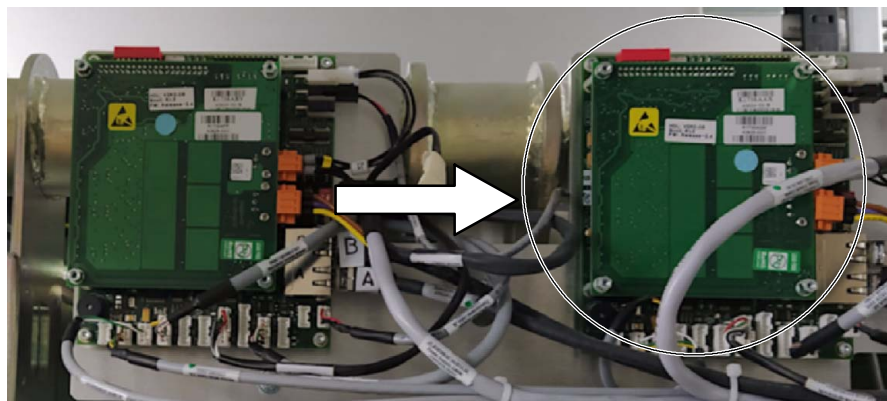
5. Remove the Servo UMC 24V and install the new board by screwing the previously removed screws.
6. Plug the previously removed connectors by tightening their screws.
7. Turn on the OTC and calibrate the Beta movement axis (*refer to the Positioner Setup section of the Configuration and Calibration document*).
8. Calibrate the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
9. Verify that the OTC movements work properly.
10. Reinstall the Carriage Covers (*refer to the OTC Covers section of the Installation document*).

JOB CARD 4.4: REPLACEMENT OF THE BETA UNIVERSAL MOTOR CONTROLLER

SUBASSEMBLY: **BETA UNIVERSAL MOTOR CONTROLLER (A3624-XX)**

TOOLS: Standard Service Tool Kit, including Torx key sets and Anti-static Protection Device.

PROCEDURE



1. Turn off the OTC and isolate it from mains.
2. Remove the Carriage Covers (*refer to Job Card 1.3, Removal of the Carriage Covers*).
3. Mark and unplug all the connectors from the Universal Motor Controller.
4. Remove the J2 and J3 cables from the Servo UMC 24V board by loosening their screws with a flat-head screwdriver (*refer to Job Card 4.3, Replacement of the Beta Servo UMC 24V*).
5. Unscrew the four Torx screws that fix the Universal Motor Controller board to the OTC.



6. Unscrew the four screws that fix the Servo UMC 24V to the Universal Motor Controller and remove this board (*refer to Job Card 4.3, Replacement of the Beta Servo UMC 24V*).
7. Check that SW2 and SW3 are set in the new Universal Motor Controller as in the previously removed board (*refer to Job Card 3.13, Replacement of the Transversal Universal Motor Controller*).
8. Assemble the new Universal Motor Controller and the former Servo UMC 24V by screwing the screws previously removed in step 6.
9. Mount the assembly on the OTC with the previously removed Torx screws.
10. Plug the previously removed connectors and screw the J2 and J3 cables.
11. Turn on the OTC and calibrate the Beta movement axis (*refer to the Positioner Setup section of the Configuration and Calibration document*).
12. Calibrate the Room Layout (*refer to the Positioner Setup section of the Configuration and Calibration document*).
13. Verify that the OTC movements work properly.
14. Reinstall the Carriage Covers (*refer to the OTC Covers section of the Installation document*).

X-ray System

Field Replacement

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SECTION 2 GENERATOR PROCEDURES



Whenever the HV Transformer or X-ray Tube is replaced in the Generator, the respective configuration and calibration procedures must be performed.

If the A3640-XX Control board is replaced, restore the configuration and AEC data from the backup files saved in the computer and perform the required calibration procedures, or transfer the U66-EEPROM from the old board to the new board and perform the calibration procedures. U66-EEPROM contains configuration and calibration data.

If the backup files cannot be restored and U66-EEPROM is not transferred, complete configuration procedure must be performed.

Update and record in the Data Book any new calibration data.



Use the Anti-static Protection Device for handling when replacing any board or electronic part.



BEFORE REPLACING ANY PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.



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 BEFORE SERVICING THE EQUIPMENT (APPROX. 3 MINUTES AFTER THE UNIT IS TURNED OFF).



TO AVOID ELECTRIC SHOCK, 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.



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.



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 ALTHOUGH THE GENERATOR IS OFF. BE SURE THAT THE SAFETY SWITCH IS OFF BEFORE HANDLING ANY INTERNAL PART OF THE EQUIPMENT.

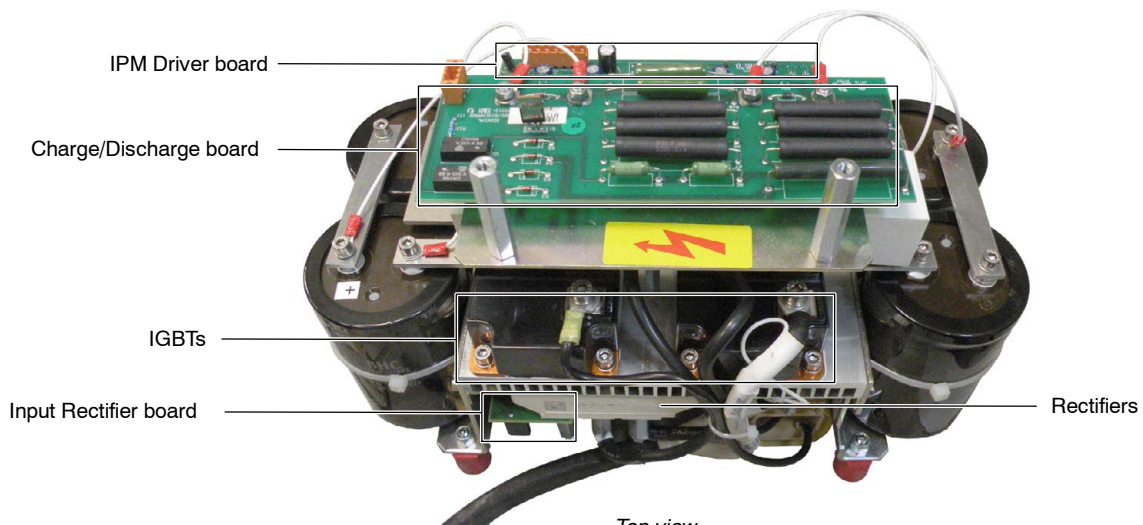
GENERATOR JOB CARDS LIST	
JOB CARD	DESCRIPTION
INVERTER MODULE	
Job Card 1.1	Inverter Module
Job Card 1.2	Input Rectifier (A3255-XX)
Job Card 1.3	Rectifiers on the Inverter Module
Job Card 1.4	Main Storage Capacitors
Job Card 1.5	Charge/Discharge Board (A3212-XX)
Job Card 1.6	IPM Driver Board (A3063-XX)
Job Card 1.7	IGBTs in the Inverter Module
TANK	
Job Card 2.1	High Voltage Tank
FRONT PANEL	
Job Card 3.1	Control Board (A3640-XX)
Job Card 3.2	Interface Board (A3674-XX)
BACK PANEL	
Job Card 4.1	Dual Speed Starter (S0008009)
Job Card 4.2	Booster Module (S0008007)
Job Card 4.3	Booster IGBT (S0009814)
Job Card 4.4	Supply Board (A3646-XX)
Job Card 4.5	Power Supply

JOB CARD 1.1: REPLACEMENT OF THE INVERTER MODULE

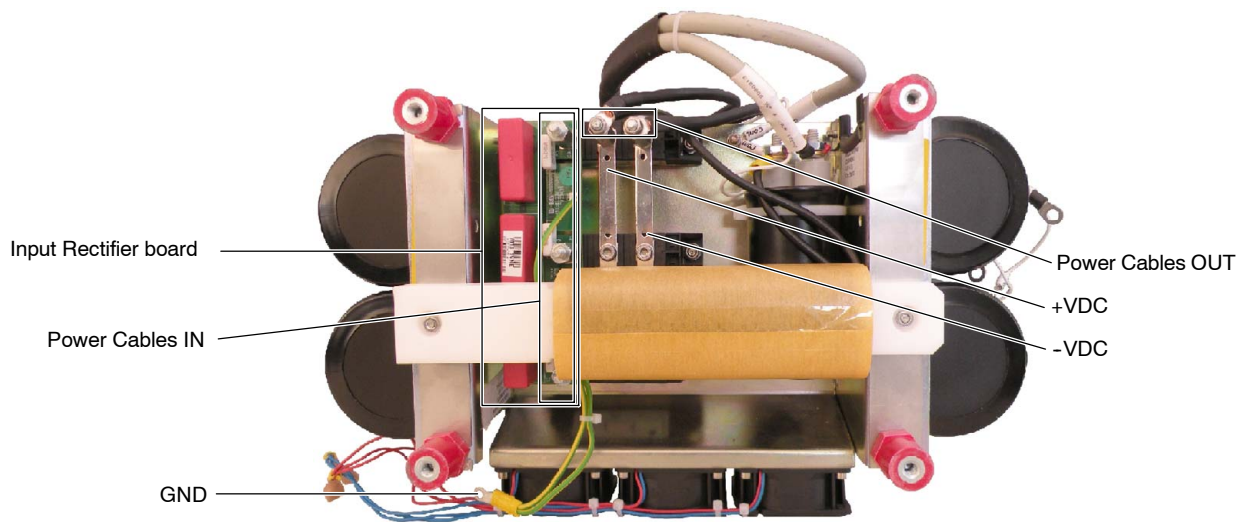
SUBASSEMBLY: INVERTER MODULE

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



Top view



Rear view

Note 

The code number of the Inverter Module depends on the Generator Model. Check labels for its identification.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

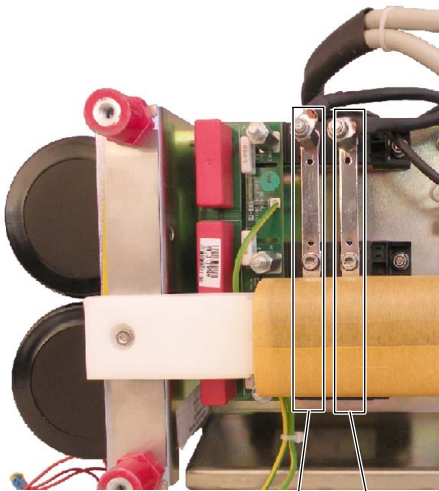


Use the Anti-static Protection Device for handling or replacing any board or electronic part.

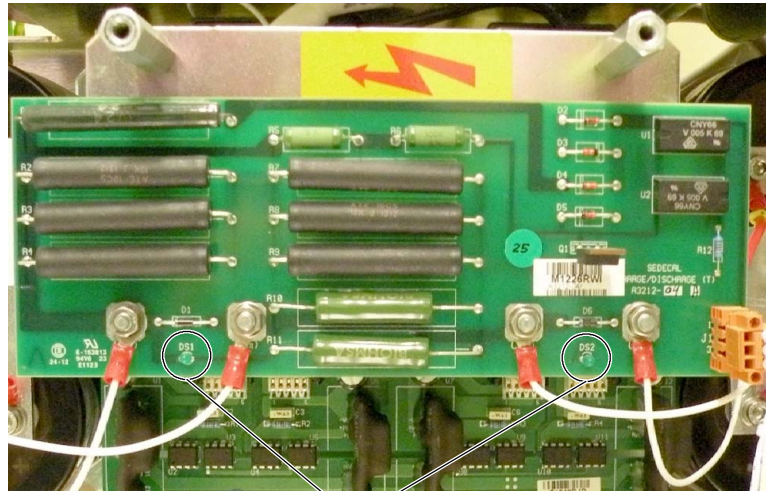
1. Remove the Generator Cabinet Covers and place the Generator where the rear panel can be accessed.
2. Remove the Generator Rear Cover taking care not to damage the Power line cables.
3. Remove the screw of the Generator Front Door and open it.
4. Remove the protective Plastic Safety Cover from the front of the Module inside the Generator.



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.

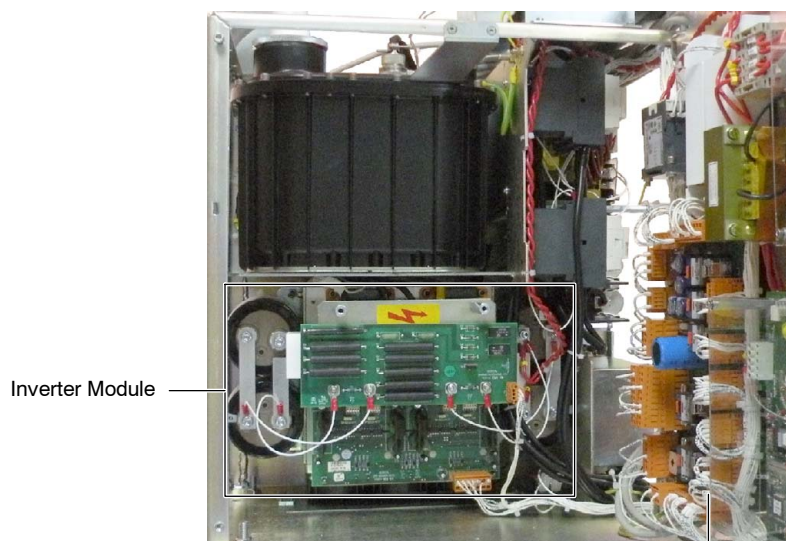


+VDC -VDC



LED on Charge/Discharge board

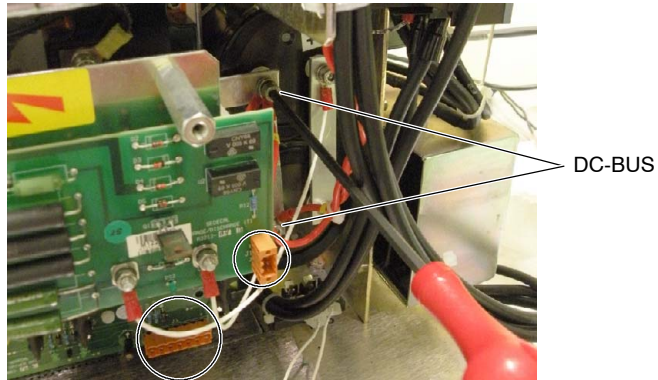
5. Place a white cloth below the inverter to easily find any screw, nut, spacer or washer that could drop down during the replacement.



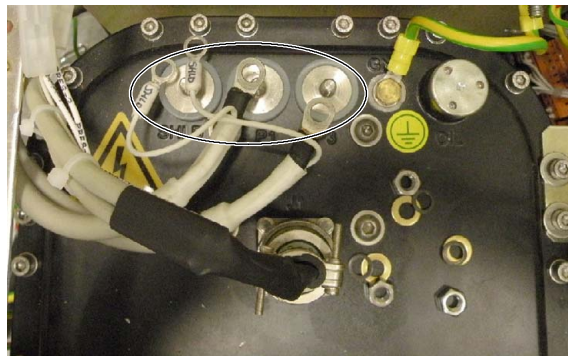
Inverter Module

Back Panel

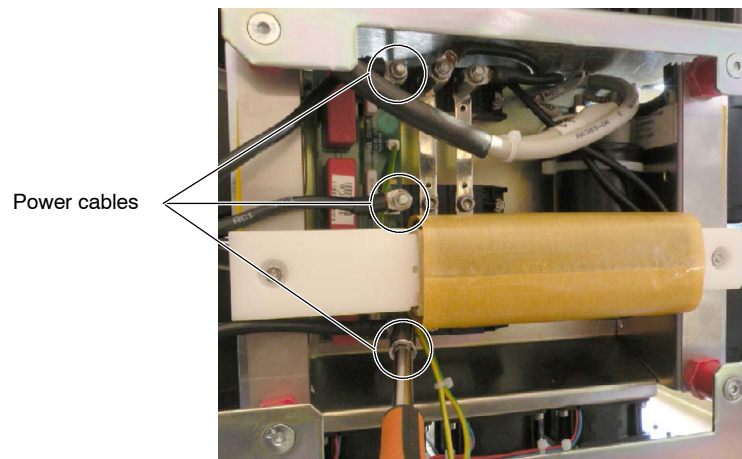
6. Disconnect the two connectors from the Charge/Discharge (J1) and from the IPM driver (J3) boards and remove the DC+ and DC- from the DC-BUS bars (refer to the following illustration).



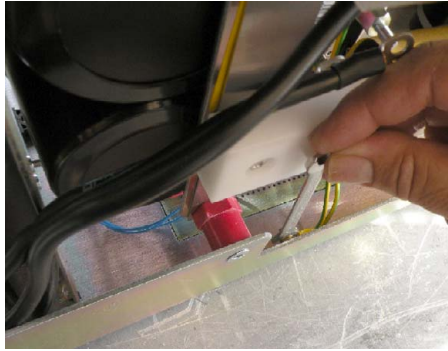
7. Label and disconnect the Cables from the HV Transformer (P1, P2-Shield, and P3).



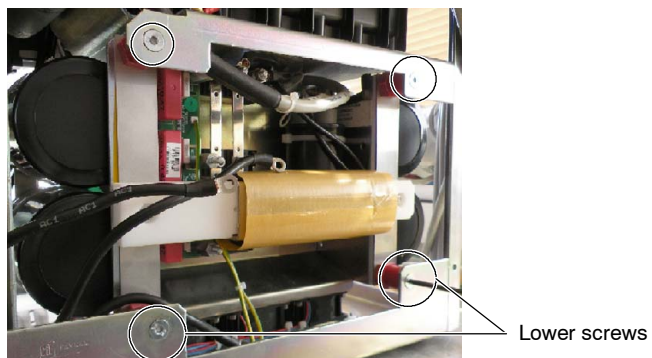
8. On the back side of the Cabinet, disconnect the Power cables from the Input Rectifier board holding the hexagonal spacer in place while unscrewing the connection. Disconnect also the GND wire.



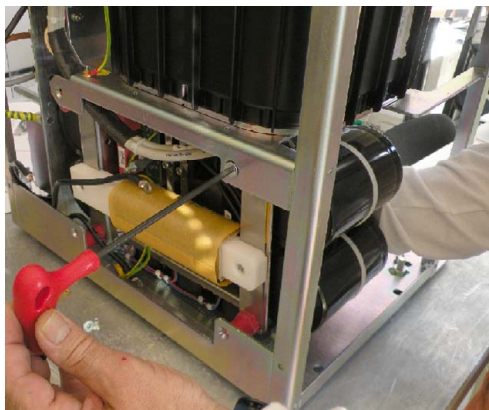
9. Use a wrench to disconnect the GND (yellow and green wires) attached to the chassis of the Generator from the Input Rectifier board, as shown in the photo below.



10. The most practical way of dismantling the Inverter Module from the Generator is by first removing the two lower screws and then loosening the two upper screws.



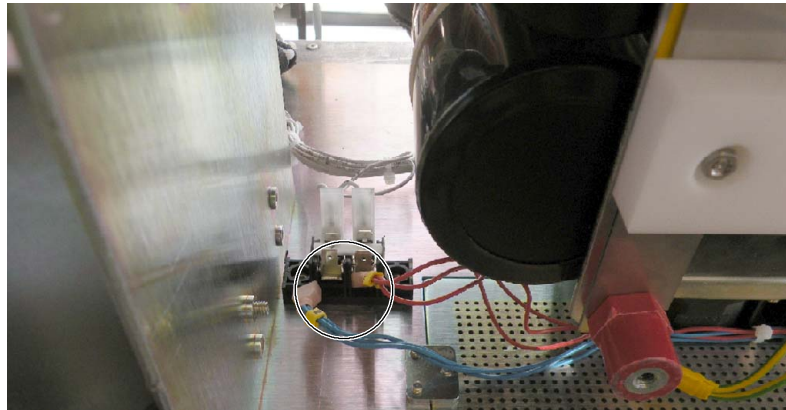
11. Hold the module with one hand (to keep the module from falling and potentially damaging the components underneath) while removing the already loosened upper screws of the Inverter Module.



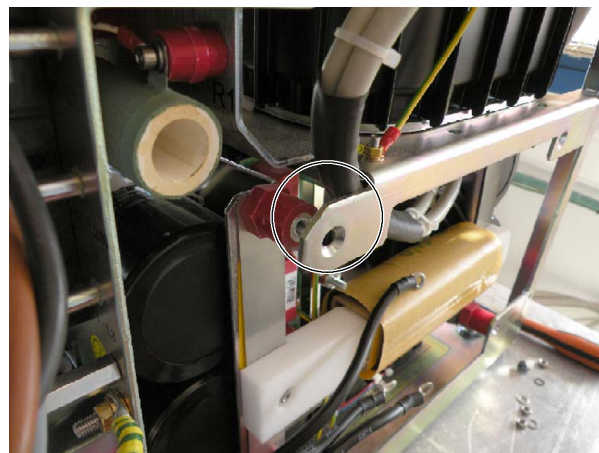


This module is heavy and must be removed through the front of the cabinet.

12. If the Inverter Module is equipped with fans, move the Inverter module to gain access to the supply wires of the fans and disconnect them from the terminal strip located at the back side of the Generator. Due to the polarity of the supply wires of the fans, note their positions in order to restore them properly when re-assembling the Inverter Module.



13. Remove the Inverter Module.
14. Install the new Inverter Module, placing the HV Tank cables in place before attaching the back screws with the nuts removed earlier.



15. Connect all the wires and connectors, removed in the previous steps, to the Inverter Module.

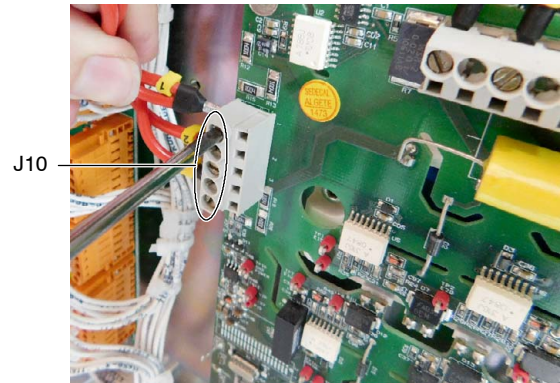
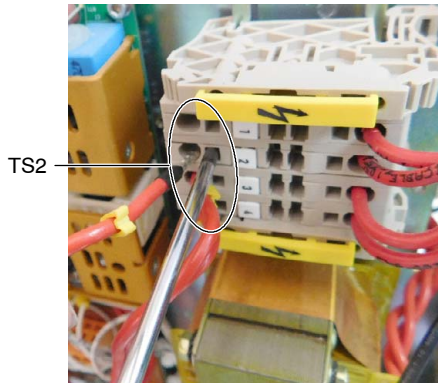


MAKE SURE THAT ALL CONNECTIONS ARE NOT ONLY SECURE BUT ALSO CORRECT.

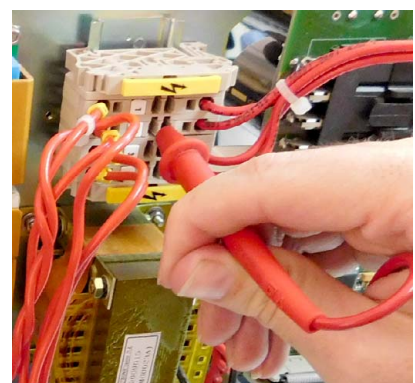
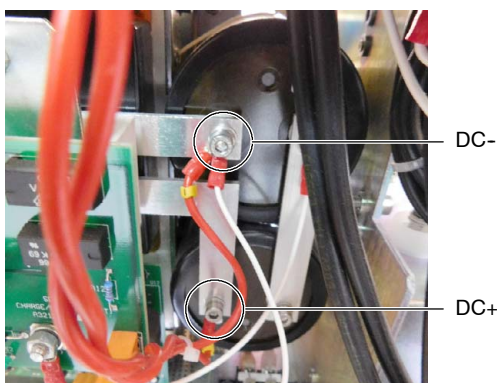
X-ray System

Field Replacement

16. In case the diameter of the ring terminals of the twisted pair cable does not match the diameter of the Capacitor screws, perform the following steps 17. to 19. Otherwise, proceed with step 20.
17. Remove all the Tie wraps from the twisted red cable and disconnect it from TS2-1, TS2-2, TS2-3 and TS2-4; and from J10 of the Dual Speed Starter.



18. Replace the previously removed cable with the one provided with the Inverter module and connect it to TS2, to the Dual Speed Starter and to the DC-BUS bars.
19. Check polarity of the wires:
 - a. For Generators equipped with Booster Module, check polarity from DC- to TS2-1, TS2-4 and J10-3; from DC+ to TS2-2 and J10-1; and from TS2-3 to J10-2.
 - b. For Generators without Booster Module, check polarity from DC- to TS2-1, TS2-4 and J10-3; and from DC+ to TS2-2, TS2-3, J10-1 and J10-2.



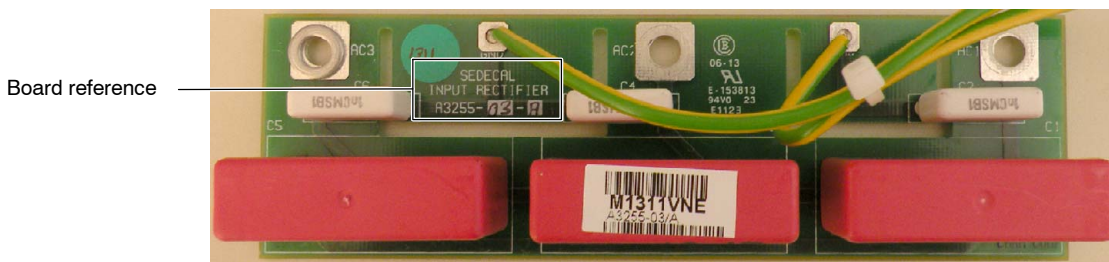
20. Reinstall the Protective Plastic Safety Cover at the front of the Inverter Module.
21. Remove the white cloth that was placed below the Inverter in step 5.
22. Close the Front Panel and secure it to the Generator Frame.
23. Switch ON the Generator, there should be no errors upon powering up. To check that the Inverter Module replacement has been performed successfully:
 - Measure RMS Voltage between 2 AC wires and measure DC voltage between DC bars and apply the following formula:
 $V(\text{DC}) = V_{\text{rms}} (\text{Line}) \times 1.41.$
The result of the previous formula should be equal or greater than the measured voltage between DC bars.
 - Make a few exposures and verify that there are X-rays to ensure proper functioning.
24. Note in the Data Book the cause and date of the replacement in order to provide the maximum information.
25. Reinstall the Back Cover and, finally, the Generator Cover.

JOB CARD 1.2: REPLACEMENT OF THE INPUT RECTIFIER

SUBASSEMBLY: **INPUT RECTIFIER (A3255-XX).**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

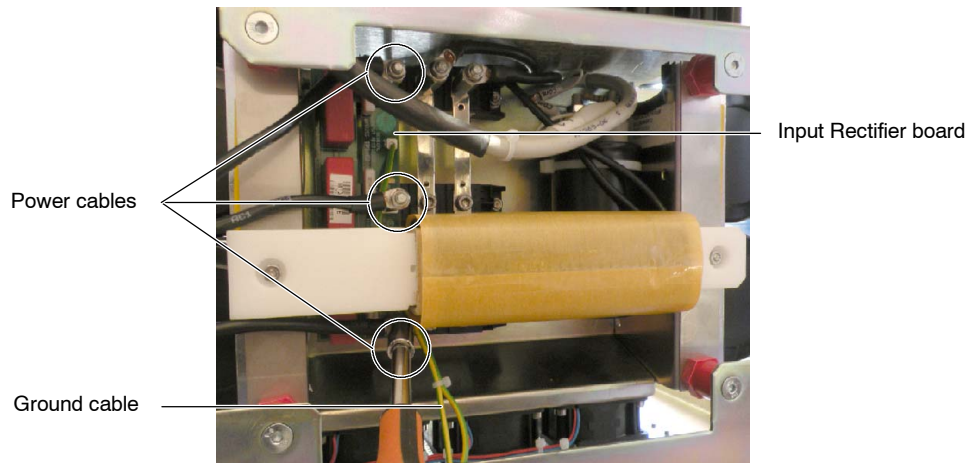
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

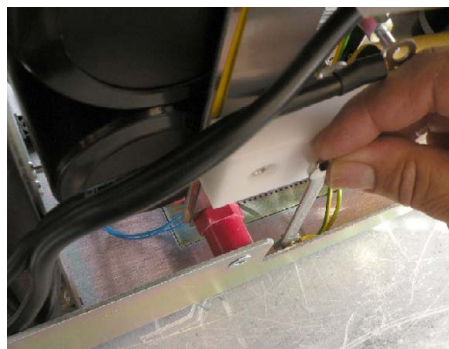


Use the Anti-static Protection Device for handling or replacing any board or electronic part.

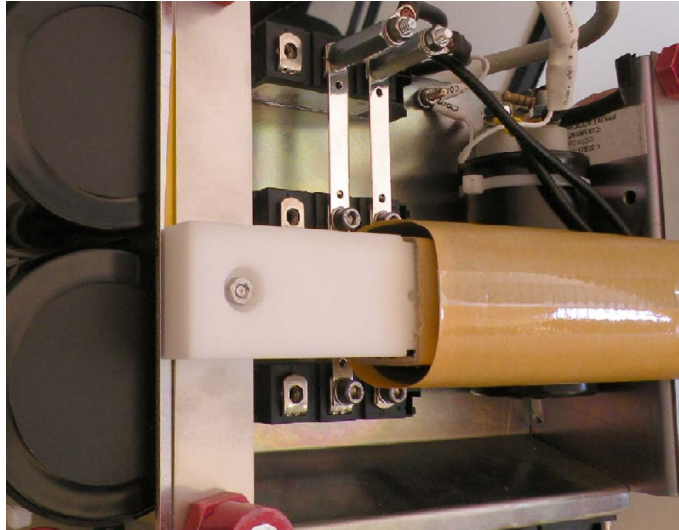
1. Remove the Generator Cover.
2. At the back side of the Cabinet, carefully remove the four Allen screws from the Back Cover of the Generator and remove the Back Cover taking care not to damage the Power line cables.
3. From the back side of the Cabinet, disconnect the Power cables from the Input Rectifier board holding the hexagonal spacer in place while unscrewing the connection.



4. With a socket wrench, disconnect the GND (yellow and green wires) attached to the chassis of the Generator from Input Rectifier board, as shown in the photo below.



5. Unscrew the hexagonal spacers, taking care not to lose the washers, in order to remove the Input rectifier board.
6. Replace the old board with the new one using the previously removed spacers and washers to hold it in place.



7. Reinstall the Ground Cable from the Input Rectifier board to the chassis of the Generator.
8. Reinstall the three Power cables on the Input Rectifier board with nuts and washers holding the hexagonal spacer in place while screwing the connection.
9. Note in the Data Book the cause and date of the replacement and fix an adhesive label in the new board indicating the date and the name of the field engineer in order to provide the maximum information.
10. Reinstall the Back Cover of the Generator and, finally, the Generator Cover.

JOB CARD 1.3: REPLACEMENT OF THE RECTIFIERS

SUBASSEMBLY: **RECTIFIERS ON THE INVERTER MODULE.**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

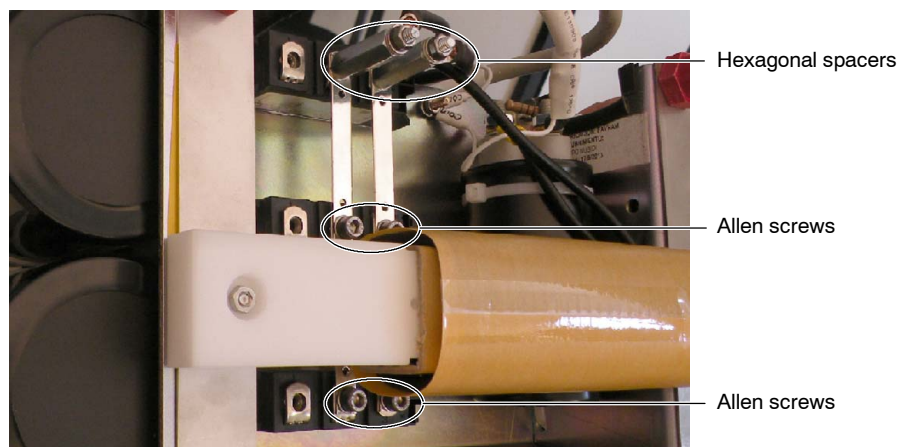
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.



Use the Anti-static Protection Device for handling or replacing any board or electronic part.

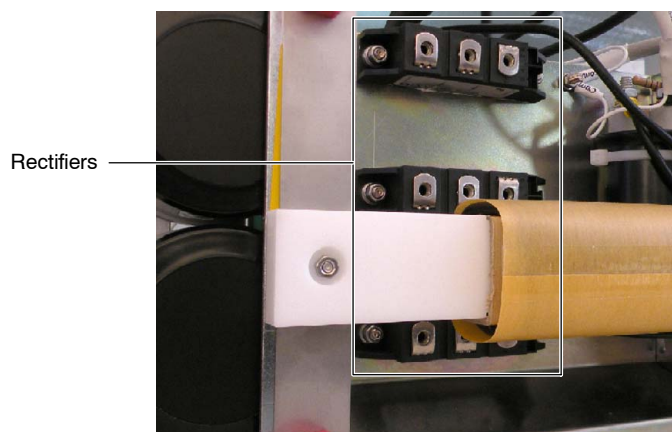
1. Remove the Input Rectifier board as described in the Job Card 1.2.
2. Label and disconnect the DC-BUS Wires (+) and (-) (Nuts and Washers) holding the hexagonal spacers in place while unscrewing the connection.
3. Remove the four Allen screws and the hexagonal spacers that fix the DC-BUS Bars (+) and (-) to the Rectifiers behind.



4. Remove the old Rectifiers and install the new ones. Each Rectifier is fixed to the Module by four washers and two nuts. Note the orientation of the Rectifiers.



Remove and replace the Rectifiers keeping the original orientation (+/-) in order to maintain the Polarity of the Unit.



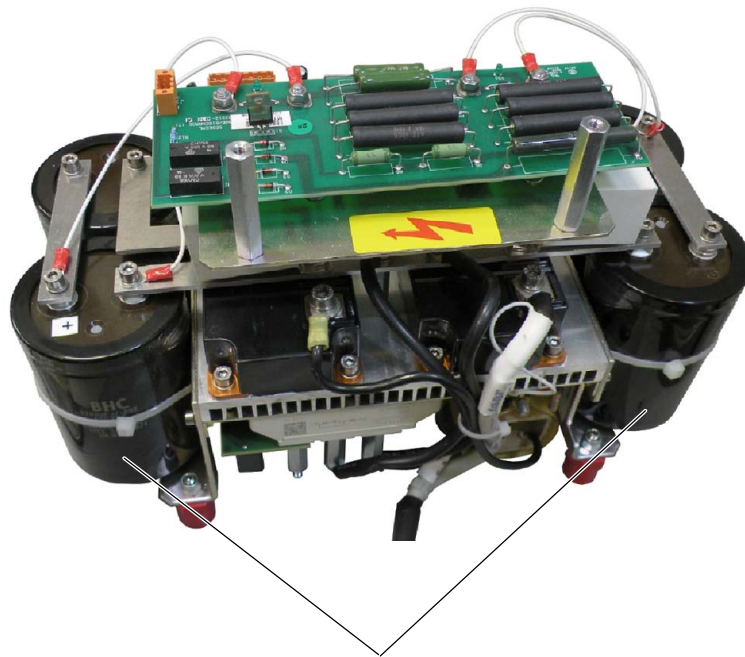
5. Install the DC-BUS Bars with their corresponding Allen screws and hexagonal spacers.
6. Connect the DC-BUS wires (+) and (-) removed before.
7. Reinstall the Input Rectifier board, ensuring that its position matches its original placement.
8. Note in the Data Book the cause and date of the replacement in order to provide the maximum information.
9. Follow with step 7. of the Job Card 1.2.

JOB CARD 1.4: REPLACEMENT OF THE MAIN STORAGE CAPACITORS OF THE HIGH VOLTAGE INVERTER

SUBASSEMBLY: MAIN STORAGE CAPACITORS.

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



Main Storage Capacitors
of the Inverter Module



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

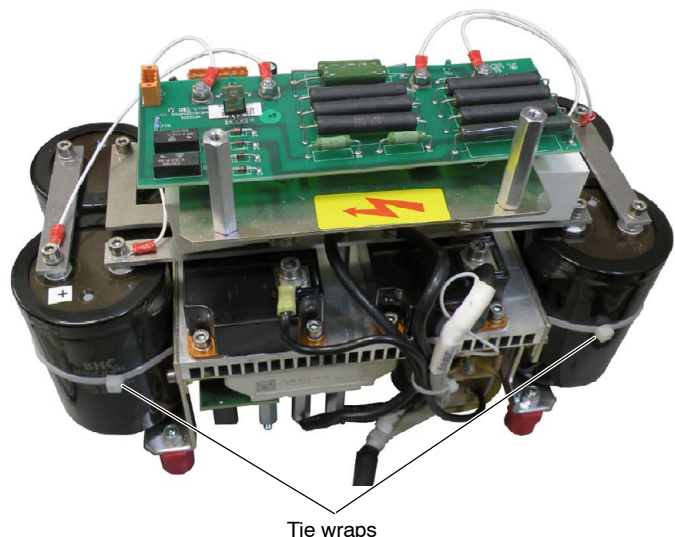
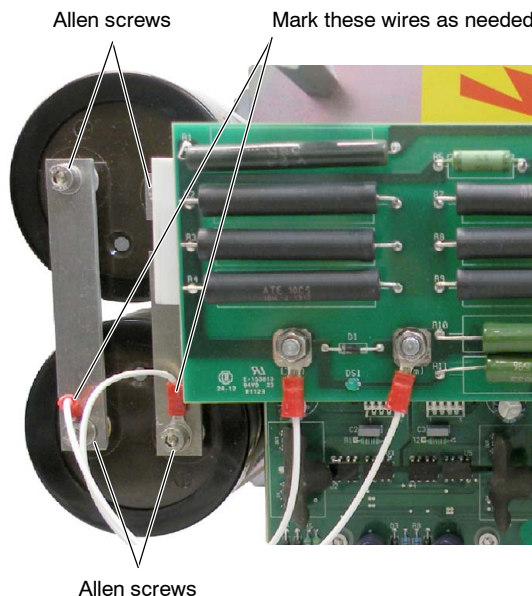
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.



Use the Anti-static Protection Device for handling or replacing any board or electronic part.

1. Remove the Inverter Module as described in the Job Card 1.1 from steps 1 to 13.
2. Position the Module face up in order to access the screws that secure each Storage Capacitor to the DC-BUS. Remove the two screws that fix the Capacitor to be replaced to the DC-BUS. If these screws serve as connections for wires from the Charge/Discharge board, mark the respective wire(s).

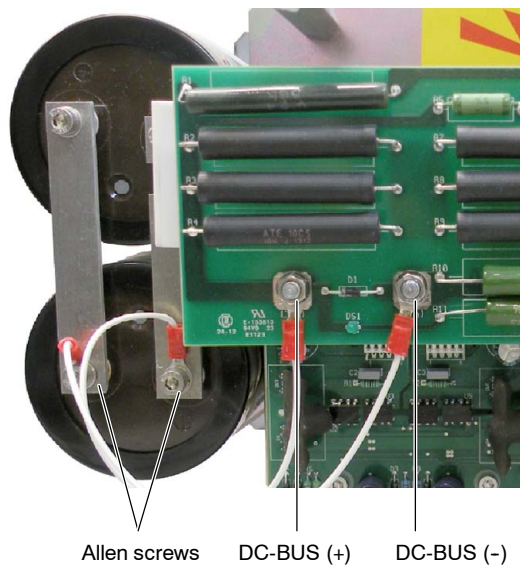


3. While holding the Capacitor to be replaced, cut the Tie wrap that holds the Capacitor to the Module.

4. Place a new Tie wrap through the holes provided in the Module.
5. Install the new Storage Capacitor, securing it to the DC-BUS with the two Allen screws. Reconnect any wires removed from the Charge/Discharge board, if needed.



MAKE SURE THAT THE DC-BUS WIRES (+) AND (-) ARE CONNECTED IN THE CORRECT SCREWS AND SECURED.



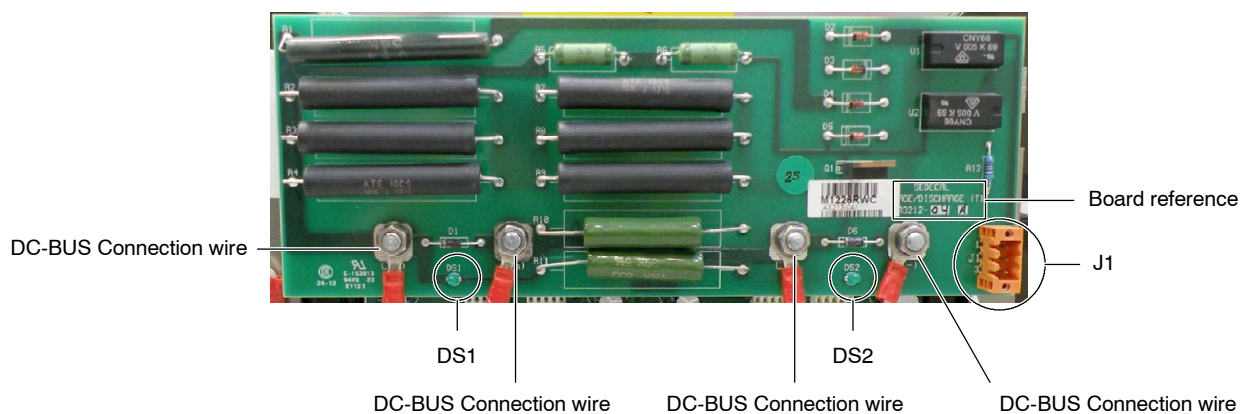
6. Secure the new Storage Capacitor to the module by securing the Tie wrap.
7. Reinstall the Inverter Module as described in Job Card 1.1 from step 14. to the end of the process.
8. Note in the Data Book the cause and date of the replacement in order to provide the maximum information.

JOB CARD 1.5: REPLACEMENT OF THE CHARGE/DISCHARGE BOARD

SUBASSEMBLY: CHARGE/DISCHARGE BOARD (A3212-XX).

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

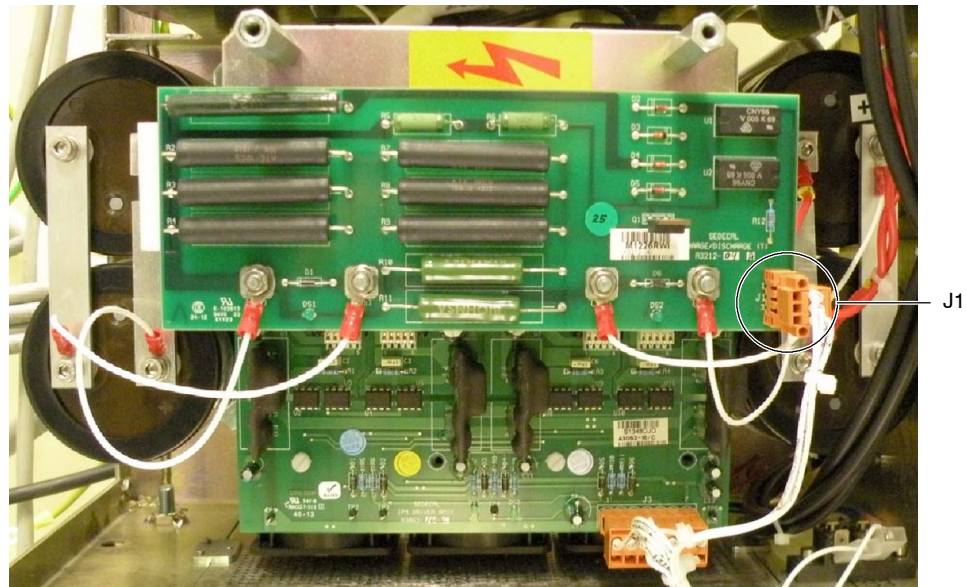
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.



Use the Anti-static Protection Device for handling or replacing any board or electronic part.

1. Remove the Generator Cover.
2. Remove the Allen screw that secure the Front Panel to the Generator Frame and open the Front Panel.
3. Remove the Protective Plastic Safety Cover from the front of the Inverter Module.
4. Remove the connector from J1 on the board.



5. Label and remove the DC-BUS wires (+) and (-) connected to the board and note their position.
6. The board is secured to the Inverter module with the nuts that fix the DC-BUS wires. Once they are removed, the Charge/Discharge board can be removed.
7. Replace the old board with the new one.
8. Reinstall the DC-BUS wires (+) and (-) with the previously removed nuts.
9. Connect the previously removed connector to J1.



MAKE SURE THAT THE DC-BUS WIRES (+) AND (-) ARE CONNECTED IN THE CORRECT SCREWS AND SECURED.

10. Turn the Generator ON.
11. Check for correct operation that:
 - a. LED DS1 is ON.
 - b. Measure the voltage in Resistor R4. It must be 0 VDC when the equipment is ON. This should be more than 200 VDC right after the equipment is Powered OFF.
 - c. Turn the Generator OFF and wait three (3) minutes for the Main Storage Capacitors to discharge.



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

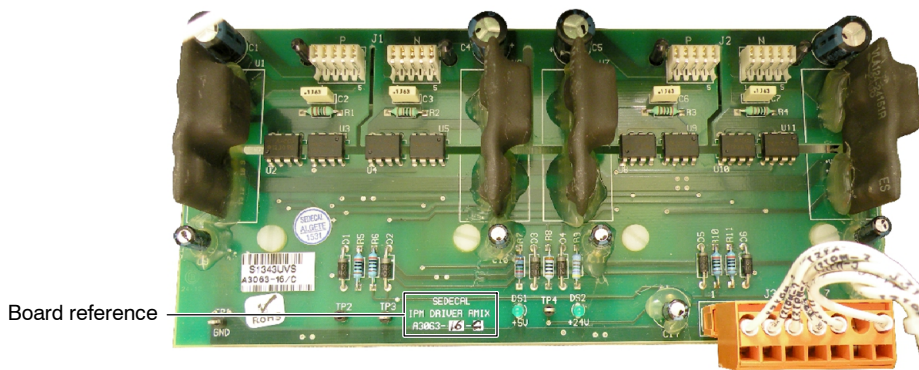
- d. LED DS1 is OFF.
 - e. Measure the voltage in Resistor R4, it must be 0 VDC or close to 0 VDC (less than 10 VDC).
 - f. Measure the voltage at DC-BUS, it must be 0 VDC or close to 0 VDC (less than 10 VDC).
12. Make a functional check of the equipment.
13. Note in the Data Book the cause and date of the replacement and fix an adhesive label beside the new board indicating the date and name of field engineer in order to provide the maximum information.
14. Reinstall the Protective Plastic Safety Cover at the front of the Inverter Module.
15. Close the Front Panel and secure it to the Generator Frame.
16. Reinstall the Generator Cover.

JOB CARD 1.6: REPLACEMENT OF THE IPM DRIVER BOARD

SUBASSEMBLY: IPM DRIVER BOARD (A3063-XX).

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

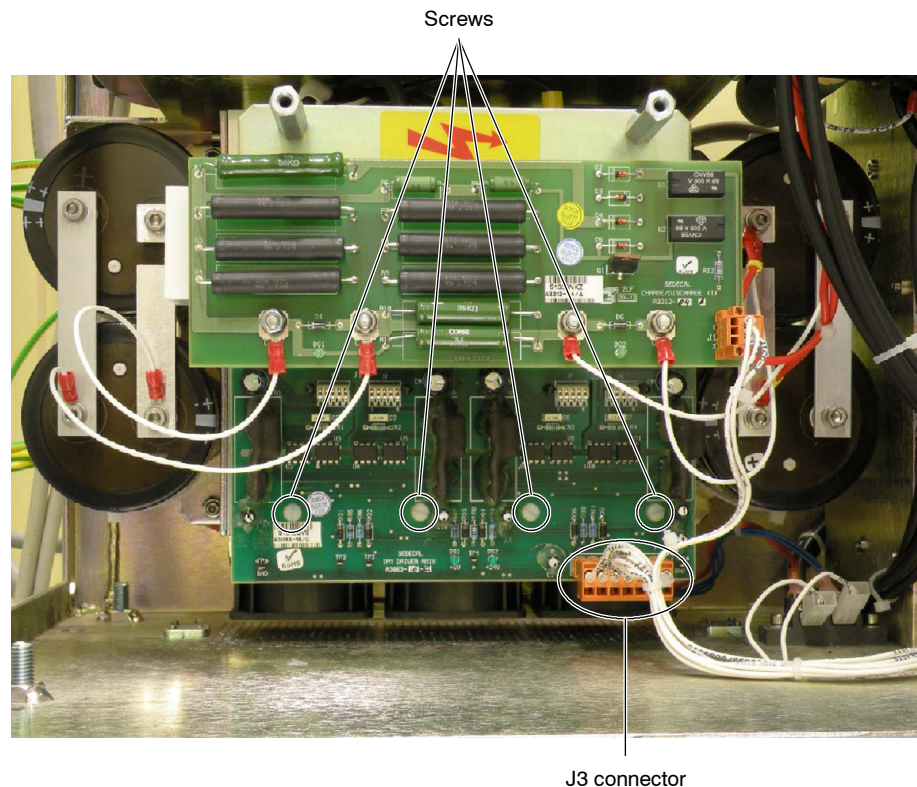
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.



Use the Anti-static Protection Device for handling or replacing any board or electronic part.

1. After accessing the Front Panel, remove the Plastic Safety Cover from the Inverter Module.
2. Disconnect the J3 connector from the board and remove the four screws used to fix the IPM Driver board to the Inverter Module (*refer to the illustration below*).



The pins connected on the back side of the IPM Driver board are fragile, take care when removing it and installing the replacement board.

3. Remove the IPM Driver board by pulling it gently and perpendicular from the Module.
4. When installing the replacement IPM Driver board, ensure that the pins on the IGBTs line up with the connectors on the board.
5. Replace the four screws.
6. Plug the J3 connector.
7. Power ON the Electrical Cabinet and then the System.
8. Check for a correct operation.
9. Make a functional check of the equipment.
10. Note in the Data Book the cause and date of the replacement and fix an adhesive label of the new board indicating the date and name of the field engineer in order to provide the maximum information.

JOB CARD 1.7: REPLACEMENT OF THE IGBT

SUBASSEMBLY: IGBTs IN THE INVERTER MODULE.

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



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 ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF. CHECK THAT THE MEASURED VOLTAGE BETWEEN POSITIVE AND NEGATIVE DC VOLTAGE WIRES ON THE CHARGE/DISCHARGE BOARD IS < 10 VDC.



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

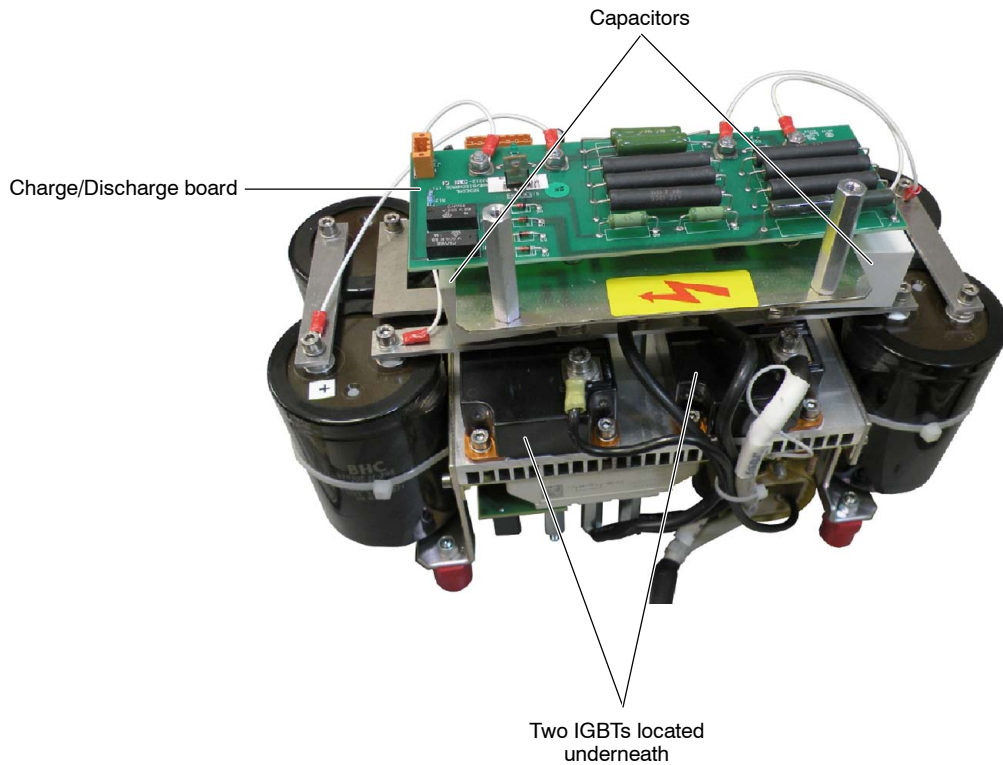
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.



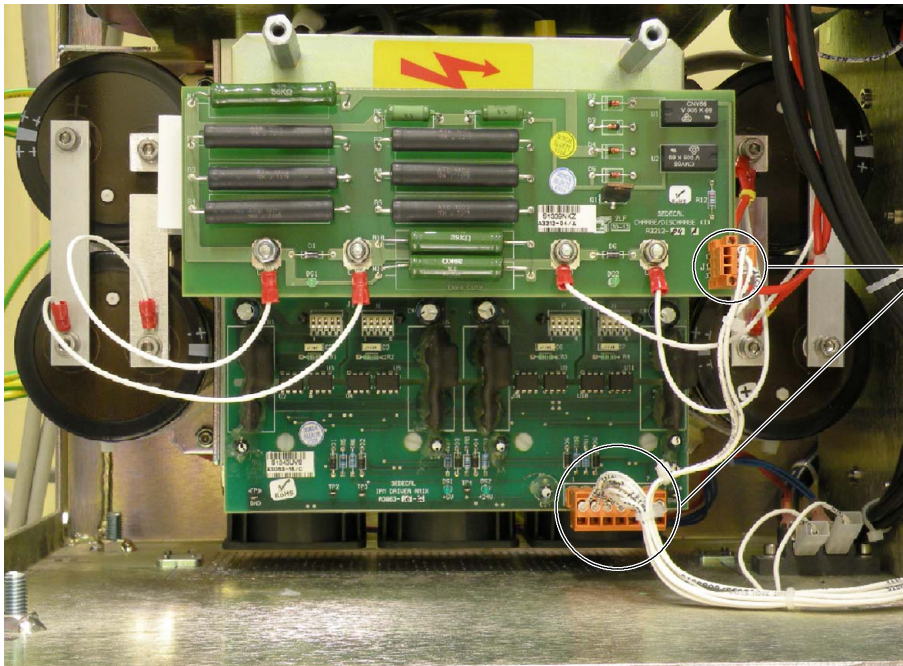
Use the Anti-static Protection Device for handling or replacing any board or electronic part.

Both IGBTs are located at the middle of the Inverter Module (behind the Charge/Discharge and IPM Driver boards and the two capacitors).



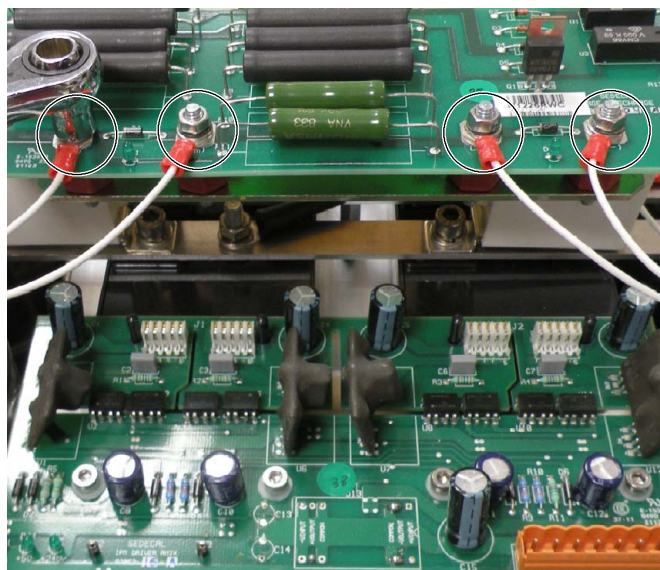
1. Remove the Generator Cover.
2. Remove the Allen screw that secure the Front Panel to the Generator Frame and open the Front Panel.
3. Remove the Protective Plastic Safety Cover from the front of the Inverter Module.

4. Disconnect the Cables from the IPM Driver and Charge/Discharge boards.

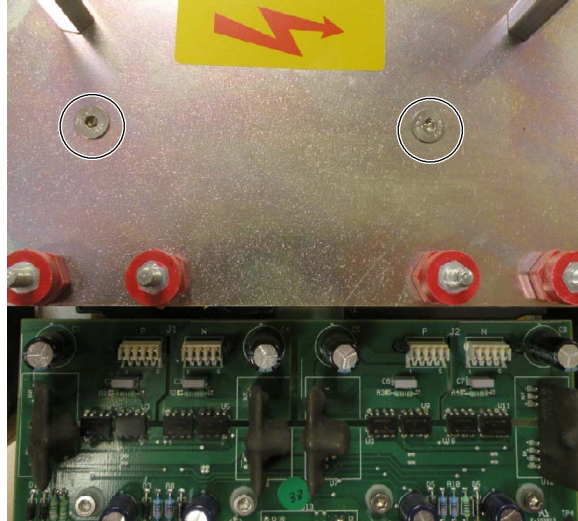


Disconnect both cables

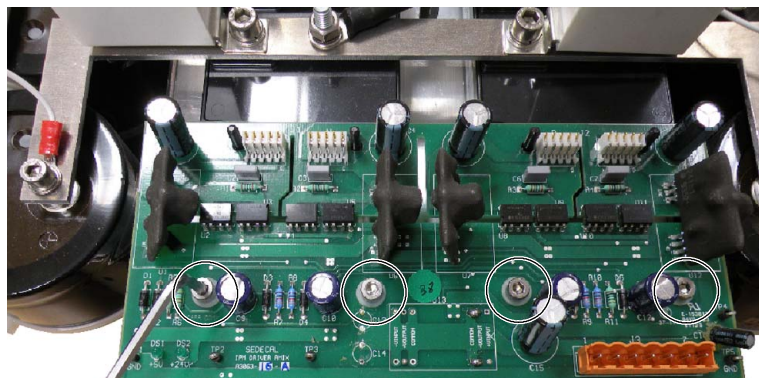
5. Label and disconnect the DC-BUS wires from the Charge/Discharge board, secured with round terminals to the Main Storage Capacitors. Take note of the wires position and mark the respective wire if necessary. The nuts that hold these wires to the board also support the board, hold the Charge/Discharge board when unscrewing the nuts to avoid dropping it and remove it.



6. Unscrew the two allen screws that support the metal plate behind the Charge/Discharge board and remove it.



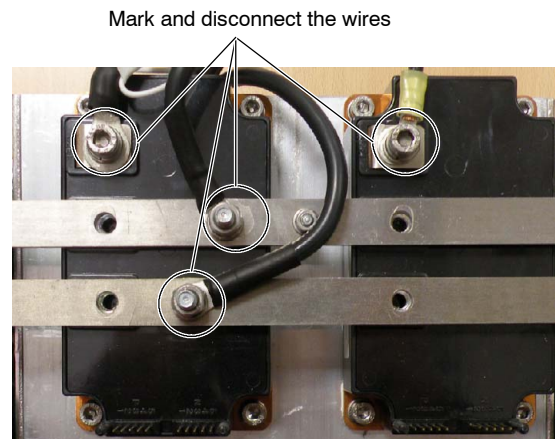
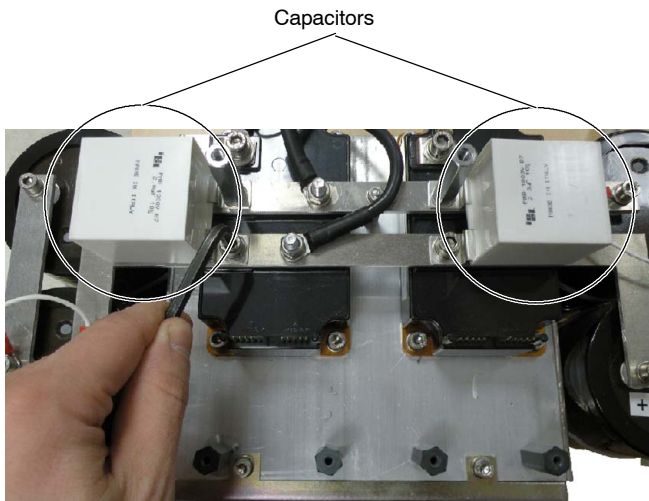
7. Remove the four screws used to fix the IPM Driver board to the Inverter Module.



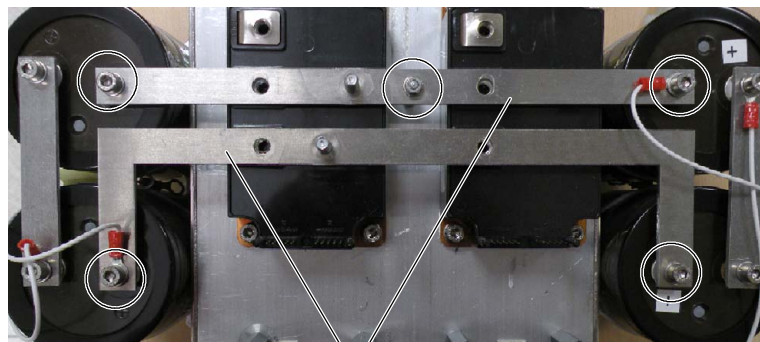
The IGBTs Connector Pins inserted on the back side of the IPM Driver board are fragile. Be careful when removing the board.

8. Remove the IPM Driver board by pulling it gently and perpendicular from the Module.

9. Remove the Allen screws and the standoffs (hexagonal spacers) that secure the two Capacitors (2 Micro/1000 V) on the DC-BUS. Then remove the two Capacitors and the wires connected to the DC-BUS and to the IGBTs. Take note of the wires position and mark the respective wire if necessary.



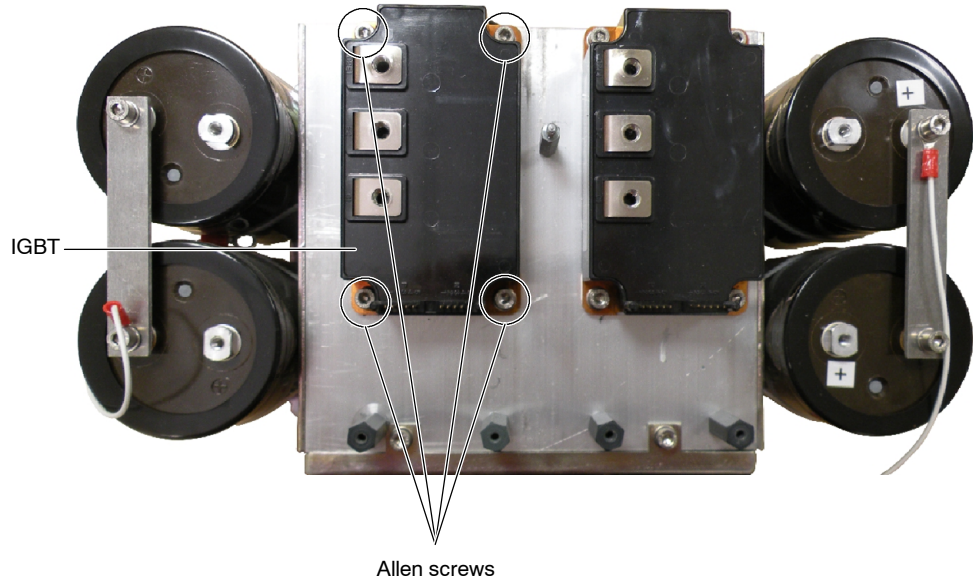
10. Label and disconnect the wires from the DC-BUS and remove the rest of the screws and the DC-BUS (metallic rails) over both IGBTs.



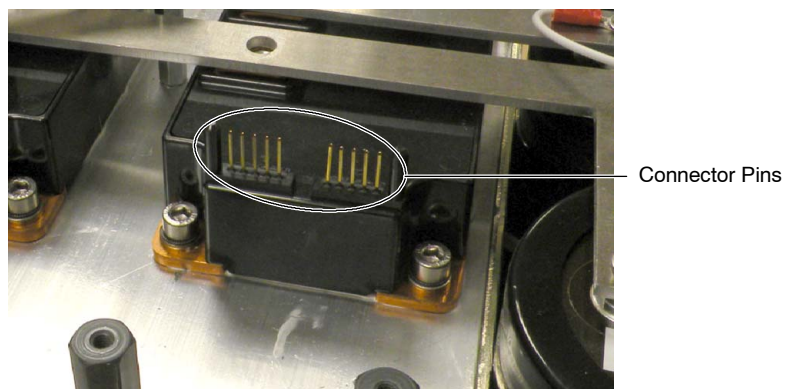
DC-BUS

11. Remove the screws that fix the IGBT to the Heat Sink and take note of the IGBT position.

12. Install the new IGBT keeping a thin layer of semiconductor silicone paste between the IGBT and the Heat Sink. Secure the IGBT to the Heat Sink with the removed Allen Screws.

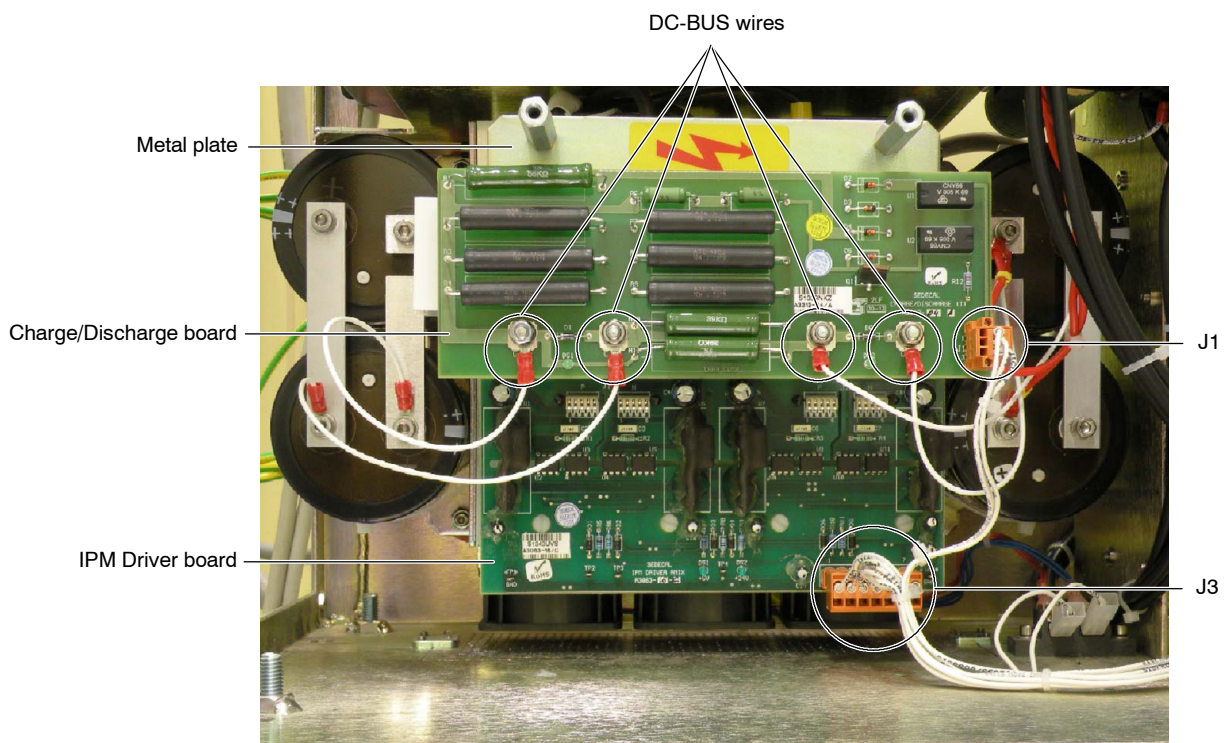


13. Reinstall the DC-BUS (metallic rail) over both IGBTs and connect the previously disconnected wires from the DC-BUS.
14. Reinstall the two Capacitors (2 Micro/1000 V) on the DC-BUS and the wires previously disconnected from the DC-BUS and from the IGBTs.
15. Reinstall the IPM Driver board. Ensure that the IGBTs Connector Pins line up with the connectors on the board.



The IGBTs Connector Pins inserted on the back side of the IPM Driver board are fragile. Be careful when installing the board.

16. Secure the IPM Driver board with the four screws.
17. Reinstall the metal plate and the Charge/Discharge board on it.
18. Reconnect the DC-BUS wires to the Charge/Discharge board and fix it with the previously removed nuts.
19. Reconnect the Cables to the IPM Driver (J3) and Charge/Discharge (J1) boards.



20. Reinstall the Protective Plastic Safety Cover at the front of the Inverter Module.
21. Close the Generator Front Panel and reinstall the Allen screw that secure the Front Panel to the Generator Frame.
22. Reinstall the Generator Cover.
23. Note in the Data Book the cause and date of the replacement in order to provide the maximum information.

JOB CARD 2.1: REPLACEMENT OF THE HIGH VOLTAGE TANK

SUBASSEMBLY: **HIGH VOLTAGE TANK.**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



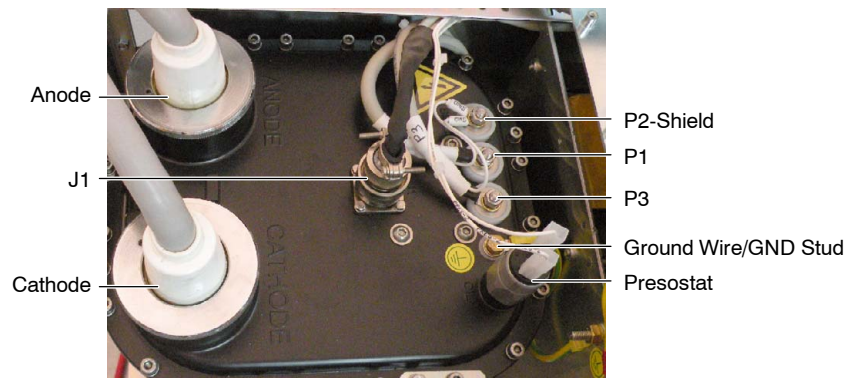
BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

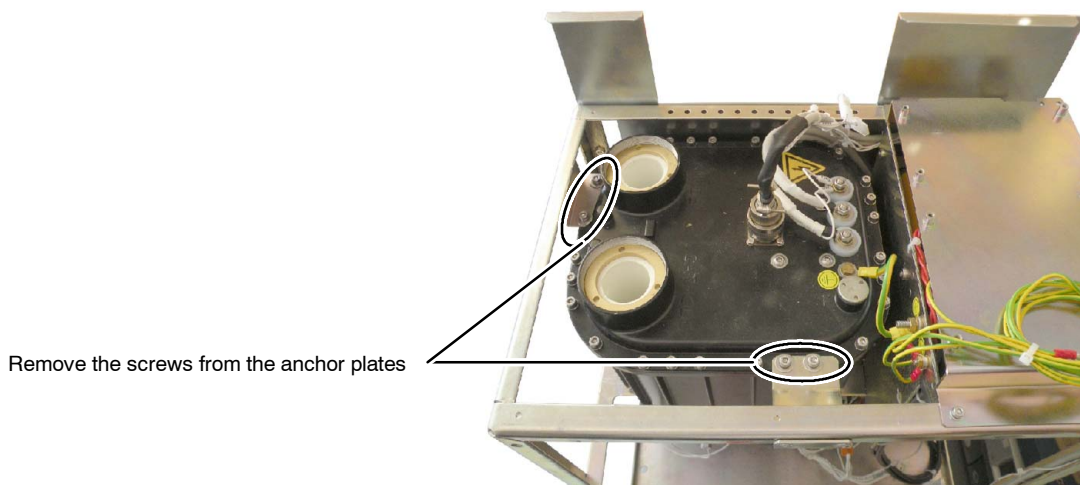
1. First of all, make sure that the Input line is disconnected and the Capacitor bank is properly discharged. Then, disconnect the anode and cathode cables and the following cables from the corresponding terminals on the HV Transformer:
 - P2-Shield, P1 and P3.
 - Ground wire from Ground stud.
 - Connector J1.
 - Presostat.

Illustration 2-1
Cable Connections to the HV Transformer



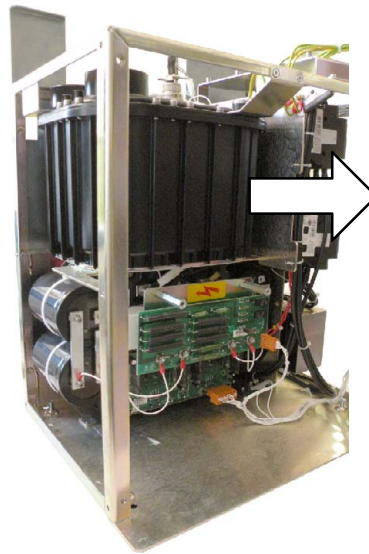
2. Next, unscrew the HV Transformer from its respective anchor plates.

Illustration 2-2
Anchor plates



3. Carefully, take out the HV Transformer from the Generator cabinet and put it aside.

Illustration 2-3 HV transformer removal



4. Install the new HV Transformer inside the Cabinet and secure it with the respective anchor plates. Then, connect the previously removed cables to the corresponding terminals on the HV Transformer.
5. When connecting the P2-Shield (2 thin wires), P1 and P3 cables to the stud-brass terminals, use two wrenches to tighten the nuts (one to hold the base nut in place and the other to tighten the nut over the cable) and to avoid twisting the studs. Ensure that the connection is secure and properly tightened.



THE HV TRANSFORMER HAS TO BE SECURED WITH ITS ANCHOR PLATES INSIDE THE CABINET. OTHERWISE P1, P2 AND P3 STUDS MAY BE IN CONTACT WITH THE CABINET FRAME AND PRODUCE A SHORT-CIRCUIT.

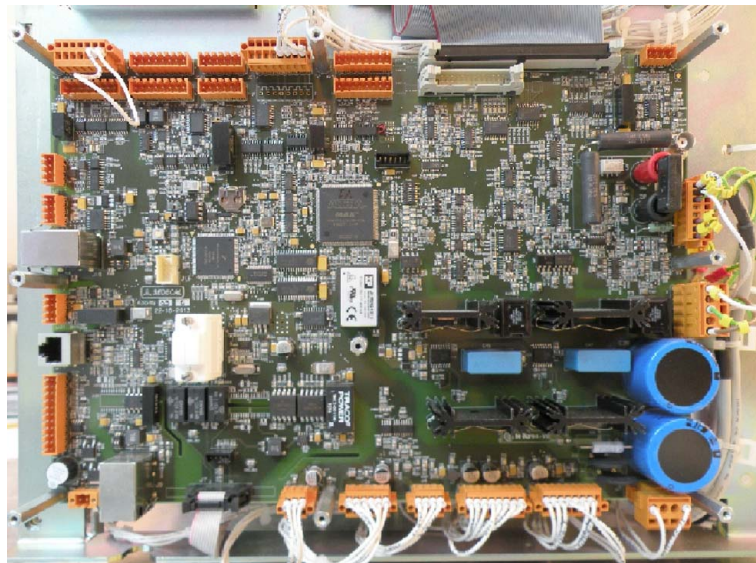
6. Perform the Gains adjustment before calibrating the equipment (*refer to the "Gains adjustment" Section on the Configuration & Calibration document*).
7. Calibrate the Filament Current data (*refer to the "Autocalibration" Section on the Configuration & Calibration document*).
8. Perform the Fall Time adjustment (*refer to the "Fall Time adjustment" Section on the Configuration & Calibration document*).
9. Perform the Fluoro calibration (if needed).

JOB CARD 3.1: REPLACEMENT OF THE CONTROL BOARD

SUBASSEMBLY: **CONTROL BOARD (A3640-XX)**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

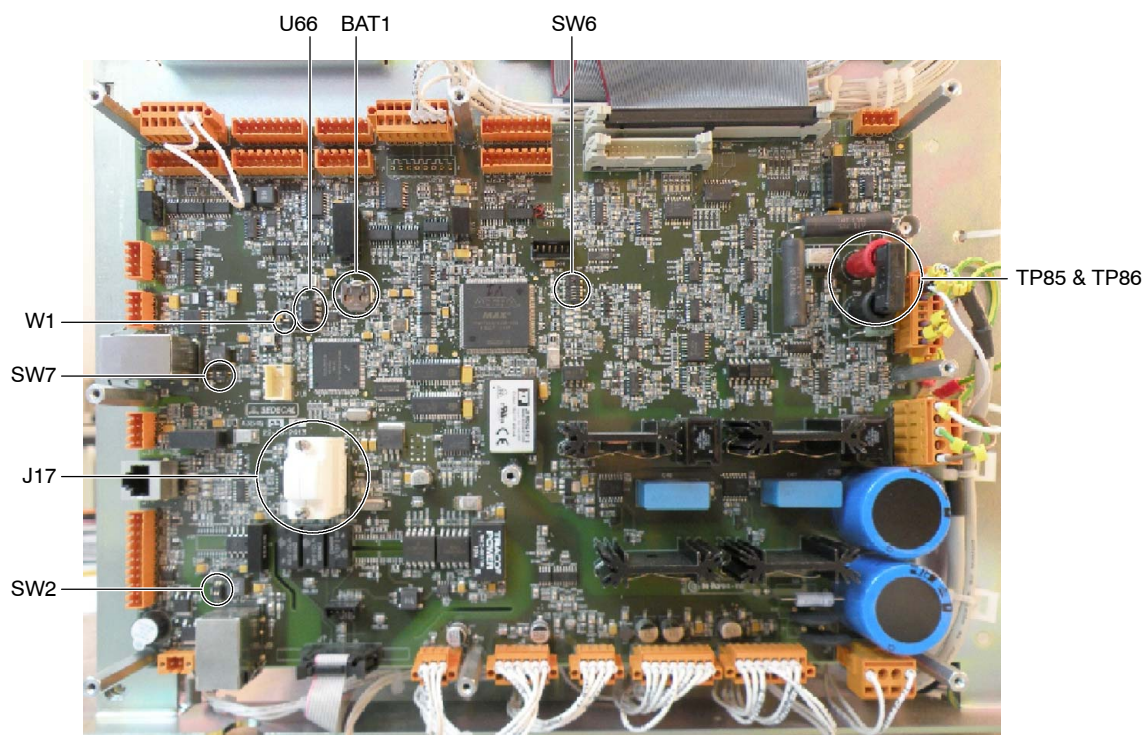
ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

1. Before removing the A3640-XX Control board, make sure to have a backup copy of the Configuration file and, in case of using AEC, of the Calibration file as well. Otherwise, save a backup of the needed data in the computer, if possible (*refer to the Configuration and Calibration documents*). Then, turn off the Generator and power off the Electrical Room Cabinet before proceeding with the next steps.

2. Remove the protective Plastic Safety Cover from the A3640-XX Control board.
3. Mark and unplug all the connectors from the board and remove the Licence from J17.
4. Remove the hexagonal spacers taking care the A3640-XX Control board does not fall.
5. Remove the A3640-XX Control board and put it aside.
6. Mount the new A3640-XX Control board with the previously removed hexagonal spacers.
7. Plug the previously removed connectors and the Licence (J17) and check that the battery is correctly installed in the new board.
8. Check that jumpers in W1 and between TP85 and TP86 are installed.
9. Check that SW2, SW6 and SW7 switches are set as in the previously removed board.

Illustration 2-4

Control board switches, jumpers, battery, Licence and EEPROM location



10. Turn on the Generator and open the Service Console program.

11. Update the software version if necessary (*refer to the Software Update Section of the Troubleshooting document*).
12. Set the configuration parameters as per the customer's request. To do so:
 - Restore the Configuration data from the backup file saved in the computer (*refer to the Configuration & Calibration document*).
 - If there is no backup file or it can not be restored, make a backup copy of the kVp Oscillator value and the mA gains values of the new board (*refer to the Configuration & Calibration document*). Then, transfer the U66-EEPROM from the old board to the new one and restore the kVp Oscillator and mA gains values from the backup file saved before (*refer to the Configuration & Calibration document*).
 - If the backup file can not be restored and the U66-EEPROM is defective, set the configuration parameters as needed by the customer (*refer to the Configuration & Calibration document*).
13. Adjust time and date (*refer to the Configuration & Calibration document*).
14. Download the Tube or the list of tubes to be used (*refer to the Configuration & Calibration document*).
15. Reboot the Generator to apply the changes.
16. Reset the Tube counters and clear the Error log (*refer to the Configuration & Calibration document*).
17. Perform the kVp Oscillator adjustment (*refer to the C&C document*).
18. Calibrate the lowest mA station with 80 kVp for Large Focal Spot. If the lowest mA station of the Generator is not available for Large Focal Spot, calibrate it for Small Focal Spot (*refer to the "Manual Calibration" section on the Configuration & Calibration document*).



PERMANENT DAMAGE CAN BE CAUSED TO THE TUBE IF THE REQUIRED MA STATION IS NOT ACCURATELY CALIBRATED BEFORE PERFORMING THE KVP GAIN ADJUSTMENT.

19. Adjust the kVp gain (*refer to the Configuration & Calibration document*).
20. Perform the Autocalibration of the Filament Current data (*refer to the Configuration & Calibration document*).

Note 

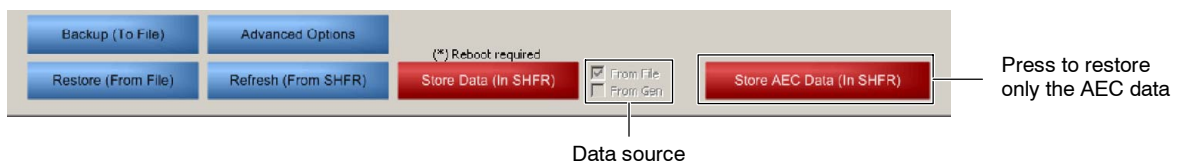
Take into account that if the Filament Current data backup file is restored instead of performing the whole Autocalibration procedure, Filament Current will not be as accurate as it should.

21. Perform the Fall Time adjustment (*refer to the Configuration & Calibration document*). Make sure to save the new value by pressing the “Store Data (In SHFR)” button of the Parameters Calibration screen before proceeding with the next steps.
22. Restore the AEC data, if necessary. To do so, enter in the Parameters Calibration screen of the Service Console, press on the “Restore (From File)” button and select the backup file saved in the computer. All the calibration data of the file will be shown on screen. Then, press **only** on the “Store AEC Data (In SHFR)” button to restore the AEC data, keeping the rest of the data as it was. If the backup file can not be restored, calibrate the AEC (*refer to the Configuration & Calibration document*).

Note 

Take into account that after pressing the “Restore (From File)” button, the data shown on screen is not saved to the Generator yet.

Illustration 2-5
AEC data storage



When restoring the AEC data, take care not to press on the “Store Data (In SHFR)” button. Otherwise, Gains, Fluoro and Digital potentiometers data will be replaced by the data of the previous board.

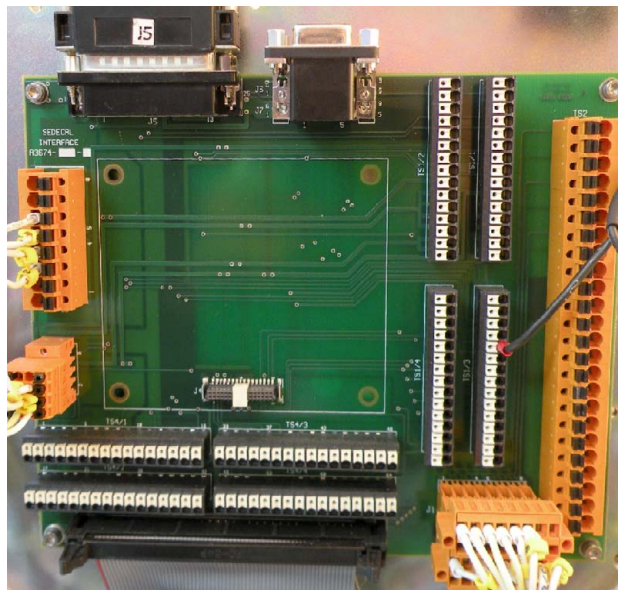
23. Calibrate Fluoro and ABC, if necessary (*refer to the Configuration & Calibration document*).
24. Write the Generator Serial number by double-clicking on it on the Service Console program. A password is required, use the password for advanced options (*refer to the Configuration & Calibration document*).
25. Save a general backup in the computer (*refer to the Configuration & Calibration document*).
26. Screw the protective Plastic Safety Cover to the hexagonal spacers.

JOB CARD 3.2: REPLACEMENT OF THE INTERFACE BOARD

SUBASSEMBLY: **INTERFACE BOARD (A3674-XX)**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

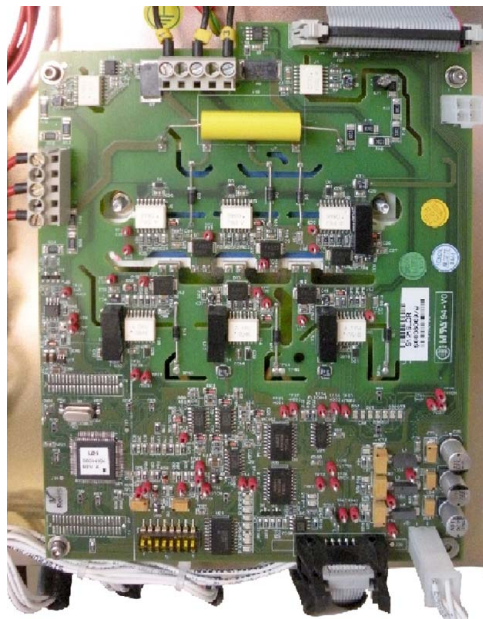
1. Mark and remove all the connectors and wires from the Interface board.
2. Unscrew the Interface board from the front panel and install the new one.
3. Connect all the previously removed connectors and wires in the same position.

JOB CARD 4.1: REPLACEMENT OF THE DUAL SPEED STARTER

SUBASSEMBLY: DUAL SPEED STARTER (S0008009)

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

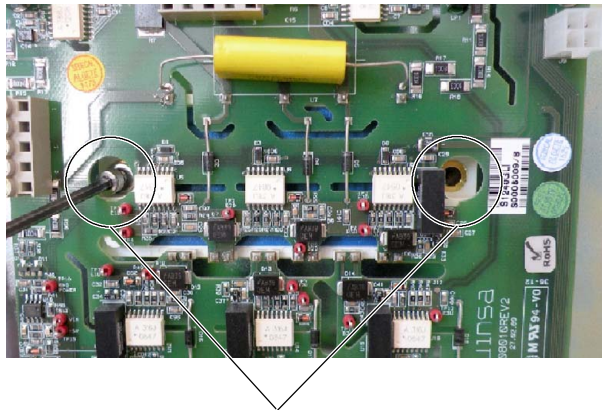
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

1. Remove the protective Plastic Safety Cover from the Dual Speed Starter.
2. Mark and remove all the connectors and wires from the Dual Speed Starter.

3. Unscrew the Dual Speed Starter from the Back Panel by removing the hexagonal spacers and the two screws that hold the IGBT of the board to the Back Panel.

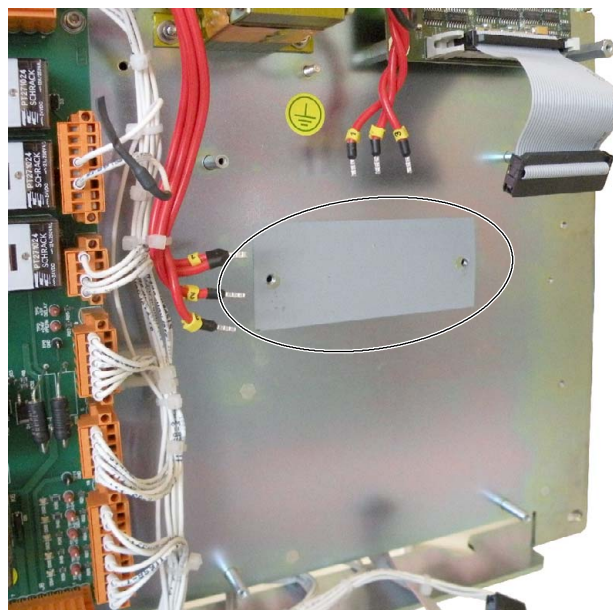
Illustration 2-6
IGBT screws



Unscrew before removing the board

4. Install the new Dual Speed Starter, screwing the four hexagonal spacers and the two screws of the IGBT to the Back Panel, making sure that the self-adhesive protector remains stuck to the back panel.

Illustration 2-7
Self-adhesive protector



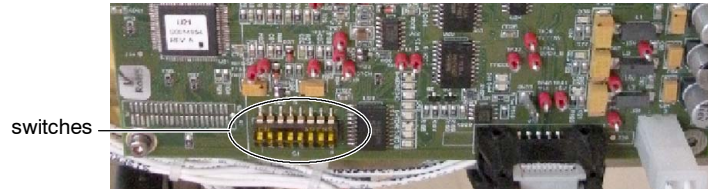
X-ray System

Field Replacement

5. Check that switch S1-2 is set to ON and the remaining switches are set to OFF.

Illustration 2-8

Dual Speed Starter switches



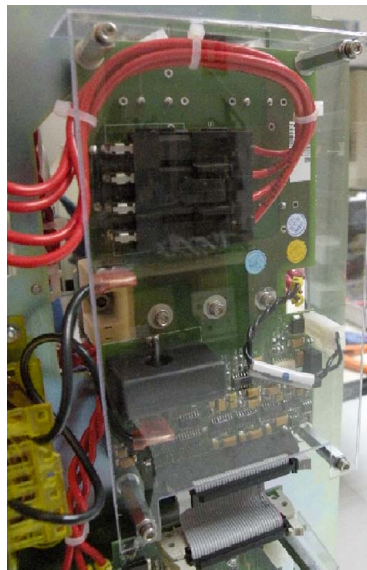
6. Connect all the previously removed connectors and wires in the same position and screw the protective Plastic Safety Cover.

JOB CARD 4.2: REPLACEMENT OF THE BOOSTER MODULE

SUBASSEMBLY: BOOSTER MODULE (S0008007)

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

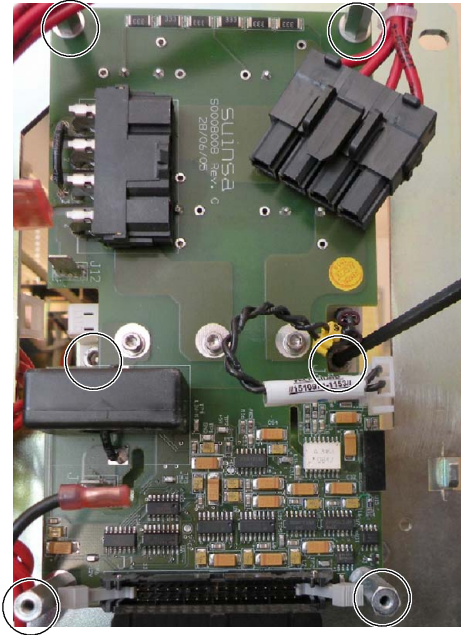
ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

1. Remove the protective Plastic Safety Cover from the Booster Module.
2. Mark and remove all the connectors and wires from the Booster Module.
3. Unscrew the IGBT from the Back Panel (two screws).

4. Unscrew the Booster Module from the Back Panel by removing the four hexagonal spacers.

Illustration 2-9

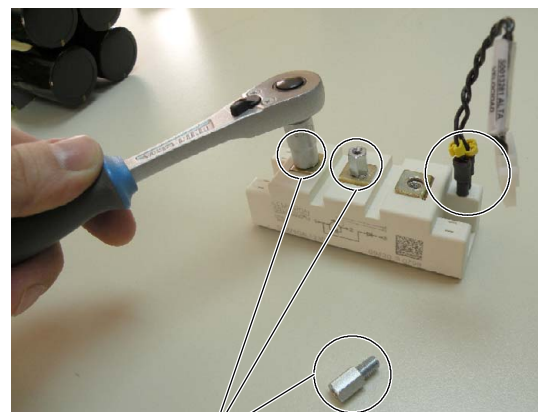
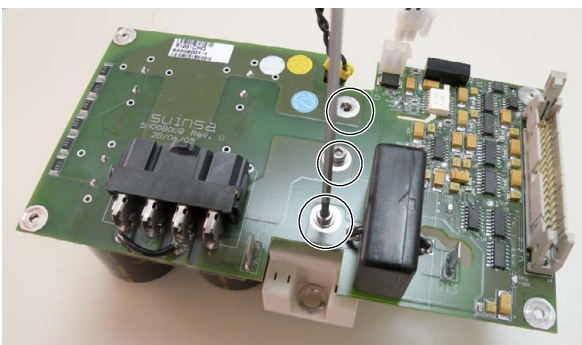
IGBT screws and hexagonal spacers



5. Unscrew the IGBT from the board and remove the three hexagonal spacers from the IGBT.

Illustration 2-10

IGBT spacers



Hexagonal spacers

6. Install the cable in the new IGBT, taking care to plug the two wires in the same position as in the old IGBT.

7. Mount the previously removed spacers on the new IGBT and screw it to the new board. Connect the IGBT connector to J6 of the board.

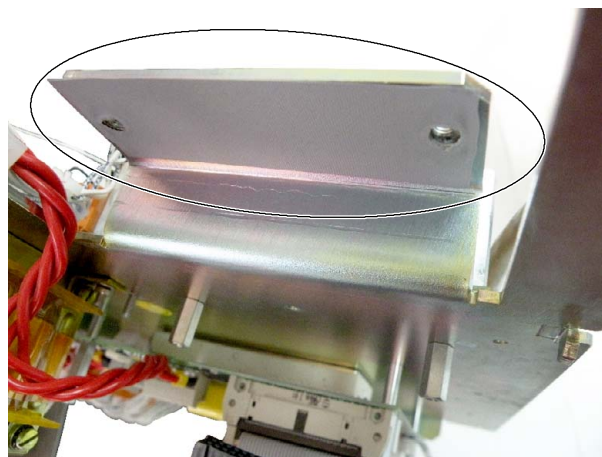
Illustration 2-11
J6 connector



IF THE TWO WIRES OF THE IGBT CABLE ARE NOT CONNECTED IN THE CORRECT POSITION IN THE IGBT AND/OR THE CABLE IS NOT CONNECTED TO J6 OF THE S0008007 BOOSTER MODULE BEFORE POWERING ON THE GENERATOR, PERMANENT DAMAGE WILL BE CAUSED TO THE EQUIPMENT.

8. Install the new Booster Module, screwing the four hexagonal spacers and the new IGBT to the Back Panel, making sure that the self-adhesive protector remains stuck to the back panel.

Illustration 2-12
Self-adhesive protector



9. Connect all the previously removed connectors and wires in the same position and screw the protective Plastic Safety Cover.

JOB CARD 4.3: REPLACEMENT OF THE BOOSTER IGBT

SUBASSEMBLY: **BOOSTER IGBT (S0009814)**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

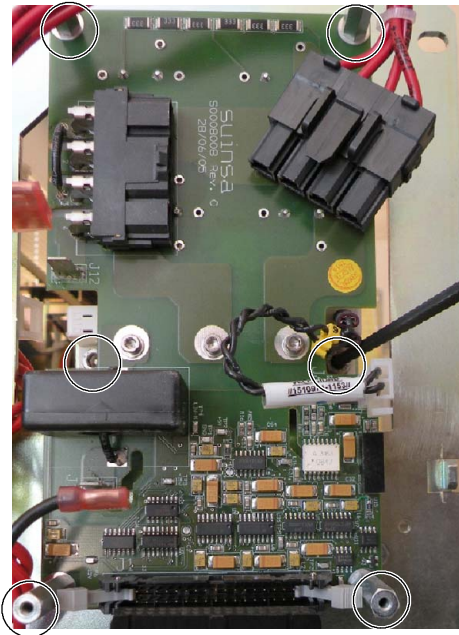
DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

1. Remove the protective Plastic Safety Cover from the Booster Module.
2. Mark and remove all the connectors and wires from the Booster Module.
3. Unscrew the IGBT from the Back Panel (two screws).

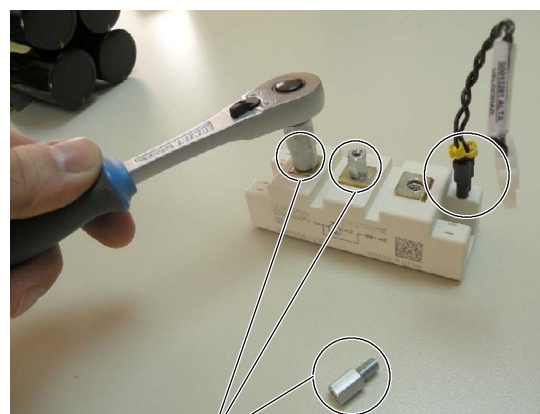
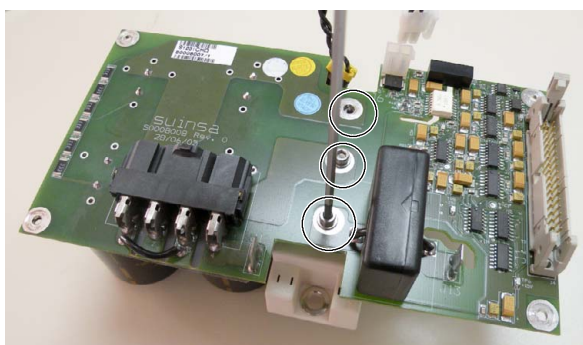
4. Unscrew the Booster Module from the Back Panel by removing the four hexagonal spacers.

Illustration 2-13
IGBT screws and hexagonal spacers



5. Unscrew the IGBT from the board and remove the three hexagonal spacers and the cable from the IGBT.

Illustration 2-14
IGBT spacers



Hexagonal spacers

6. Install the cable in the new IGBT, taking care to plug the two wires in the same position as in the old IGBT.

7. Mount the previously removed spacers on the new IGBT and screw it to the board. Connect the IGBT connector to J6 of the board.

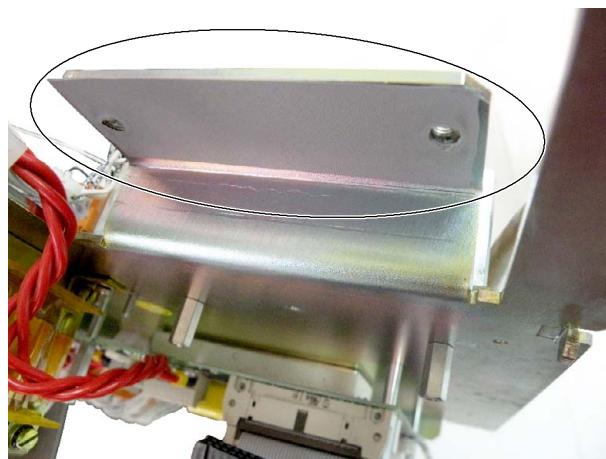
Illustration 2-15
J6 connector



IF THE TWO WIRES OF THE IGBT CABLE ARE NOT CONNECTED IN THE CORRECT POSITION IN THE IGBT AND/OR THE CABLE IS NOT CONNECTED TO J6 OF THE S0008007 BOOSTER MODULE BEFORE POWERING ON THE GENERATOR, PERMANENT DAMAGE WILL BE CAUSED TO THE EQUIPMENT.

8. Install the Booster Module, screwing the four hexagonal spacers and the new IGBT to the Back Panel, making sure that the self-adhesive protector remains stuck to the back panel.

Illustration 2-16
Self-adhesive protector



9. Connect all the previously removed connectors and wires in the same position and screw the protective Plastic Safety Cover.

JOB CARD 4.4: REPLACEMENT OF THE SUPPLY BOARD

SUBASSEMBLY: **SUPPLY BOARD (A3646-XX)**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

1. Mark and remove all the connectors and wires from the Supply board.
2. Unscrew the Supply board from the Back Panel and install the new one.
3. Connect all the previously removed connectors and wires in the same position.

JOB CARD 4.5: REPLACEMENT OF THE POWER SUPPLY

SUBASSEMBLY: **POWER SUPPLY**

TOOLS: Standard Service Tool Kit and Anti-static Protection Device.

PROCEDURE



BEFORE REPLACING THIS PART BE SURE THAT THE GENERATOR AND THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) ARE POWERED OFF.

DO NOT SUPPLY THE MAIN POWER FROM THE ELECTRICAL ROOM CABINET (MAIN DISCONNECT) OR TURN ON THE SYSTEM UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT.

ALSO, FOLLOW THE GENERAL CAUTIONS INDICATED AT THE BEGINNING OF THIS DOCUMENT.

1. Unscrew and remove the covers from the Power supply.
2. Unplug both connectors from the Power supply.

3. Unscrew and remove the Power supply and replace it by the new one.

Illustration 2-17
Power supply without covers



4. Connect all the previously removed connectors in the same position.
5. Adjust the Power supply potentiometer (*refer to the Troubleshooting document*).
6. Put the covers back.

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SECTION 3 RAD TABLE PROCEDURES

The Job Cards of this Section are intended to be guides to the most common problems that arise, but not to all of them, and to give the instructions for replacing the spare parts included in the Renewal Parts document.

It is mandatory to follow the security procedures before any mechanical or electrical intervention:

- **Electrical Safety Procedures:** Isolate all the electrical sources.
- **Mechanical Safety Procedures.** It is mandatory when required in the job cards.



ALWAYS PROCEED TO ACCOMPLISH THESE PROCEDURES WITH THE SYSTEM SWITCHED OFF. IF IT IS REQUIRED TO TURN IT ON, USE ALWAYS SAFE ELECTRICAL PRACTICES TO SAFEGUARD FROM THE UNEXPECTED ENERGIZATION OR START UP OF THE EQUIPMENT, OR THE RELEASE OF HAZARDOUS ENERGY DURING SERVICE OR MAINTENANCE ACTIVITIES.



PERSONAL PROTECTION EQUIPMENT IS A REQUIREMENT WHEN PROCEEDING TO ACCOMPLISH ALL THESE PROCEDURES.



After accomplishing any of these procedures, proceed to check the RAD Table correct operation. For further information refer to the Functional Checks Section of the Installation document.

Note 

It is highly recommended to place the Overhead Tube Crane at a safe distance from the RAD Table, which allows the procedures to be carried out conveniently.

X-ray System

Field Replacement

RAD TABLE JOB CARDS LIST	
JOB CARD	DESCRIPTION
BASE FRAME	
Job Card 1.1	Motor Replacement
Job Card 1.2	Double Pedals Set Installation (Option)
Job Card 1.3	Control Pedals Kit Replacement
Job Card 1.4	Input Module Replacement
Job Card 1.5	AC Power Supply Cable Replacement
TABLETOP	
Job Card 2.1	Additional Emergency OFF Switch (Option)
Job Card 2.2	Vertical Height Potentiometer Replacement

JOB CARD 1.1: MOTOR REPLACEMENT

SUBASSEMBLY: TABLE BASE FRAME

TOOLS: Locking Rods, Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE



Note 

In case of breakdown or malfunction, it is mandatory to replace both motors as a precautionary measure.

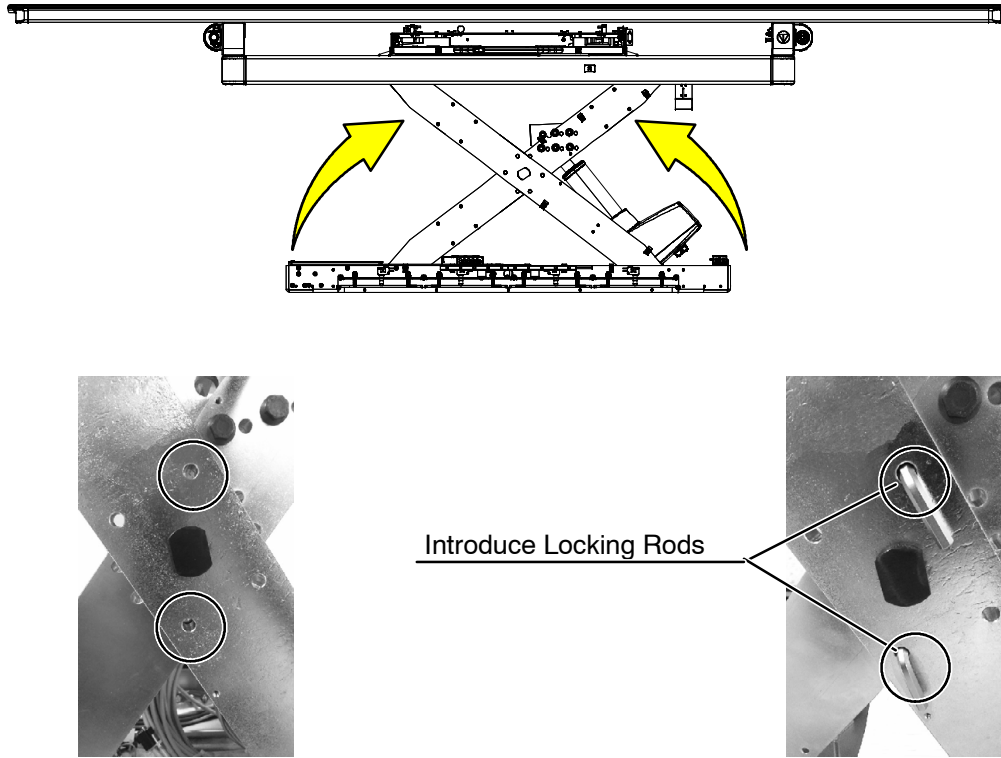
1. Lift the Tabletop at its higher position.
2. Loosen and disassemble the Covers of the Table Base (*refer to the IN-1235Rx document for further information about covers disassembly*).
3. Enable the Service Mode.
4. Loosen carefully the Height Potentiometer from the fixation screw located at the bottom of the Base.



Once the potentiometer has been released, in order to avoid equipment damages, ensure that the retractable wire is carefully rolled up from the lower end until it is finally attached to the back of the tabletop.

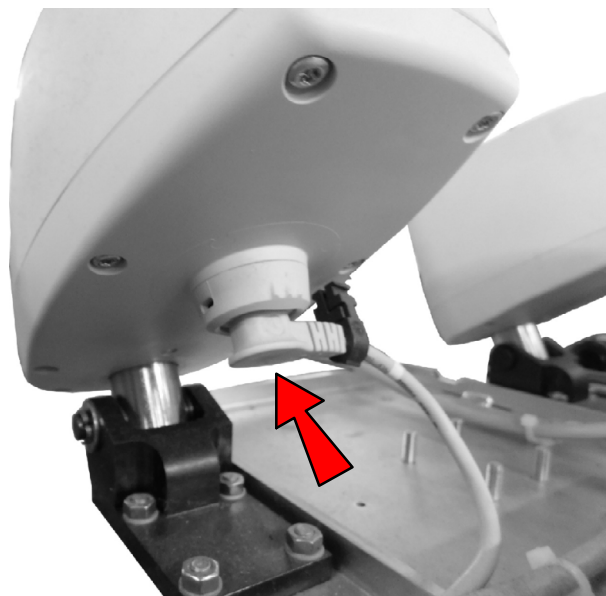
5. Block the legs of the Table. Both legs must be aligned so it is possible to lock mechanically their position introducing a locking rod in almost one bore for each pair of legs.

Illustration 3-1
Table Locking Procedure



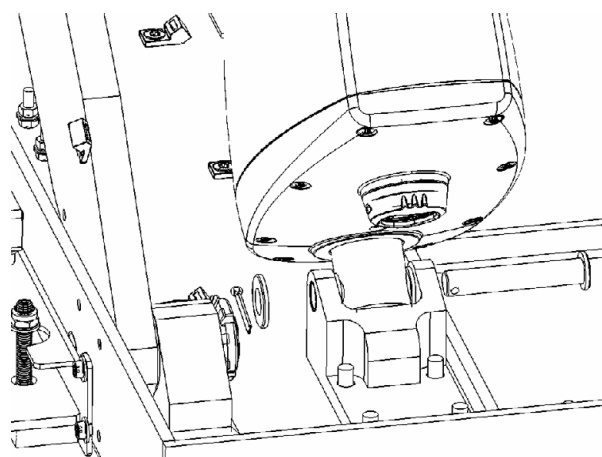
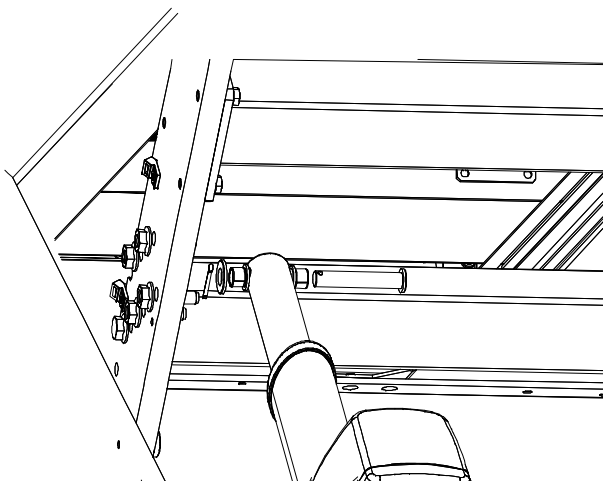
6. Disconnect the power cable from both motors.

Illustration 3-2
Motor Power Cable



7. Remove the locking washers of the motor to be replaced and remove the pin at both ends of the motor.

Illustration 3-3
Motor Fixations



8. Remove the Motor and proceed to install the new one. Once the new motor has been mounted on the base, connect the power cable.



ONLY CONNECT THE NEWLY REPLACED MOTOR TO THE POWER SUPPLY IN ORDER TO AVOID EQUIPMENT DAMAGE WHEN PROCEEDING TO ADJUST ITS POSITION.



DUE TO THIS TYPE OF MOTORS INCLUDES A MECHANICAL DECLUTCHING DEVICE, IT IS MANDATORY TO FULLY EXTEND THE HOIST CYLINDER OF THE INSTALLED MOTOR, IN ORDER TO AVOID PERSONAL INJURIES AND/OR EQUIPMENT DAMAGE WHEN PROCEEDING TO MAKE THE FUNCTIONAL CHECKING OF THE TABLE VERTICAL MOVEMENT.

9. Press and hold the “Raise” control pedal until the maximum height has been reached. Once the hoist cylinder is fully extended, reinstall the locking washers and the pin at both ends of the motor.



Disconnect the newly installed motor before to repeat the same procedure with the second one.

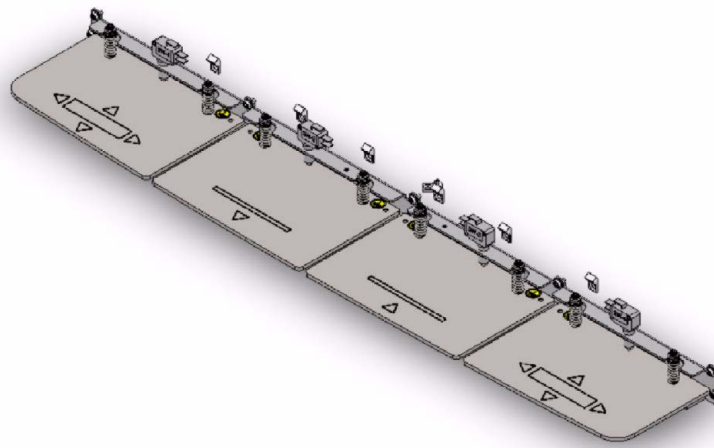
10. Ensure the first installed motor is disconnected and proceed to replace the second one in the same way as the first.
11. Remove the locking rods from the legs bores to unlock the vertical movement.
12. Once the new motors have been mounted proceed to make the functional checking of the vertical movement.
13. Once it has been checked proceed to install the Covers and disable the Service Mode.

JOB CARD 1.2: DOUBLE PEDALS SET INSTALLATION (OPTION)

SUBASSEMBLY: TABLE BASE FRAME

TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE

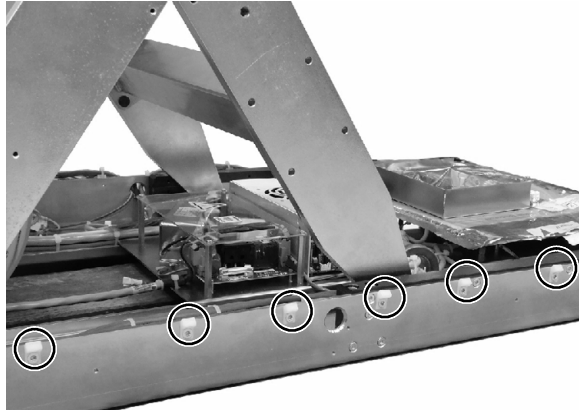


The Double Pedals Set is an option that may be installed in factory when ordered by the customer, but it can also be installed in field to upgrade a previously installed RAD Table. For its installation proceed as indicated:

1. Disconnect the RAD Table from the Room Electrical Cabinet.
2. Remove the Tabletop right side end-stop and remove it, but not completely, and leave space enough to work properly.
3. Remove the Covers of the Table Base to get free access to the back of the bottom frame (*refer to the IN-1235Rx document for further information about covers disassembly*).

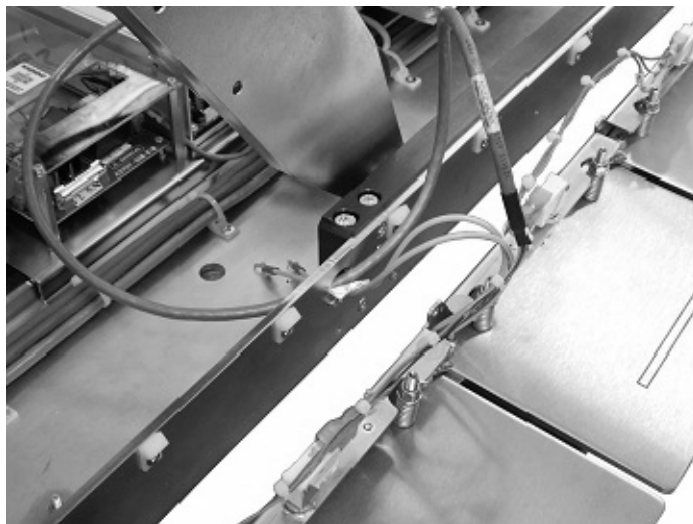
4. Tighten to the frame base the wraps for the pedals microswitches cables.

Illustration 3-4
Fix all Wraps for Cables



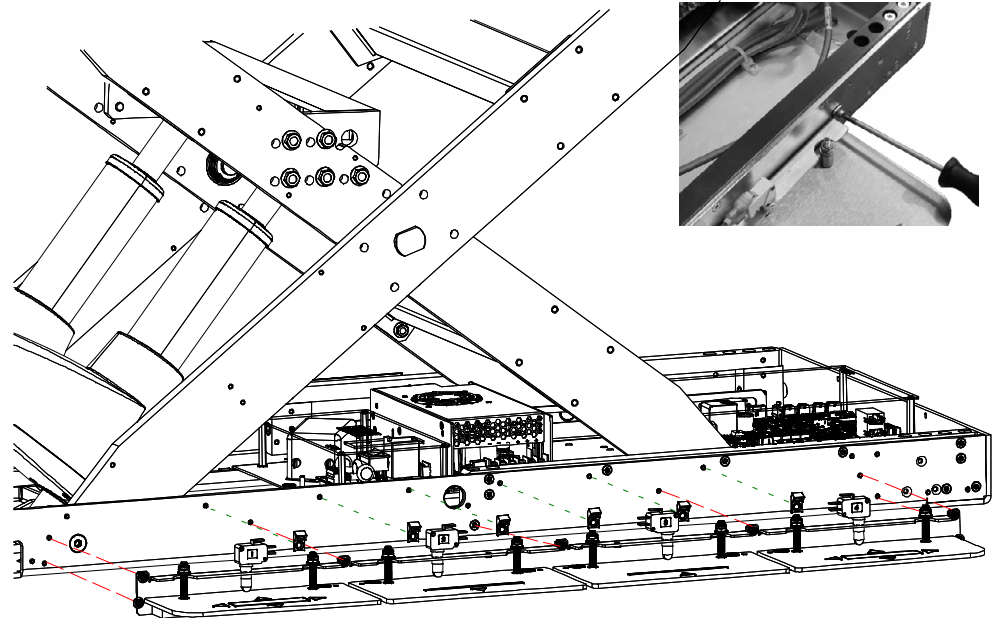
5. Place the Control Pedals Set in its final position and route the GND Cables and Pedals Cable inside the Table Base.

Illustration 3-5
Route Control Pedals and GND Cables inside the Base



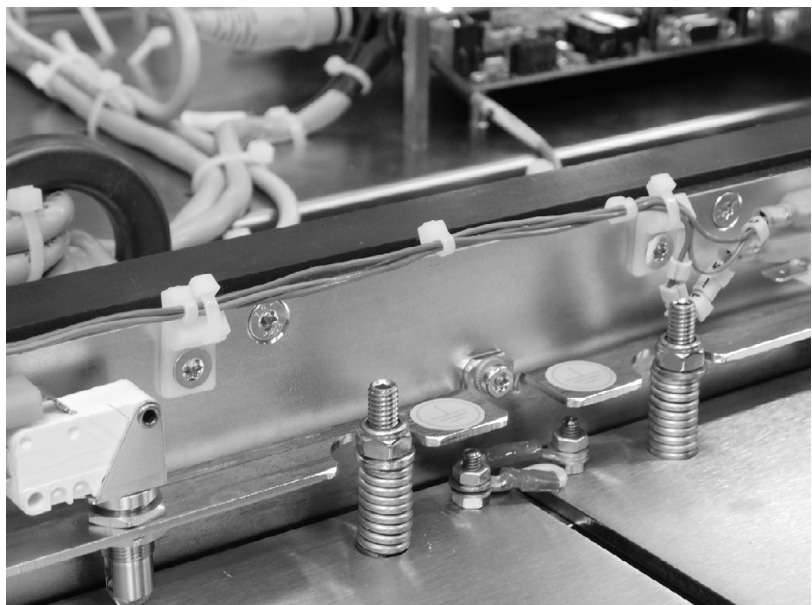
6. Fix the Control Pedals Set to the Base frame.

Illustration 3-6
Control Pedals Set Fixation



7. Fix with tie wraps the cables of the Control Pedals Set to the frame.

Illustration 3-7
Fix Cables to the Frame of the Table Base



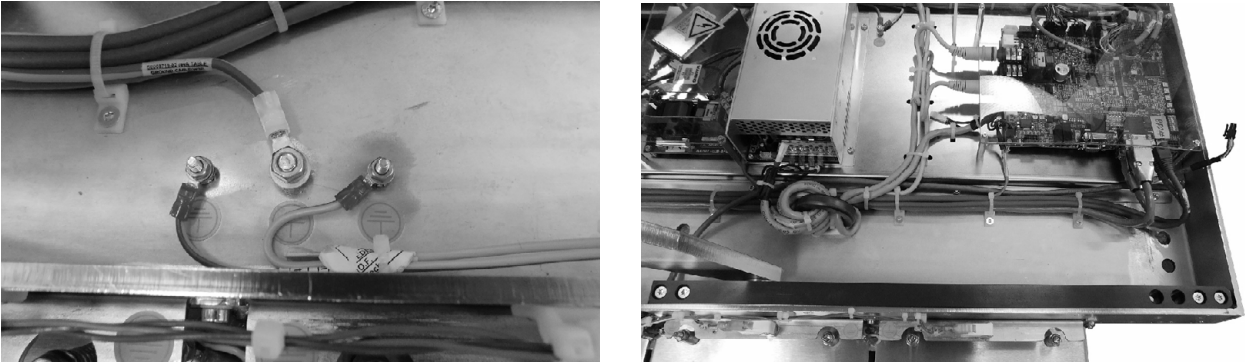
X-ray System

Field Replacement

8. Tighten the GND Cables to the free studs of the Table Frame.
9. Route the Control Pedals Kit Cable to the GPIO Module Board.

Illustration 3-8

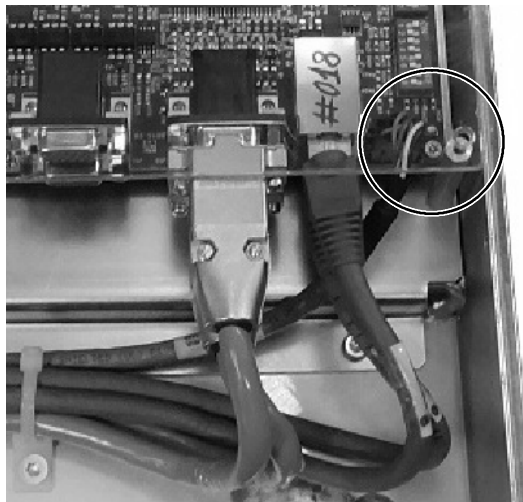
Route GND and Double Control Pedals Set Cables



10. Connect the Control Pedals Cable, A15196-01, to the J16 connector of the GPIO Module board for the back or Double Control Pedals Kit.

Illustration 3-9

Connect the Control Pedals Cable



11. When installing a Double Control Pedals Set ,it is also mandatory to install an additional Emergency OFF Switch. *Proceed with Job Card 2.1 (Additional Emergency OFF Switch).*
12. Turn on the RAD Table and proceed with the functional checking of the Double Control Pedal Set and Emergency OFF Switches.

JOB CARD 1.3: CONTROL PEDALS KIT REPLACEMENT

SUBASSEMBLY: TABLE BASE FRAME

TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE

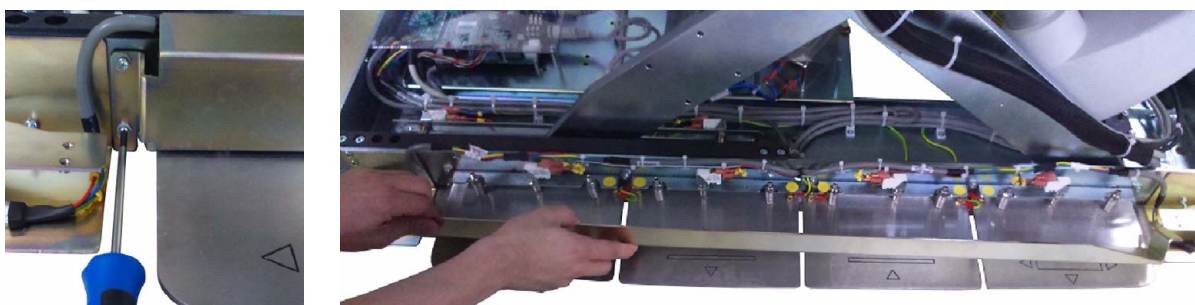


This instruction is also valid for the front Control Pedals Kit but also for the installation of the Double Control Pedal Kit, which is an option, usually released factory mounted, but in some cases it will be necessary to install it in the field or as result of an upgrade of the X-ray Room device.

To remove the Control Pedals Kit:

1. Disconnect the RAD Table from the Room Electrical Cabinet.
2. Remove the Covers of the Table Base to get free access to the back of the bottom frame (*refer to the IN-1235Rx document for further information about covers disassembly*).
3. Loosen and remove the cover of the electronics of the Control Pedals Kit for the NET 500 RAD Table.

**Illustration 3-10
Remove the Cover Of the Control Pedals Kit**

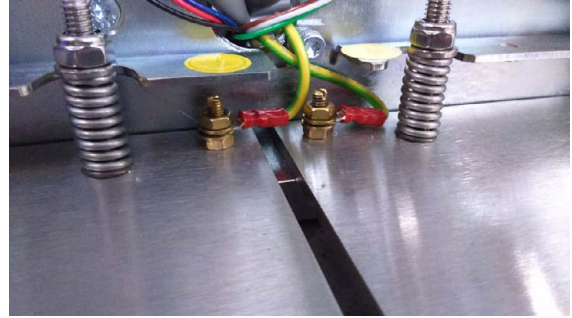
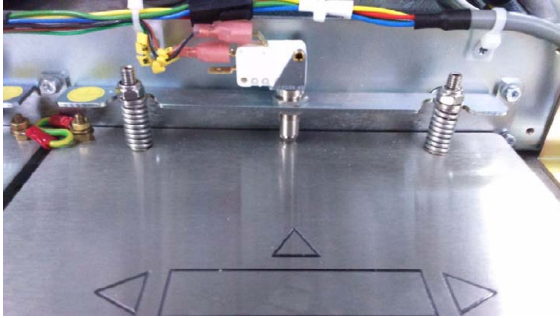


4. Disconnect the Pedals Cable (A15196-01) from all pedals switches.

5. Disconnect the Ground cables connected to both central pedals.

Illustration 3-11

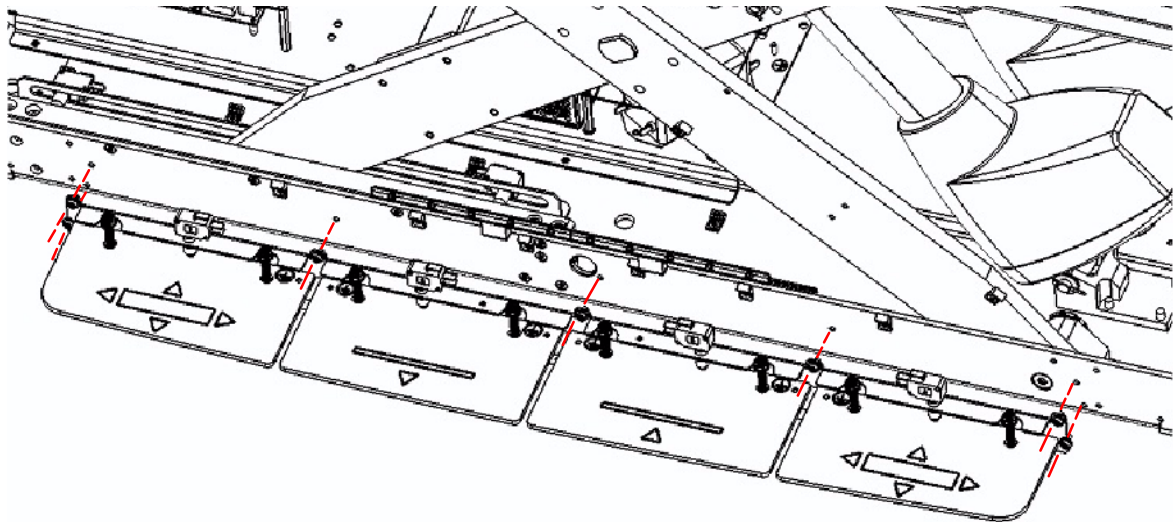
Disconnect all Pedals and Ground Cables from both Central Pedals



6. Loosen all the fixing screws and remove the Control Pedals Kit.

Illustration 3-12

Control Pedals Kit Fixations



To install the new Control Pedals Kit:

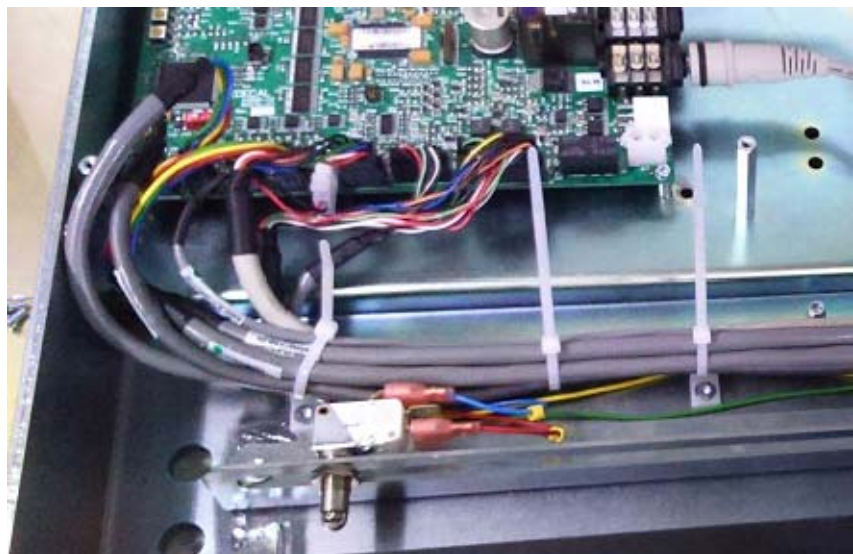
1. Tighten the Control Pedals Kit to the bottom frame of the Table (refer to *Illustration 3-12*).
2. When the kit is a new one or it is released with the Pedals Cable (A15196-01), route it from the Control Pedals Kit to the GPIO Module Board (A3696-02).

3. Connect the Control Pedals Cable:
 - To J5 connector of the GPIO Module Board for the front Control Pedals Kit.
 - To J16 connector of the GPIO Module board for the back or Double Control Pedals Kit.
4. Connect the Ground Cables to both Central Pedals (*refer to Illustration 3-11*).

Note 

When routing all cables in the Table Base, it is important to tie them properly to avoid any damage due to possible entrapments by moving mechanical parts.

Illustration 3-13
Tie wrapped Cables



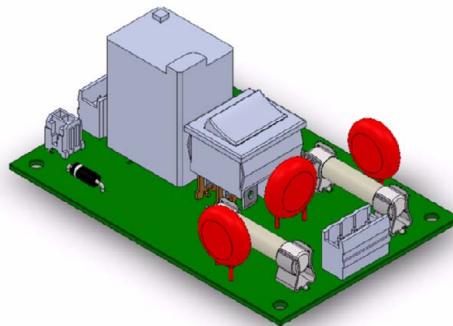
5. Install the Cover for the electronics of the Control Pedals Kit.
6. Proceed to check the new Control Pedals Kit and install all Covers if everything is correct.

JOB CARD 1.4: INPUT MODULE REPLACEMENT

SUBASSEMBLY: TABLE BASE FRAME

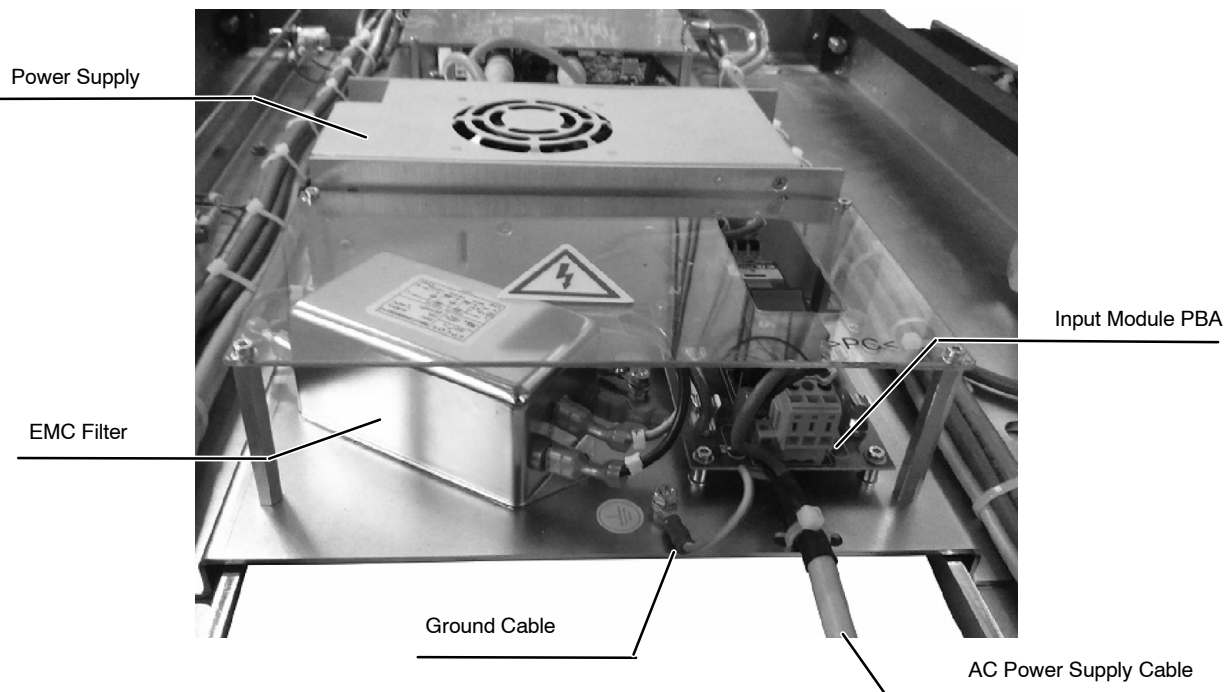
TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE



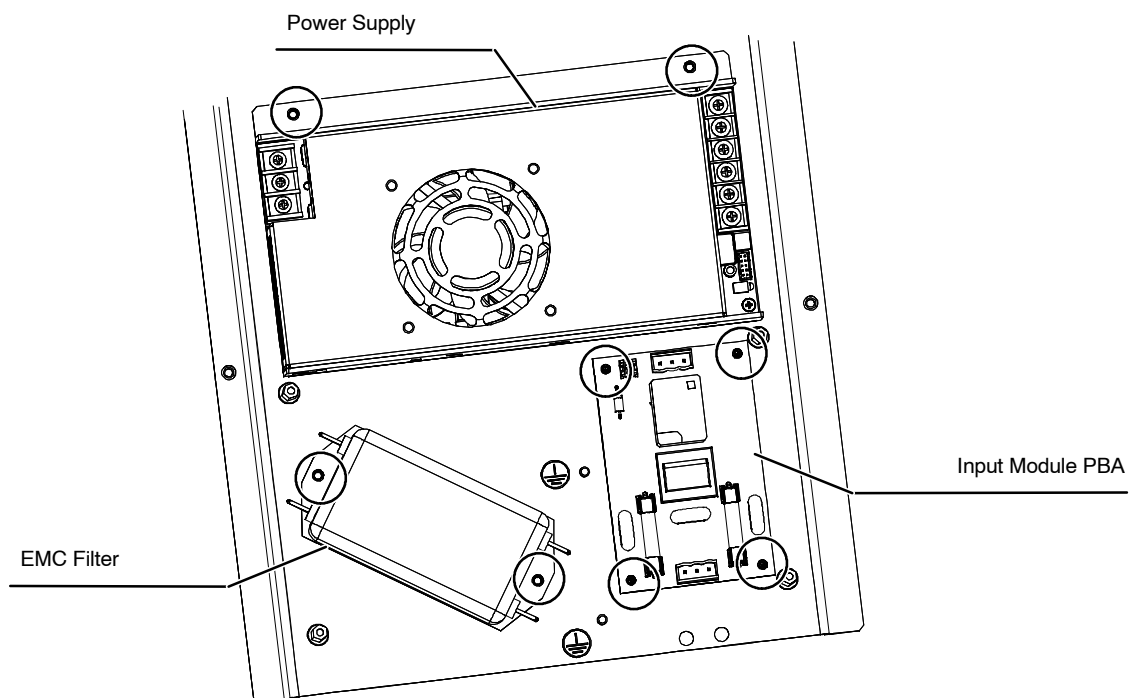
This Procedure is valid for the replacement of the different components of the Input Module and the Power Supply.

Illustration 3-14
Input Module and Power Supply



1. Lift the Tabletop at its higher position.
2. Disconnect the RAD Table from the Room Electrical Cabinet.
3. Remove the Covers of the Base (*refer to the IN-1235Rx document for further information about covers disassembly*).
4. Remove the top cover of the Input Module
5. Disconnect all cables connected to the Input Module of the Table:
 - AC Power Supply Cable (A15223-XX) from J1 in Input Module (A3707-01).
 - Ground Cable (S008719-02) from stud close to the Input Module (A3707-01).
6. As each component of the Input Module is independently fixed, loosen and disconnect all cables.

Illustration 3-15
Fixations of the Input Module and Power Supply



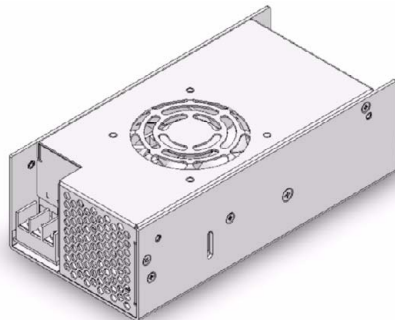
7. Install the new component of the Input module, connect all cables.
8. Connect the AC Power Supply and Ground Cables and the cover.
9. Connect the AC Power Supply Cable in the Electric Room Cabinet.
10. Check the RAD Table turns ON.

JOB CARD 1.5: AC POWER SUPPLY CABLE REPLACEMENT

SUBASSEMBLY: TABLE BASE FRAME

TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

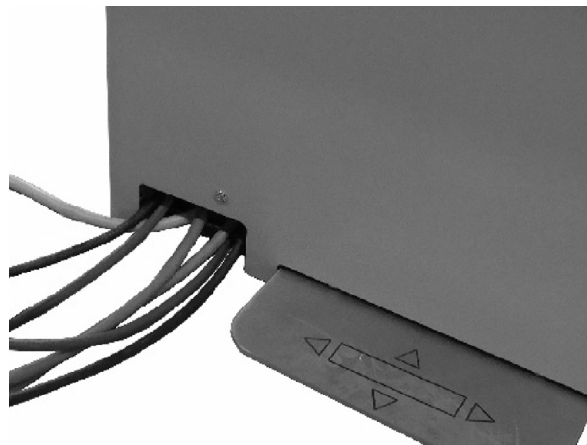
PROCEDURE



1. Lift the Tabletop at its higher position.
2. Disconnect the RAD Table from the Room Electrical Cabinet.
3. Remove the Covers of the Base (*refer to the Installation Chapter for further information about covers disassembly*).
4. Remove the top cover of the Input Module.
5. Disconnect all cables connected to the Input Module of the Table:
 - 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).

6. Drive out the AC Power Supply Cable through the Cables Output of the the RAD Table.

Illustration 3-16
RAD Table Cables Output



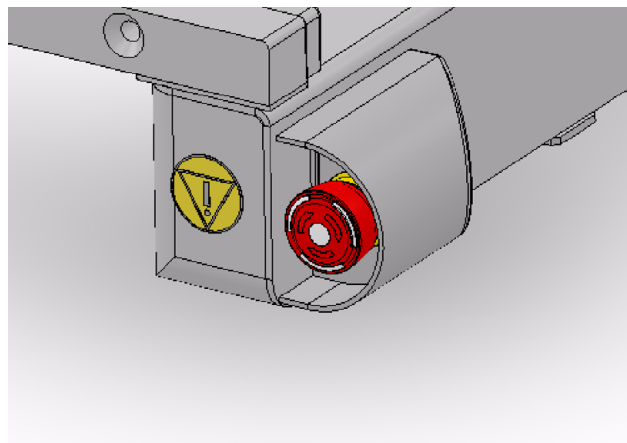
7. Route the new AC Power Supply Cable from Room Electric Cabinet to the Input Module and connect it.
8. Turn ON the equipment and check it for a correct power supply and operation

JOB CARD 2.1: ADDITIONAL EMERGENCY OFF SWITCH (OPTION)

SUBASSEMBLY: **TABLETOP**

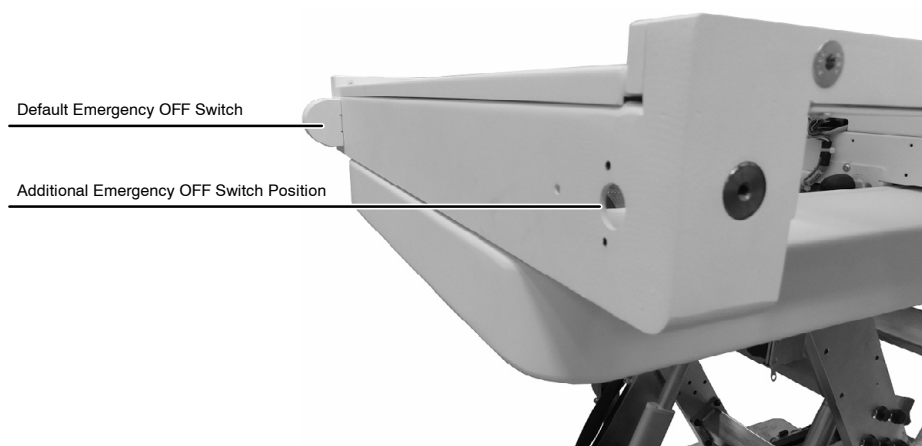
TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE



When installing a Double Control Pedals Set (*refer to Job Card 1.2*), it is also mandatory to install an additional Emergency OFF Switch, which must be located at the back of the Table. To install it proceed as indicated:

Illustration 3-17
Additional Emergency OFF Switch Position



1. Fix the plate for the Emergency OFF Switch fixation to the Tabletop Support frame.

Illustration 3-18

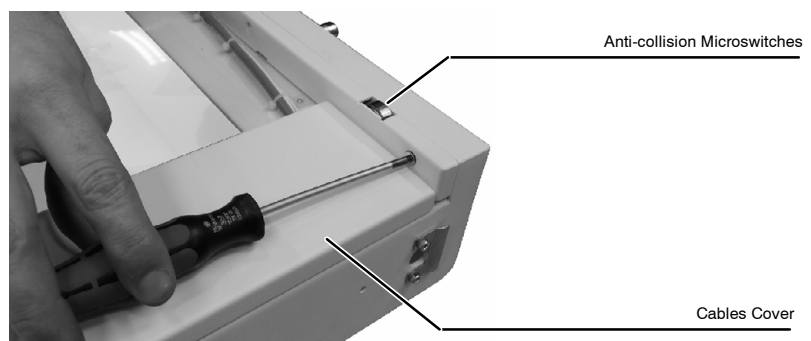
Fix the plate for the Emergency OFF Switch Fixation



2. Loosen and set aside both Anti-collision microswitches from the Tabletop Support.

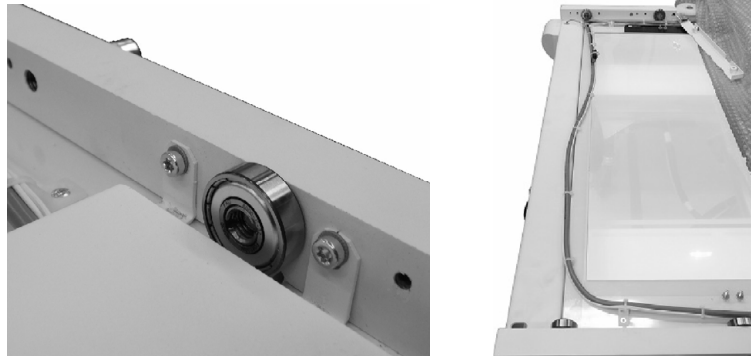
Illustration 3-19

Set aside the Anti-collision Microswitches



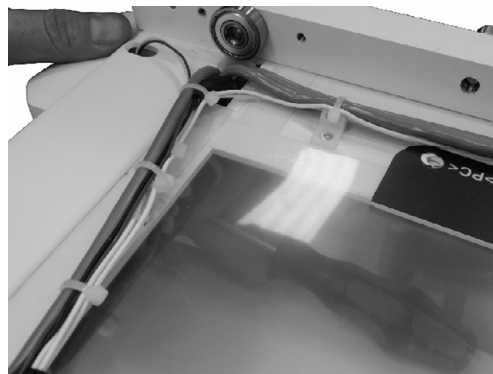
3. Loosen and remove the Cables cover of the Frame.

Illustration 3-20
Remove Cables Cover



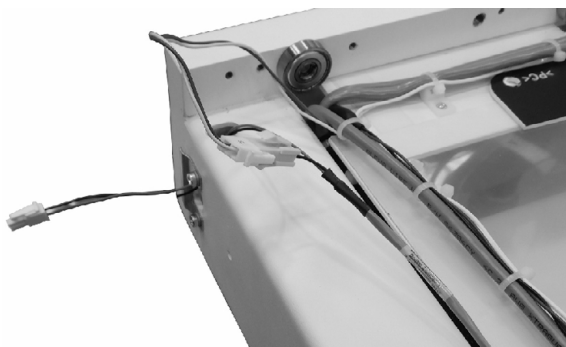
4. Dismount the front Emergency OFF Switch.

Illustration 3-21
Dismount Front Emergency OFF Switch



5. Replace the cable of the front Emergency OFF Switch with the Double Emergency Cable.

Illustration 3-22
Change the Emergency OFF Switch Cable with the one for both Switches



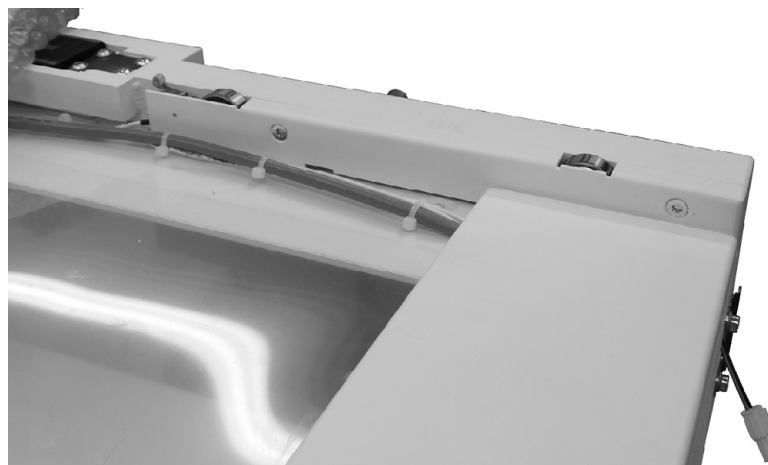
6. Fasten Cables with ties to protect them.

Illustration 3-23
Fasten Cables



7. Mount the Cables Cover back and both Anti-collision Microswitches.

Illustration 3-24
Mount Cables Cover and Anti-collision Microswitches



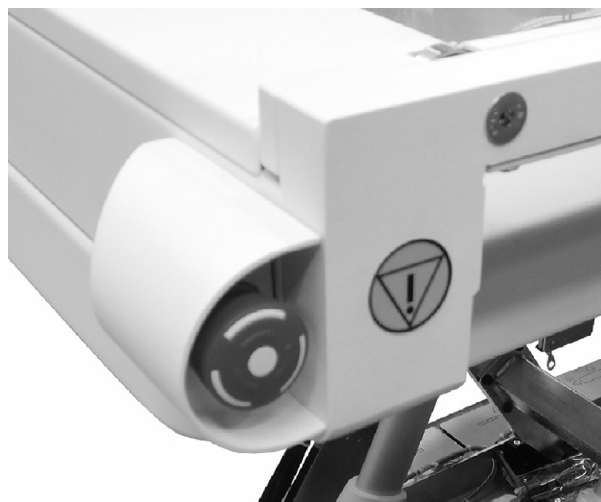
8. Connect both Emergency OFF Switches and supports.

Illustration 3-25
Fix both Emergency OFF Switches



9. Stick the Emergency OFF Warning label on the back Support.

Illustration 3-26
Stick Warning Label



10. Turn on the RAD Table and proceed with the functional checking of the Emergency OFF Switches.

JOB CARD 2.2: VERTICAL HEIGHT POTENTIOMETER REPLACEMENT

SUBASSEMBLY: TABLETOP

TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE



1. Lift the Tabletop at its higher position.
2. Disconnect the RAD Table from the Room Electrical Cabinet.
3. Remove the Covers of the Base (*refer to the IN-1235Rx document for further information about covers disassembly*).

Illustration 3-27
Vertical Height Potentiometer



4. Disconnect the Vertical Height Potentiometer from the connector of the Interface Module, located at the right of the top frame of the Base of the table, inside the frame.

Illustration 3-28

Vertical Height Potentiometer Connection with the Interface Module

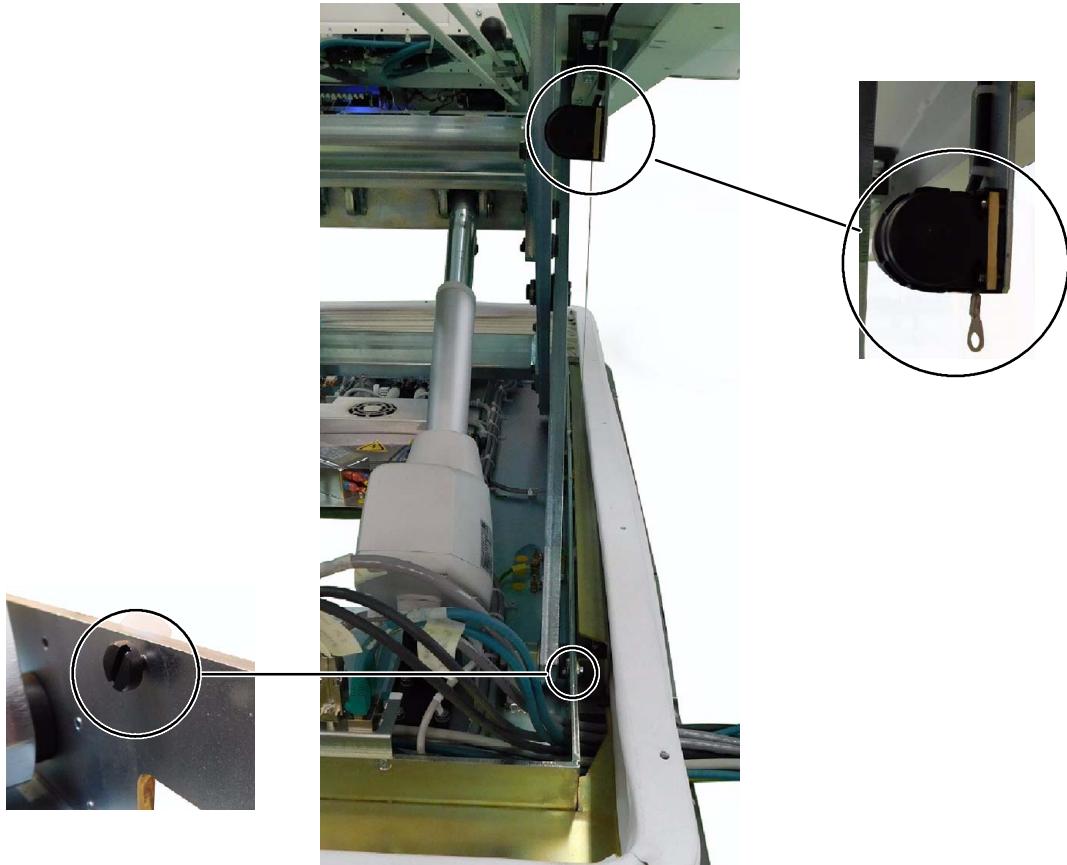


5. Loosen the screw used to tie the wire to the bottom of the frame.

6. Loosen the screws that fix the Potentiometer to the top plate and remove.

Illustration 3-29

Loosen the Vertical Height Potentiometer



7. Fix the new Potentiometer to the plate and to the bottom fixing screw.
8. Turn on the Table and proceed to the Functional Checking of the Table and install all Covers if everything is correct.

SECTION 4 RAD WALL STAND PROCEDURES

The Job Cards of this Section are intended to be guides to the most common problems that arise, but not to all of them, and to give the instructions for replacing the spare parts included in the Renewal Parts document.

It is mandatory to follow the security procedures before any mechanical or electrical intervention:

- **Electrical Safety Procedures:** Isolate all the electrical sources.
- **Mechanical Safety Procedures.** It is mandatory when required in the job cards.



ALWAYS PROCEED TO ACCOMPLISH THESE PROCEDURES WITH THE SYSTEM SWITCHED OFF. IF IT IS REQUIRED TO TURN IT ON, USE ALWAYS SAFE ELECTRICAL PRACTICES TO SAFEGUARD FROM THE UNEXPECTED ENERGIZATION OR START UP OF THE EQUIPMENT, OR THE RELEASE OF HAZARDOUS ENERGY DURING SERVICE OR MAINTENANCE ACTIVITIES.



PERSONAL PROTECTION EQUIPMENT IS A REQUIREMENT WHEN PROCEEDING TO ACCOMPLISH ALL THESE PROCEDURES.



After accomplishing any of these procedures, proceed to check the RAD Wall Stand correct operation. For further information refer to the Functional Checks Section of the Installation document.

Note 

It is highly recommended to place the Overhead Tube Crane at a safe distance from the RAD Wall Stand, which allows the procedures to be carried out conveniently.

X-ray System

Field Replacement

RAD WALL STAND JOB CARDS LIST	
JOB CARD	DESCRIPTION
Job Card 1.1	Adding or Removing Counterweights

JOB CARD 1.1: ADDING OR REMOVING COUNTERWEIGHTS

SUBASSEMBLY: **COLUMN**

TOOLS: Standard Service Tool Kit, including Allen and Torx key sets, and Anti-static Protection Device.

PROCEDURE



DURING THIS PROCEDURE, THE COUNTERWEIGHTS MODIFICATION MAY CAUSE UNEXPECTED MOVEMENTS OF THE RECEPTOR CARRIAGE AND COUNTERWEIGHT CARRIAGE. PLEASE PROCEED AS CAREFULLY AS POSSIBLE DURING THE WHOLE PROCEDURE.

For Fixed Detectors, the Wall Stand is factory counterbalanced depending on the mounted Receptor by default.

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

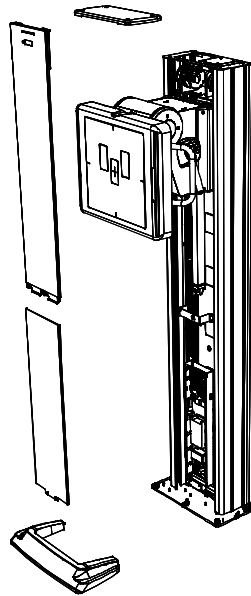
Also, if there are any modifications to the equipment configuration during the transportation (e.g. new accessories) or the Receptor model is changed, the weight supported by the Receptor assembly varies, so it is necessary to counterbalance the Wall Stand again. This procedure would be necessary when adding new optional accessories, e.g. Lateral Bar.

The equipment is not provided with additional counterweights, so it may be required to ask for counterweights as renewal parts if new accessories are added to the equipment (*refer to the Renewal Parts document*).

1. Remove all the Column covers (*refer to Section 3.2. of the Installation document for details about covers installation and fixations*).

Illustration 4-1

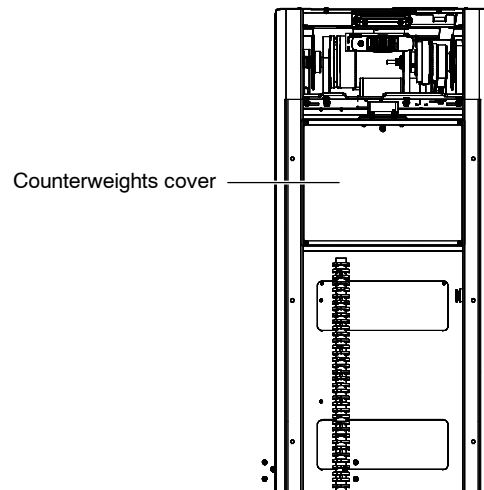
Remove all Covers from the Column



2. Keep the Receptor at its lower position, as it has been lowered to remove the front top cover, so the counterweights are lifted and accessible for their replacement.
3. Make sure that the equipment is disconnected from main power so the Receptor remains blocked. If desired, put any weighty object on the Receptor assembly to block the Receptor.

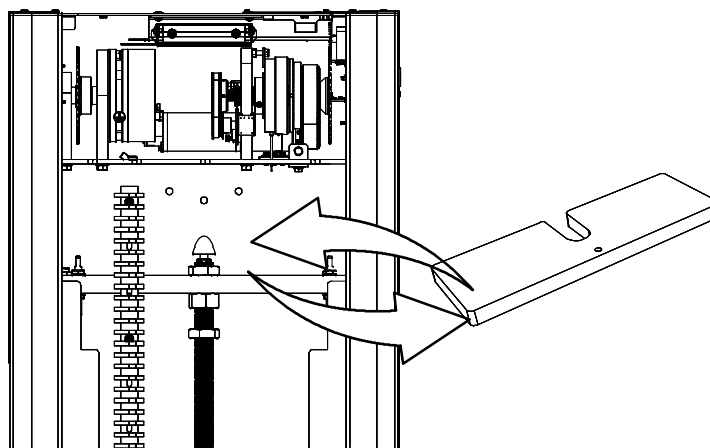
4. The Counterweights cover is located at the top of the column. Unscrew it and put it aside. Hold it firmly before removing all the screws to avoid it from falling down inside the column.

Illustration 4-2
Remove the Counterweights cover



5. Add or remove the counterweights as needed carefully. Counterweights come in two different weights, 0.575 kg (1.268 lb) and 2.875 kg (6.34 lb).

Illustration 4-3
Counterweights Replacement



6. Check that it is correctly counterbalanced:
 - a. Turn the equipment On.
 - b. Press the Vertical Movement Button to release the electromechanical brake.



Do not hold the Brake Button pressed for too long, just press enough to check if the equipment is properly counterbalanced.

Illustration 4-4
Vertical Movement Handle



- c. If the Receptor goes down, it means that more weight is required. On the contrary, if it moves upwards, some weight has to be removed.
 - d. Once it is required to exert force to move the Receptor up & down, the equipment is properly counterbalanced.
7. Once the new counterweights configuration is finished, install the Covers and prepare the equipment to be used.