Technical Publication
TR-1319R0
Summit P/N 09743-004 Rev. A

Troubleshooting

Mobile X-ray Unit

REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	SEP 28, 2022	First Edition.

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

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

ADVISORY SYMBOLS

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

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

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

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

Note ☞

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

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SECTION 1 GENERAL PROCEDURES

1.1 TORQUE VALUES FOR SCREWS

Generally, when any screw is re-installed during the procedures described in this document, it is recommended to apply the torque listed in the *Table 1-2*, except in case that the torque value to be applied is specified in the *Section 1.1.1 "Special Torque for Screws"* or the corresponding procedure.

Apply only the tightening torques listed in Table 1-2 for mounting the mechanical parts of the unit (metallic parts to metallic parts), never for mounting electronic parts (e.g. electronic boards) or other non-metallic parts.

Respect the markings on screws and/or nuts mounted in the unit, as specified in Table 1-1, indicating when it is necessary or not to apply a determined torque value and/or a drop of Loctite 243 to the end of the screws before tightening them.

Table 1-1
Markings on Screws and/or Nuts

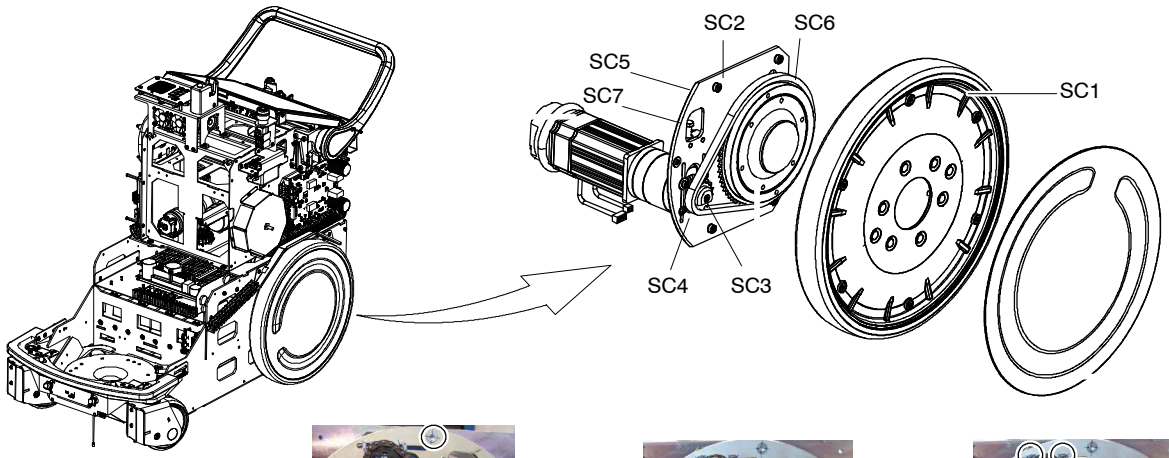
	Without Torque Without Loctite 243	With Torque Without Loctite 243	Without Torque With Loctite 243	With Torque With Loctite 243
Markings on screws and/or nuts	 **GREEN**	 **GREEN**	 **BLUE**	 **BLUE**

Table 1-2
General Torque Values for Screws

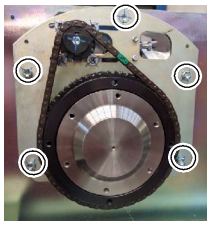
SCREW SIZE (Metric ISO Screw Thread)	TORQUE APPLIED
M4	2.9 Nm
M5	5.7 Nm
M6	10 Nm
M8	24.1 Nm
M10	47.7 Nm
M12	82 Nm
*Note.- Conversion factor: 1 Nm = 0.10197 kgf*m ; 1 Kgf*m = 9.80665 Nm*	

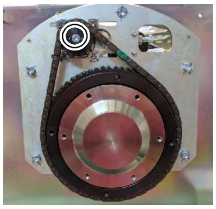
1.1.1 SPECIAL TORQUE VALUES FOR SCREWS

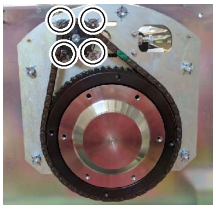
Illustration 1-1
Motor Group

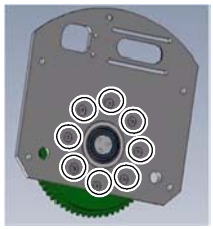



SC1 Back Wheel


SC2 Transmission (Front View)


SC3 Transmission (Front View)


SC4 Transmission (Front View)


SC5 Transmission (Back View)

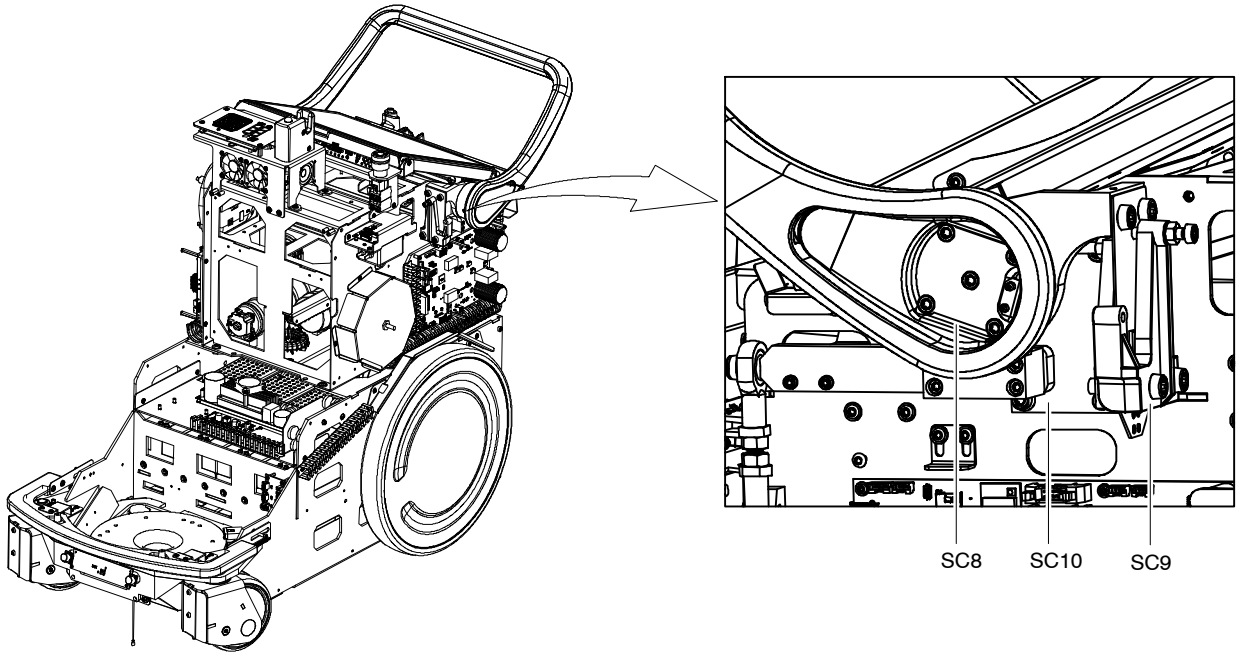

SC6 Transmission (Back View)


SC7 Transmission (Back View)

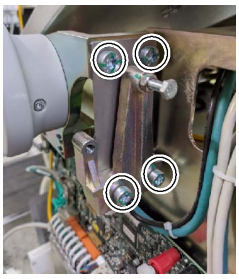
Table 1-3
Screws for Motor Group

SCREWS	SCREW SIZE (Metric ISO Screw Thread)	TORQUE APPLIED	LOCTITE 243
SC1	M8	24 Nm	NO
SC2	M8	20 Nm	YES
SC3	M6	20 Nm	YES
SC4	M6	10.5 Nm	YES
SC5	M6	10.5 Nm	YES
SC6	M5	6 Nm	YES
SC7	M8	24 Nm	YES

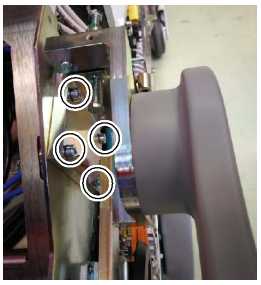
Illustration 1-2
Handle



SC8 Handle



SC9 Handle Gauge

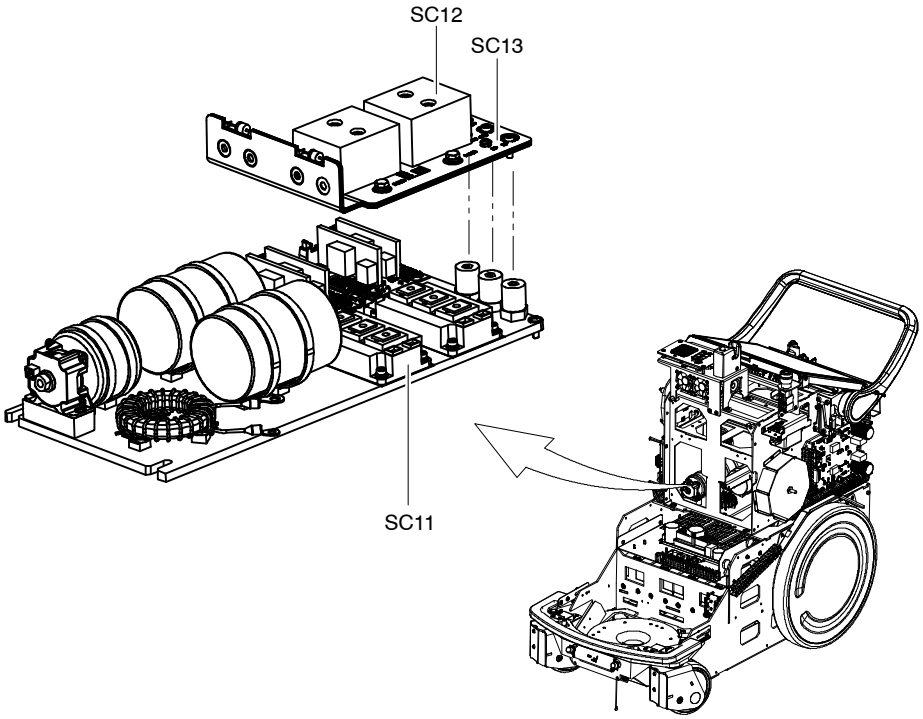


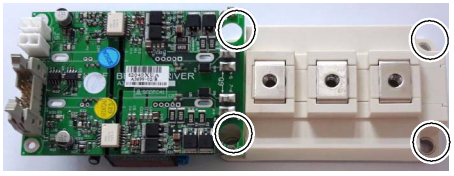
SC10 Handle Gauge Support

Table 1-4
Handle

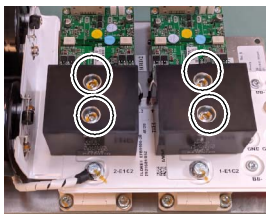
SCREWS	SCREW SIZE (Metric ISO Screw Thread)	TORQUE APPLIED	LOCTITE 243
SC8	M6	10.5 Nm	YES
SC9	M8	20 Nm	NO
SC10	M6	16 Nm	YES

Illustration 1-3
Inverter Module

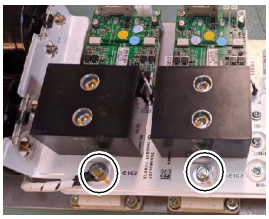




SC11 IGBT + PBA Driver CR



SC12 Capacitor

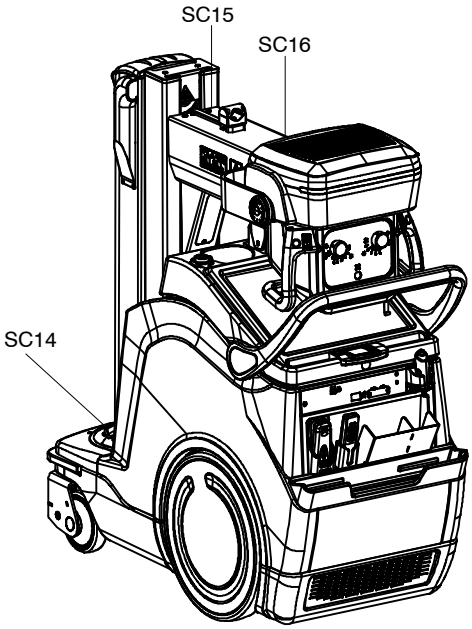


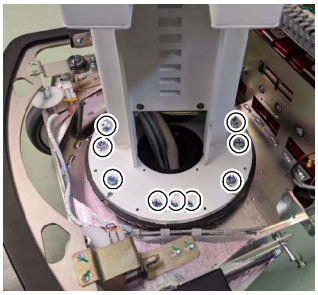
SC13 Busbar IGBT

Table 1-5
Inverter Module

SCREWS	SCREW SIZE (Metric ISO Screw Thread)	TORQUE APPLIED	LOCTITE 243
SC11	M6	6 Nm	NO
SC12	M6	5 Nm	NO
SC13	M6	5 Nm	NO

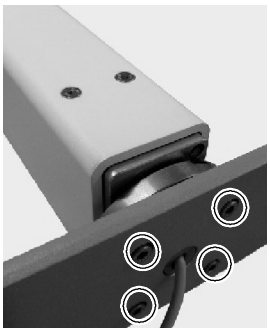
Illustration 1-4
Column and Arm (3-Section Arm)





SC14 Column Base

SC15 Telescopic Arm

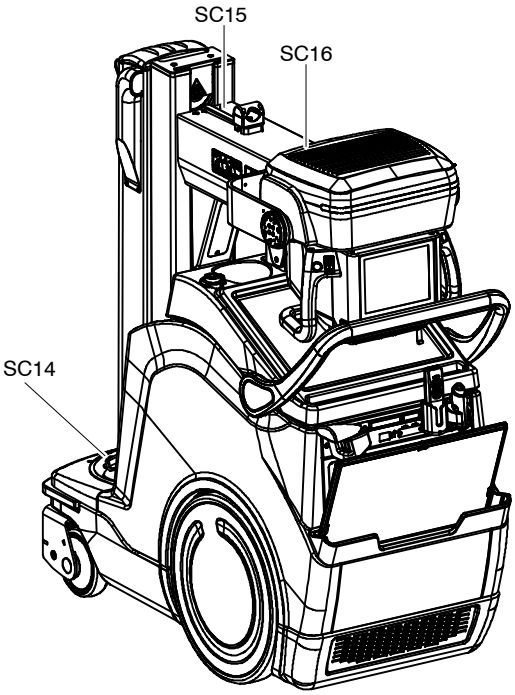


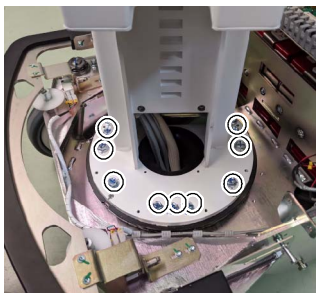
SC16 Head Rotation Support

Table 1-6
Column and Arm (3-Section Arm)

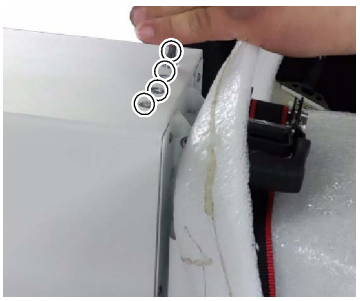
SCREWS	SCREW SIZE (Metric ISO Screw Thread)	TORQUE APPLIED	LOCTITE 243
SC14	M8	20 Nm	YES
SC15	M6	10.5 Nm	YES
SC16	M6	10.5 Nm	YES

Illustration 1-5
Column and Arm (4-Section Arm)





SC14 Column Base



SC15 Telescopic Arm

SC16 Head Rotation Support

Table 1-7
Column and Arm (4-Section Arm)

SCREWS	SCREW SIZE (Metric ISO Screw Thread)	TORQUE APPLIED	LOCTITE 243
SC14	M8	20 Nm	YES
SC15	M6	10.5 Nm	YES
SC16	M5	10.5 Nm	YES

1.2 COVERS REMOVAL

For Troubleshooting, certain Covers may need to be removed. Refer to the specific sections to dismount the respective Cover.

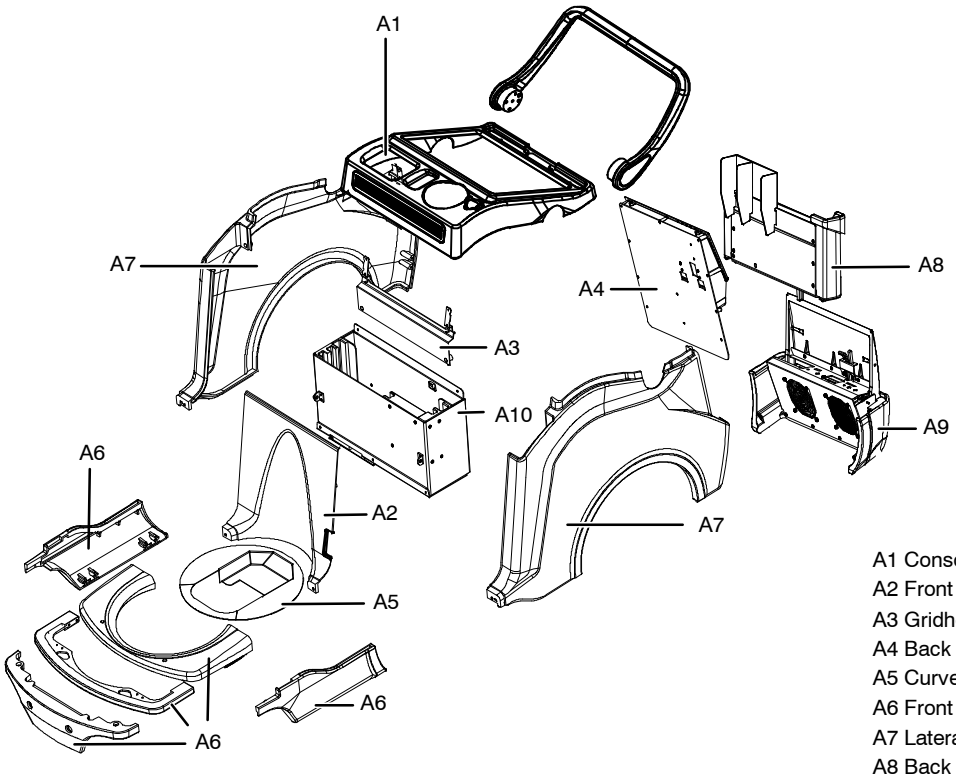
WARNING

KEEP THE UNIT TURNED OFF AND ISOLATED FROM THE POWER SUPPLY WHILE PERFORMING THIS PROCEDURE.

Note ☞ *The different parts and components of the Mobile Unit are named in the following illustrations. These references (A1, A2, B1, B2, etc.) will be used to refer to those parts during the procedures explained in the next pages.*

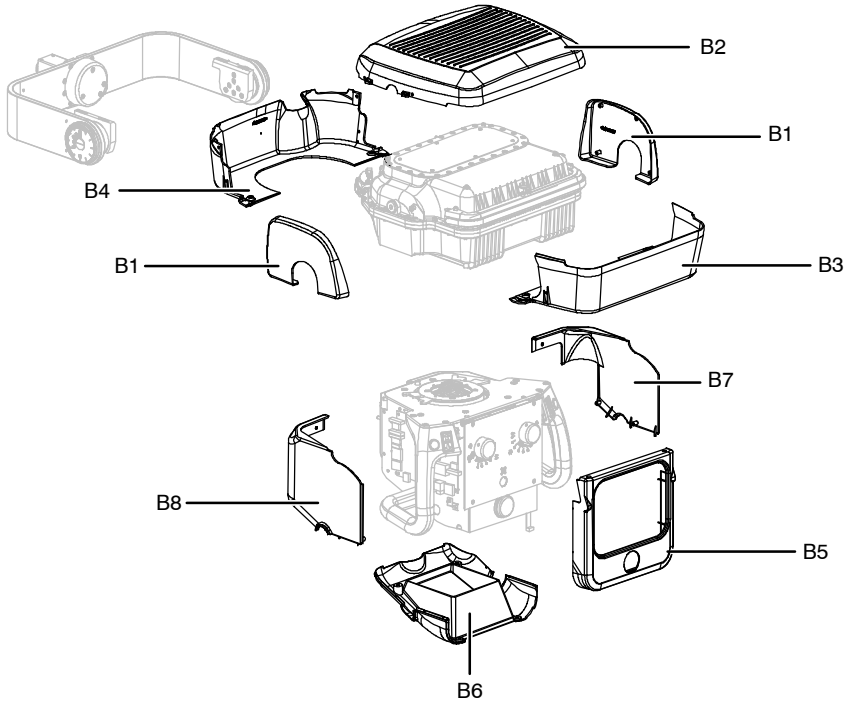
Note ☞ *The procedures for removing the external Covers are described in the following steps as required, although some of these covers could have been dismounted previously (therefore, some of the pictures could show the unit without one or some covers).*

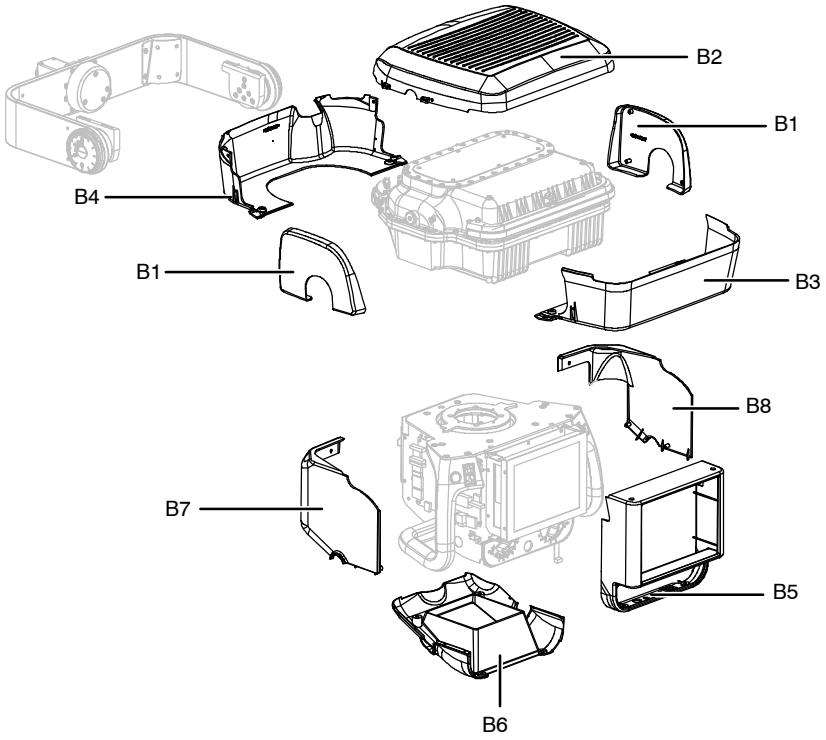
Illustration 1-6
Covers Removal (Main Module)



A1 Console Cover
A2 Front Cover
A3 Gridholder Cover
A4 Back Cover
A5 Curved-Top Cover
A6 Front and Lateral Bumpers
A7 Lateral Covers
A8 Back Holder for Detector
A9 Back Bumper
A10 Front Holder for Detector

Illustration 1-7
Covers Removal (Head-Assembly)





MONOBLOCK

B1 Lateral Covers
B2 Upper Cover
B3 Lower Front Cover
B4 Lower Back Cover

COLLIMATOR

B5 Front Cover
B6 Lower Cover
B7 Left Lateral Cover
B8 Right Lateral Cover

1.2.1 MAIN MODULE

1.2.1.1 FRONT COVERS

CONSOLE COVER

1. Remove the two (2) Plastic Caps and unscrew the two (2) Screws located at the Pencil Tray of the Console Cover (A1) below the Handlebar.

Note ☞ *Most Fastening Screws of the covers require a Screwdriver type Torx-20 for M5 Screws.*

2. Loosen the two (2) Screws at the front, just above the Holder for Detector (A10) at the Front Cover (A2).

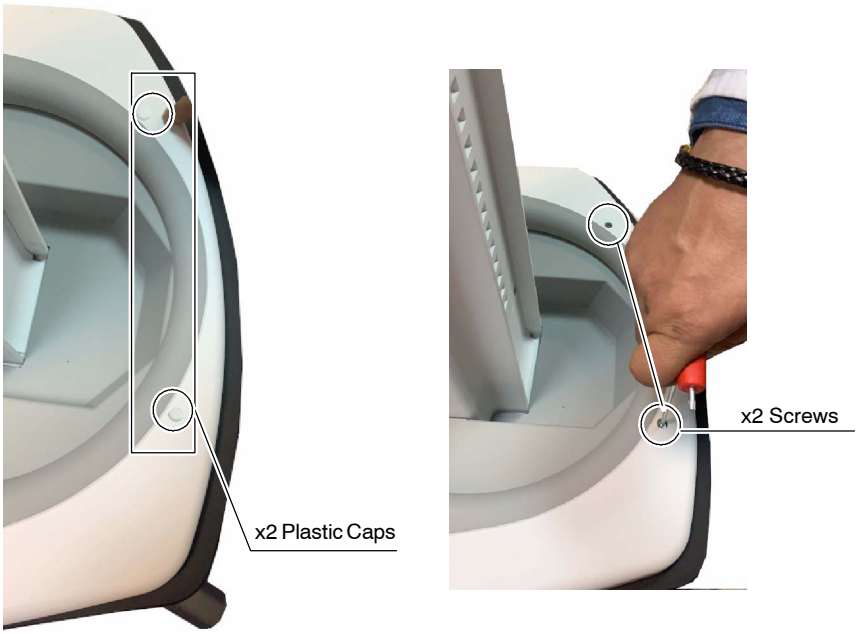
3. Elevate the Grid Cover (A3) and rotate it 90^{o} to remove it from its housing.

4. In this space, remove the two (2) Screws that hold the Console Cover (A1).

5. Remove the Console Cover (A1) carefully.

CURVED-TOP COVER

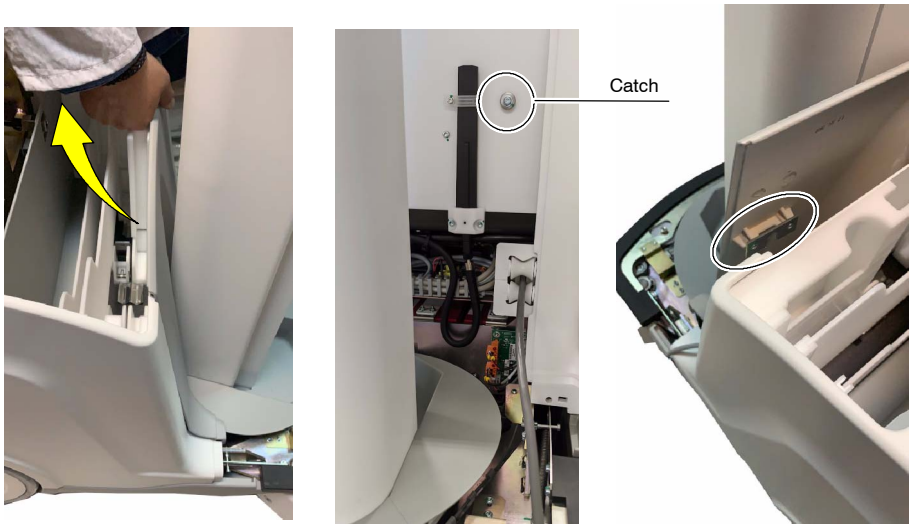
6. Remove the two (2) Plastic Caps located at the Curved-Top Cover (A5) and unscrew the two (2) Screws located beneath them. Put the Curved-Top Cover (A5) aside.



FRONT COVER

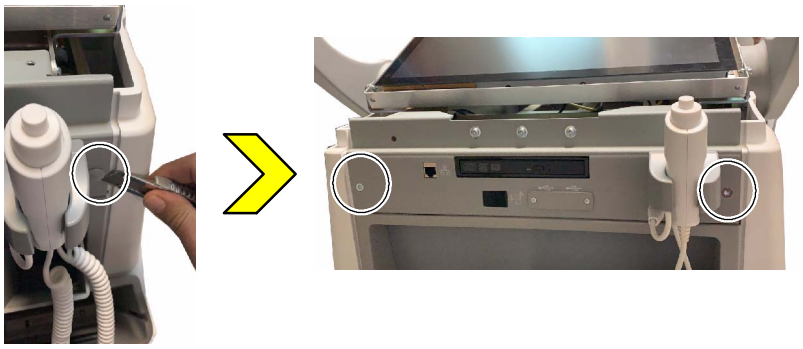
7. Remove the two (2) Screws (one on each side) of the Front Cover (A2), at the bottom of the front part of the Mobile Unit.

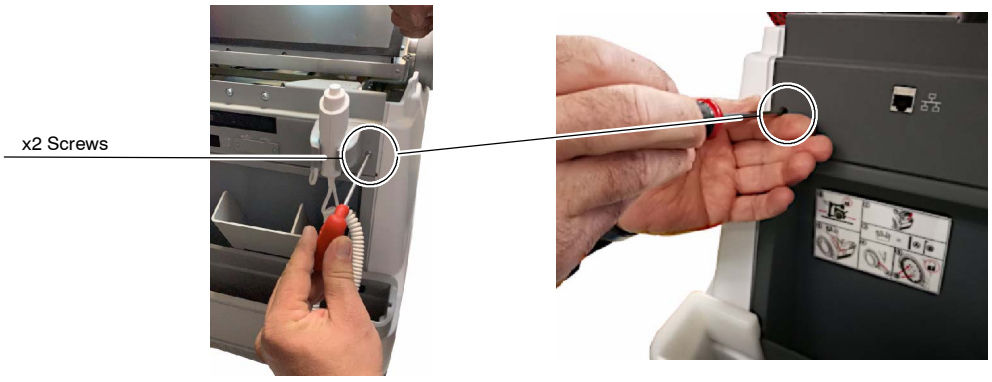
8. Pull the Front Cover (A2) up, disengaging it from its position anchored within the catches (two on each side), shown in the image below.



1.2.1.2 LEFT AND RIGHT LATERAL COVERS

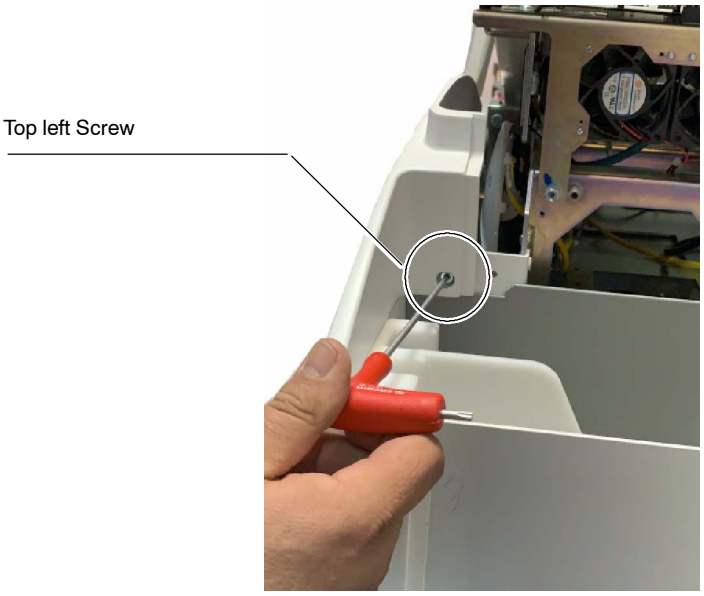
9. At the back side of the Mobile Unit, disconnect and put aside the Infrared Remote Control and the Barcode Scanner (if installed) and remove the Plastic Caps (x2) located at the Connections Panel. Unscrew the two (2) Screws beneath them.





10. Unscrew the left Screw of the Lateral Cover (A7), at the bottom of the front side of the Mobile Unit.

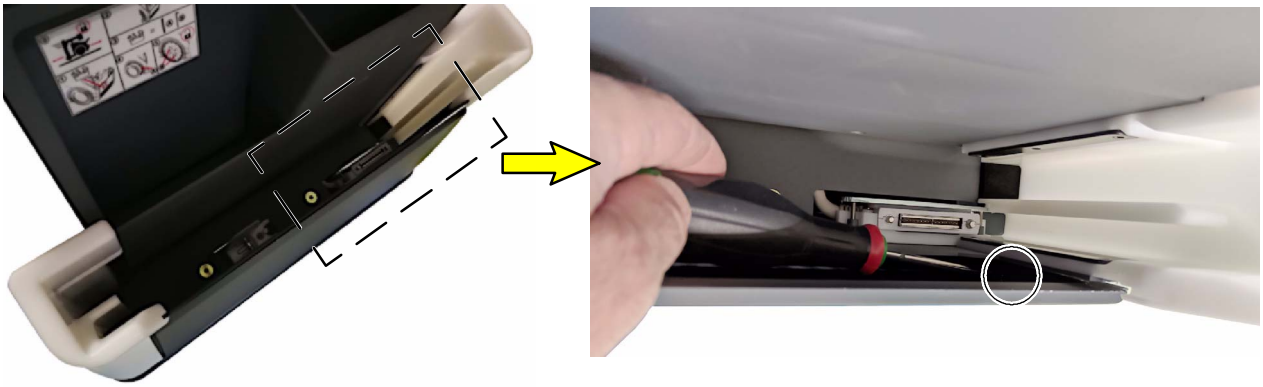
11. Unscrew the left Screw of the Lateral Cover (A7), at the top of the front side of the Mobile Unit.



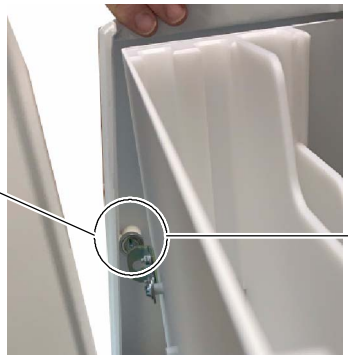
12. Remove and put aside the Separating Plate of the Back Holder placed at the back of the Mobile Unit (below this Plate, a Key Set to dismount the Wheels is provided).

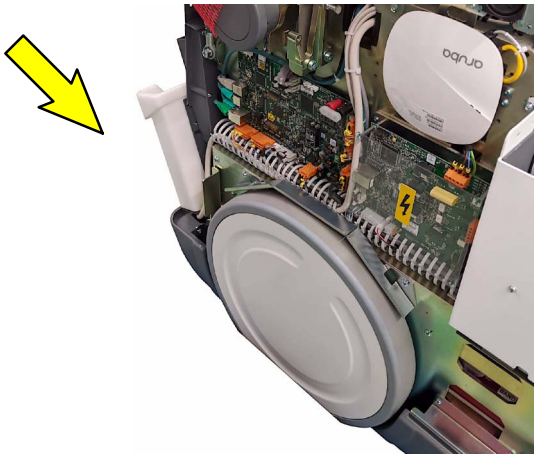
13. Remove the two (2) Screws from the bottom of the Back Holder for Detector (A8).

14. Remove the screw at the right side of the bottom of the Back Holder for Detector (A8).

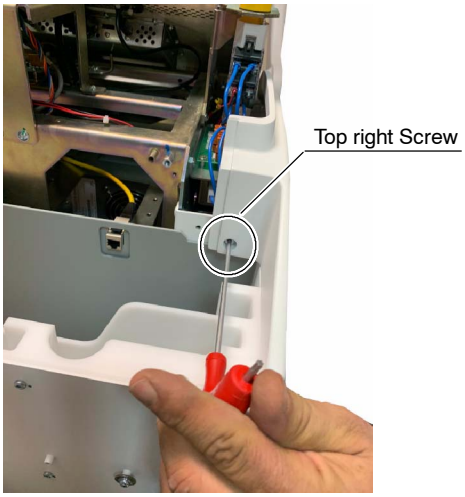


15. The right Lateral Cover (A7) loosens. Turn and move the cover from one side to the other, pulling the cover outwards and upwards to release it from the magnet that is placed at the front.

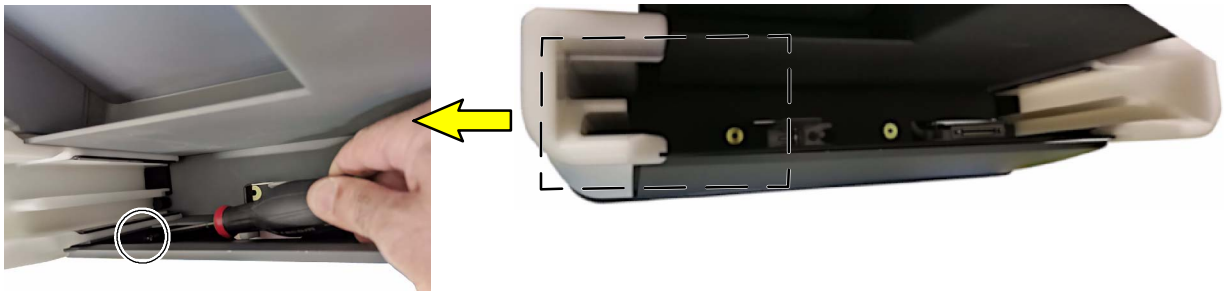




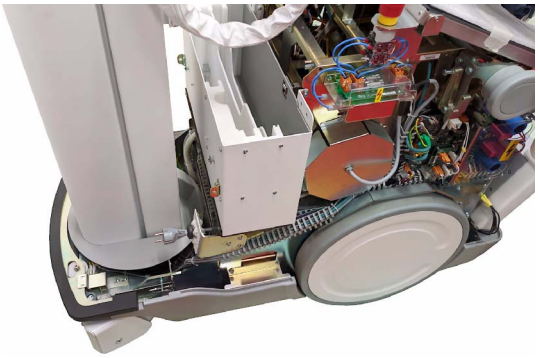
16. Unscrew the right Screws of the white cover at the top and bottom of the front side of the Mobile Unit.



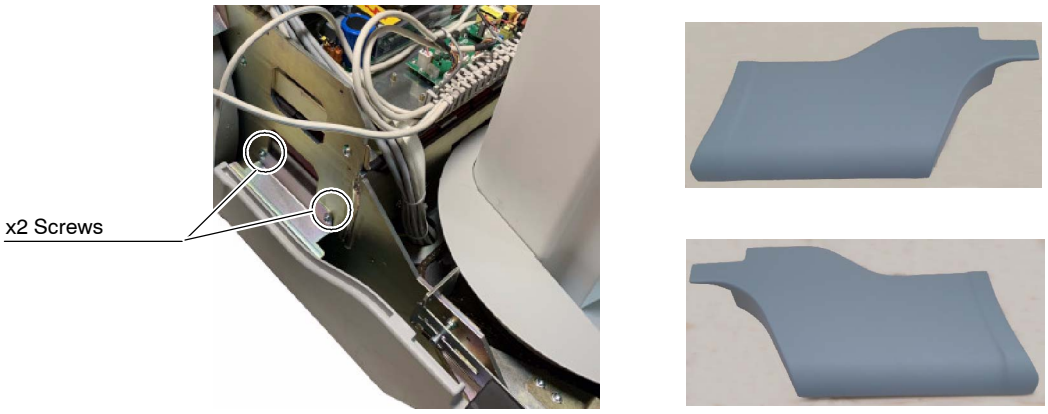
17. Remove the Screw at the left side of the bottom of the Back Holder for Detector (A8).



18. The left Lateral Cover (A7) loosens. Repeat the process explained in step 15. with this side.



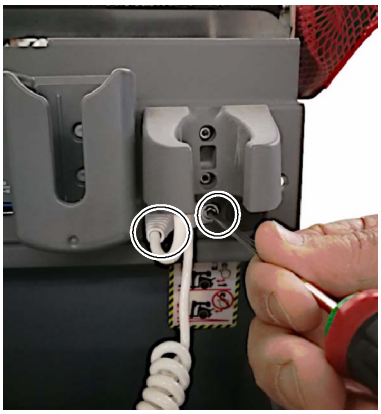
19. Loosen the two (2) Screws of each Metal Plate that holds the Lateral Bumpers (A6) to the Unit Chassis on the left and right sides.



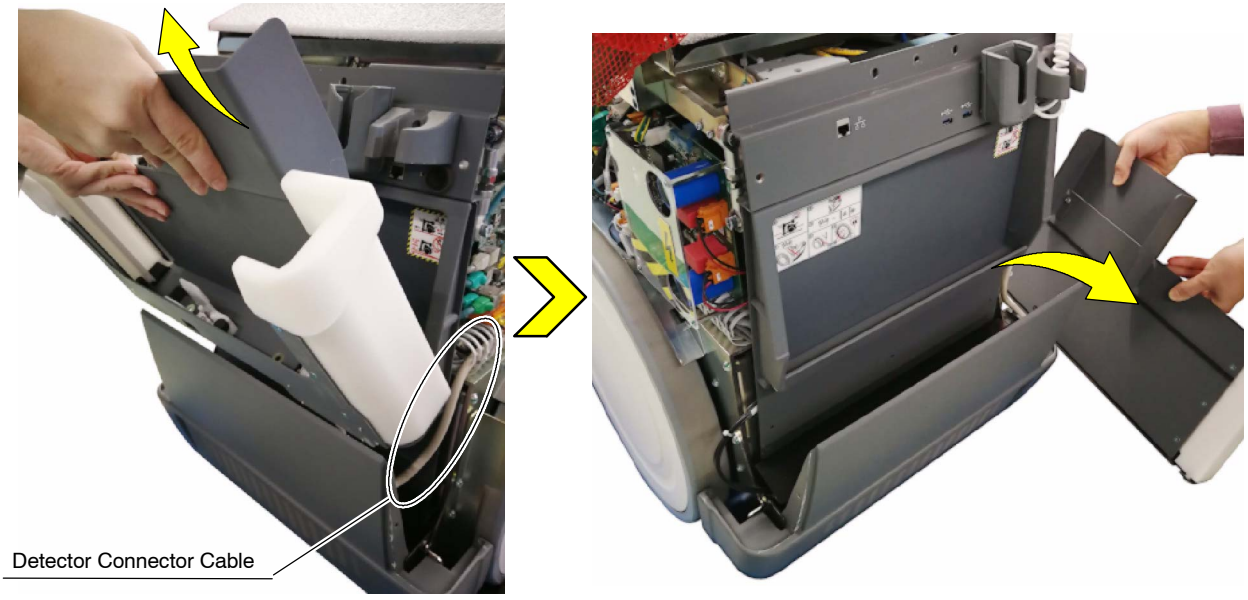
Note ☞ *Generally, it is not necessary to remove the Lateral Bumpers. Lateral Bumpers will be removed if access to the Column Clutch Adjustment Screw is needed (placed under the Right Lateral Bumper) or if the Lateral Bumpers have to be substituted.*

1.2.1.3 BACK COVERS: ACCESS TO BATTERIES AND CHARGERS

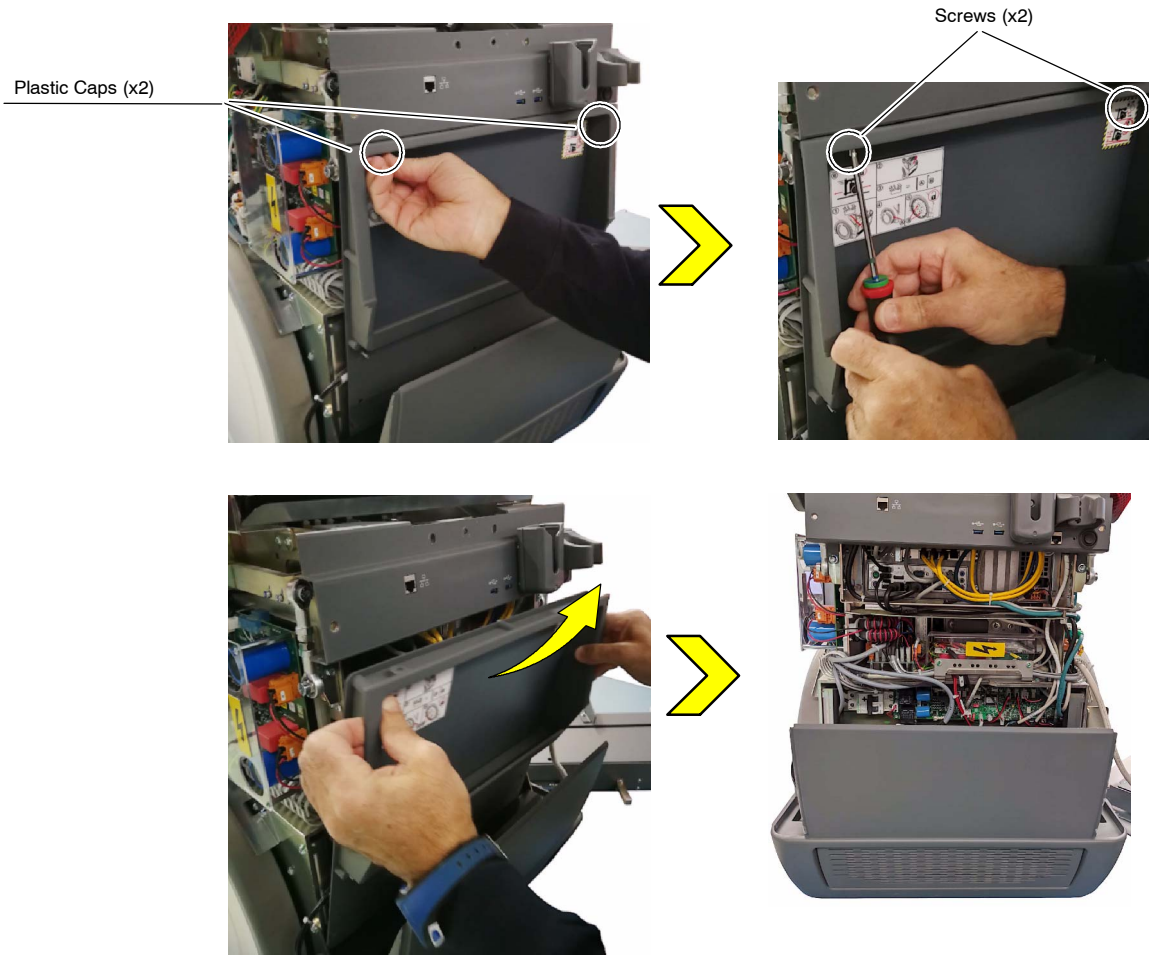
20. Place the X-ray Handswitch aside to facilitate the removal of the back covers. To do this, remove the screw from the Handswitch Cable clamp and disconnect the cable from its port.



21. Dismount the Back Holder for Detector (A8) and place it in a safe position next to the Unit, taking care with the Detector Connector Cable.



22. Remove the two (2) Plastic Caps and remove the two (2) Screws that hold the upper part of the Back Cover (A4). Hold the Frame and pull it up.

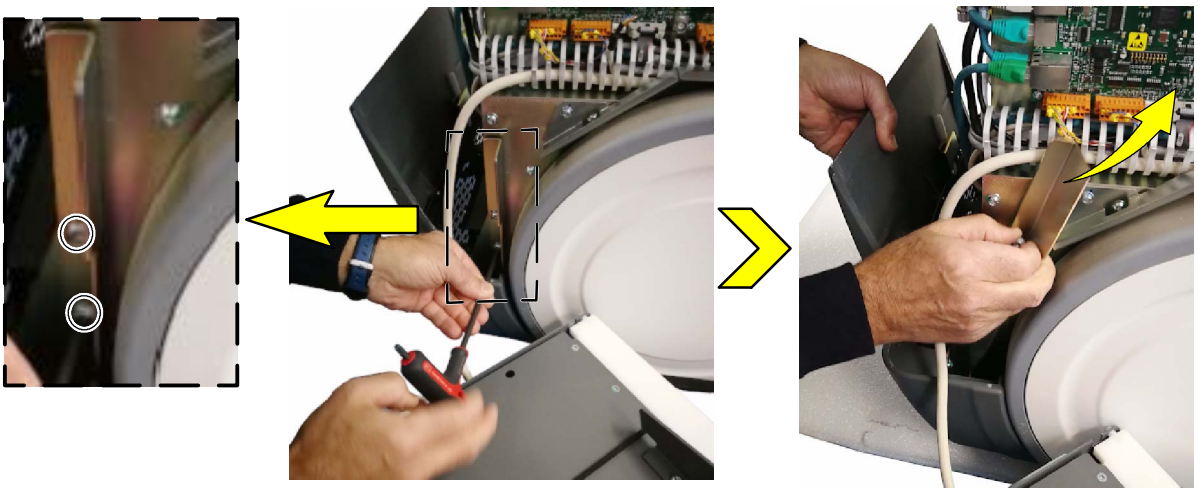


23. To remove the Back Bumper (A9) and gain access to the Battery Tray Module, it is necessary to unscrew the four (4) Screws (two on each side of the Mobile Unit) that hold the Back Bumper to the Chassis with the Bumper Supports. Proceed as follows:

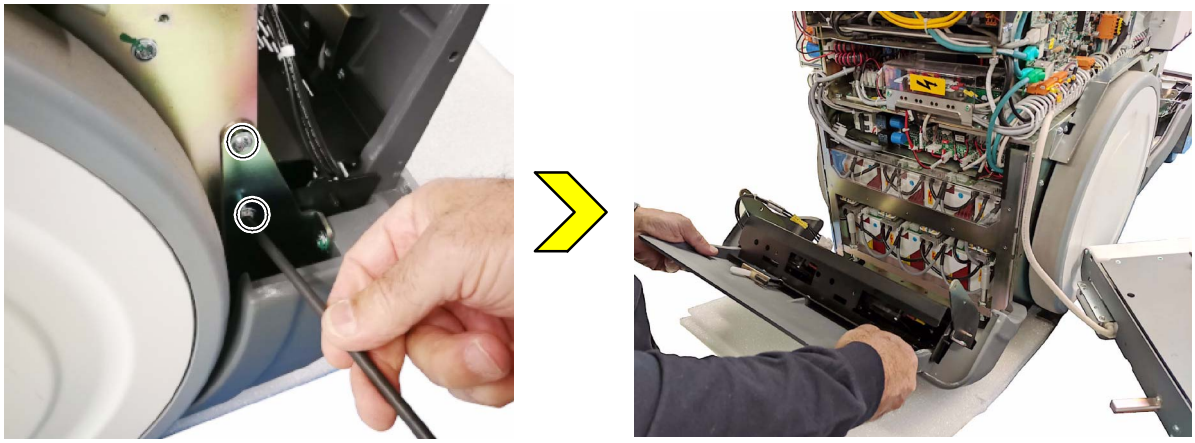
Note ☞ *It is recommended to place some kind of protection under the rear of the Unit in order to prevent damage to the Bumper if it accidentally comes loose from the Chassis.*

a. First, disconnect the Bumper Fans power cable.

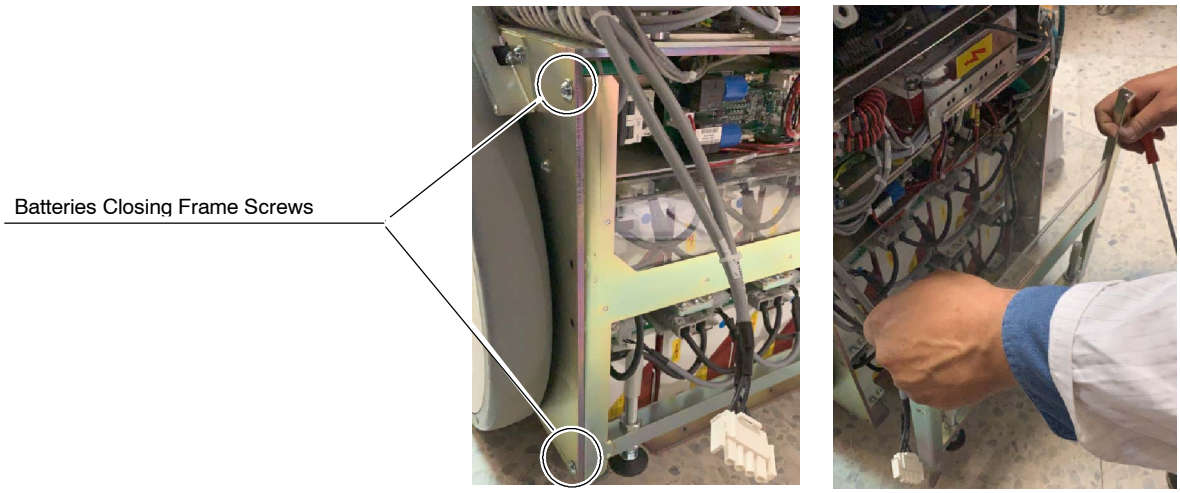
b. Then remove the two (2) screws from the Right Support, which has a Protection Plate for the Detector Cable mounted on it. Put the Plate aside after removing the screws.



c. Finally remove the two (2) screws from the Left Support while holding the Bumper and carefully place it on the ground.

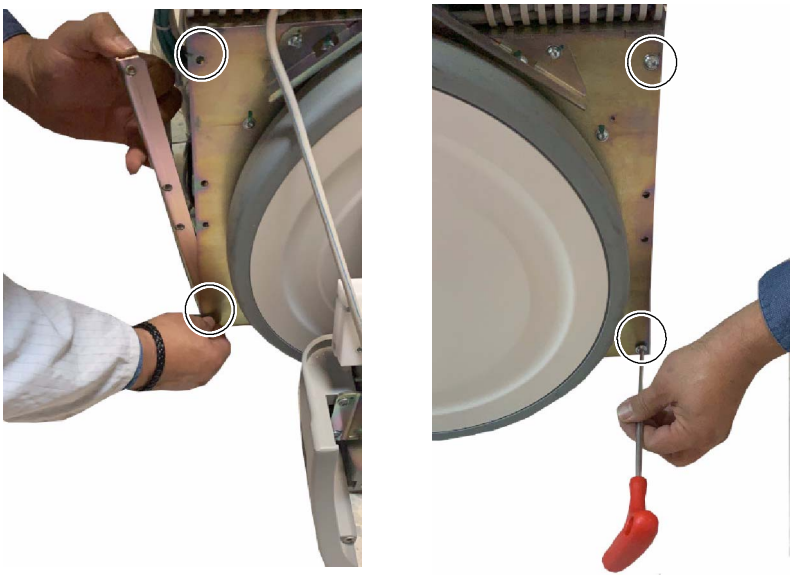


24. Once put the Back Bumper (A9) aside, remove the four (4) Screws (two on each side) of the Batteries Closing Frame. The Frame fits pressurized. Pulling forcefully might be necessary to remove it.



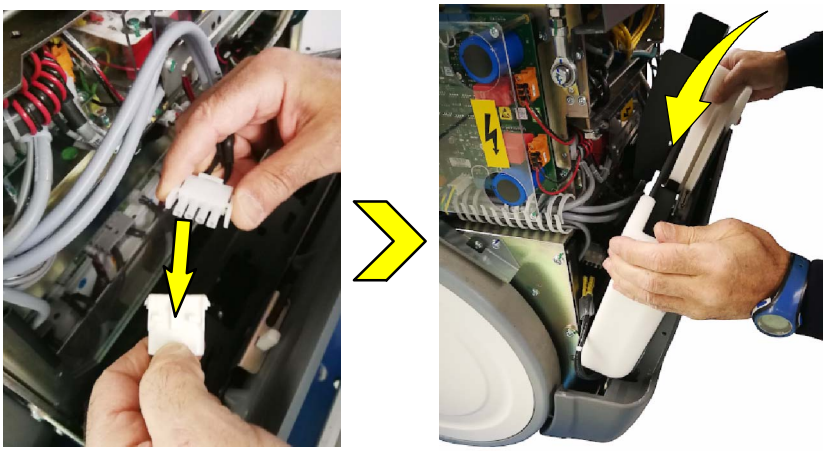
25. At this point, all the Covers of the Main Module have been removed. To perform any procedure that does not require access to the Battery Tray Module, it is necessary to reassemble some elements of the Unit covers, as indicated below:

    a. Mount the Batteries Closing Frame: screw the four (4) Screws on its laterals.



b. Mount the Back Bumper (A9) by screwing the four (4) Screws (two on each lateral support) and reassemble the Protection Plate for the Detector Cable on the Right Support.

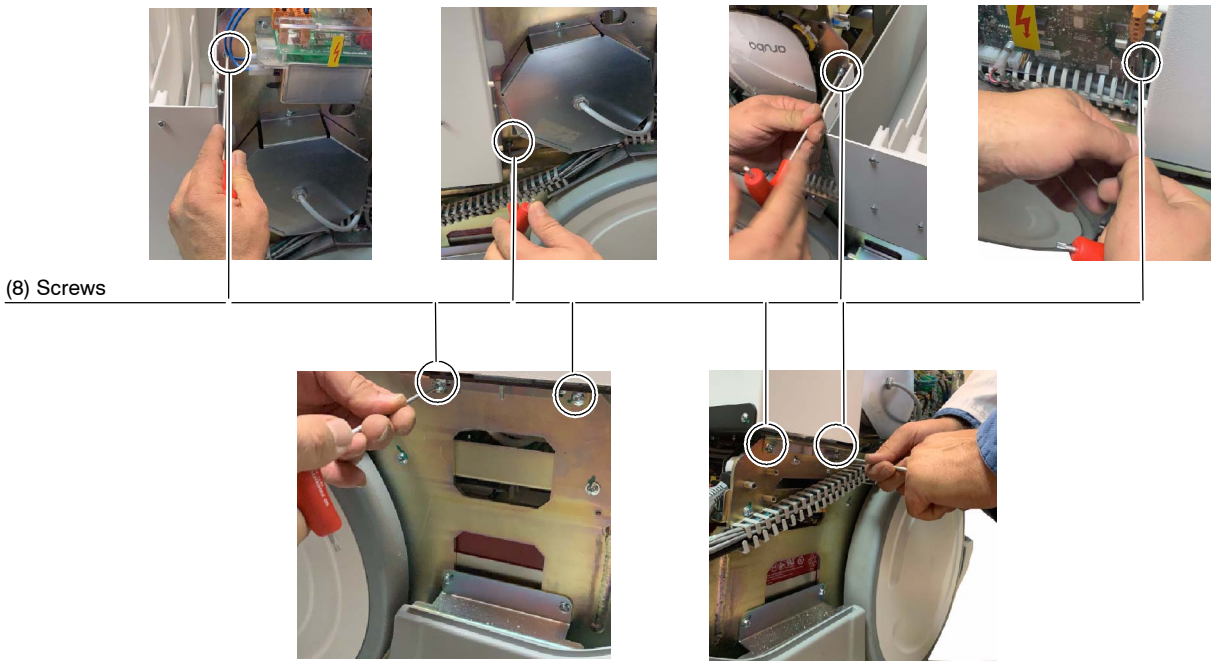
c. Reconnect the Bumper Fans power cable and mount the Back Holder for Detector (A8) again.



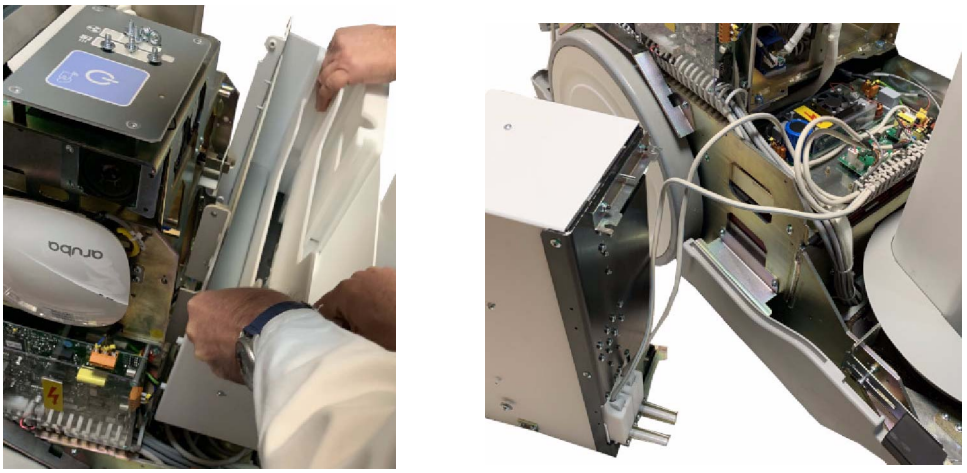
d. Reinstall the X-ray Handswitch.

1.2.1.4 FRONT HOLDER FOR DETECTORS

26. Remove the eight (8) Screws highlighted in the following pictures that fix the Holder for Detector (A10) to the Unit Chassis: four (4) close to the Cable Reel and the Access Point and four (4) under the Holder for Detector Charge and Storage (two on each side of the Mobile Unit).



27. Dismount the Holder for Detector (A10). To put it back in place, it is necessary to apply some pressure to fit it correctly inside the Unit.



1.2.1.5 BACK BUMPER FANS REPLACEMENT

28. Follow steps 20. to 23. in Section 1.2.1.3 to dismount the Back Bumper (A9).

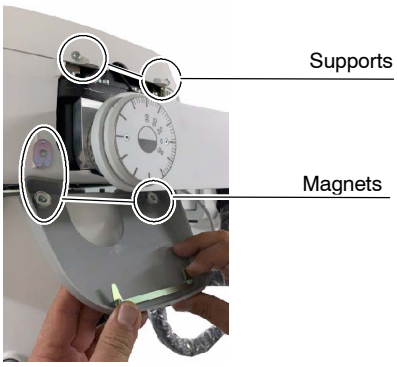
29. Once removed, unscrew the four (4) Screws located at the bottom area of the Fans Section and the three (3) Screws that hold the Fans on top.

30. Replace Fans if needed and/or dismount the Detector Charger.

1.2.2 HEAD-ASSEMBLY COVERS IN MOBILE UNITS WITH 3-SECTION ARM

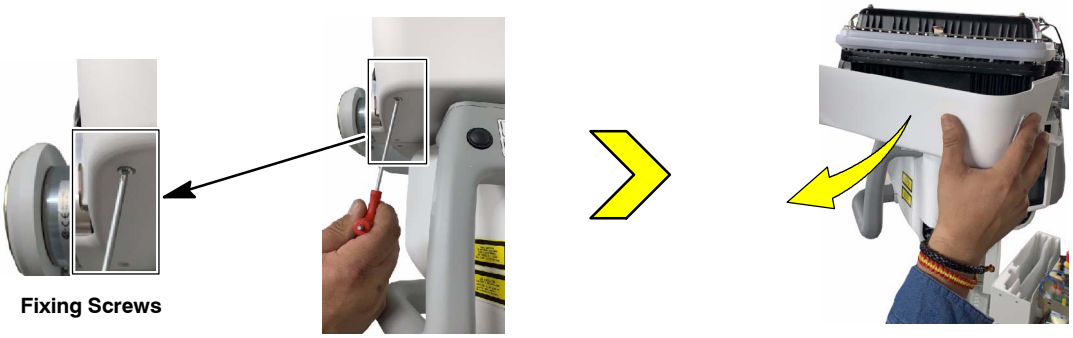
1.2.2.1 MONOBLOCK COVERS

1. Remove the Lateral Covers (B1) loosening them from the lower Magnets and the upper Supports (two Magnets and two Supports on each side).



2. Upper Cover (B2): remove the four (4) Fixing Screws that remain visible after removing the Lateral Covers (two Screws on each side) and pull upwards. This Cover contains an inner Magnet at the front side.

3. Lower Front Cover (B3): remove the four (4) lower Fixing Screws (two on each side). Rotate the Collimator to the left and to the right in order to gain access to the Screws. Then, pull outwards to remove the Cover.



Fixing Screws

4. Lower Back Cover (B4): remove the four (4) Fixing Screws (two on each side, one up and one down). To gain access to the Screws, it is necessary to turn left and right the Collimator.

   Rotate upwards the Tube-Collimator Assembly 45º approximately and separate the shielded cables to easily remove the Cover from behind.

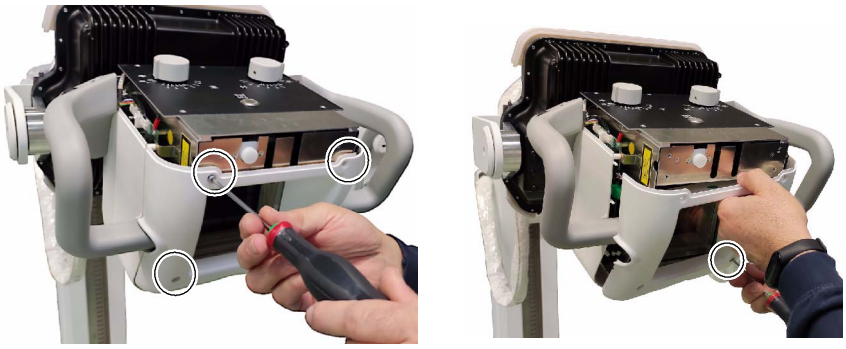
1.2.2.2 COLLIMATOR COVERS

5. Front Cover (B5): remove the two (2) Fixing Screws at the bottom. To remove the Cover carefully, pry from the bottom rear to protect the Proximity Sensor (Focal Skin Distance). Then pull from the cover frontwards.

Fixing Screws (x2)

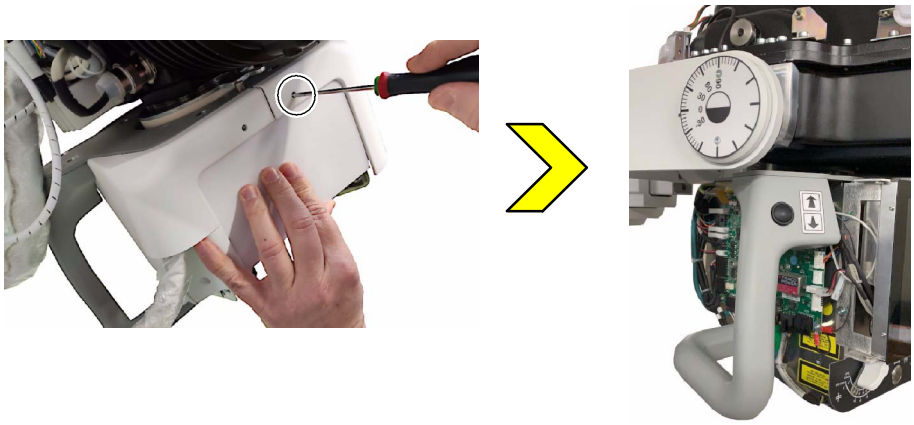
Do not remove the two (2) screws on the top of the Front Cover, because these screws fix internal couplings.

6. Lower Cover (B6): loosen the four (4) Fixing Screws and remove the Cover.

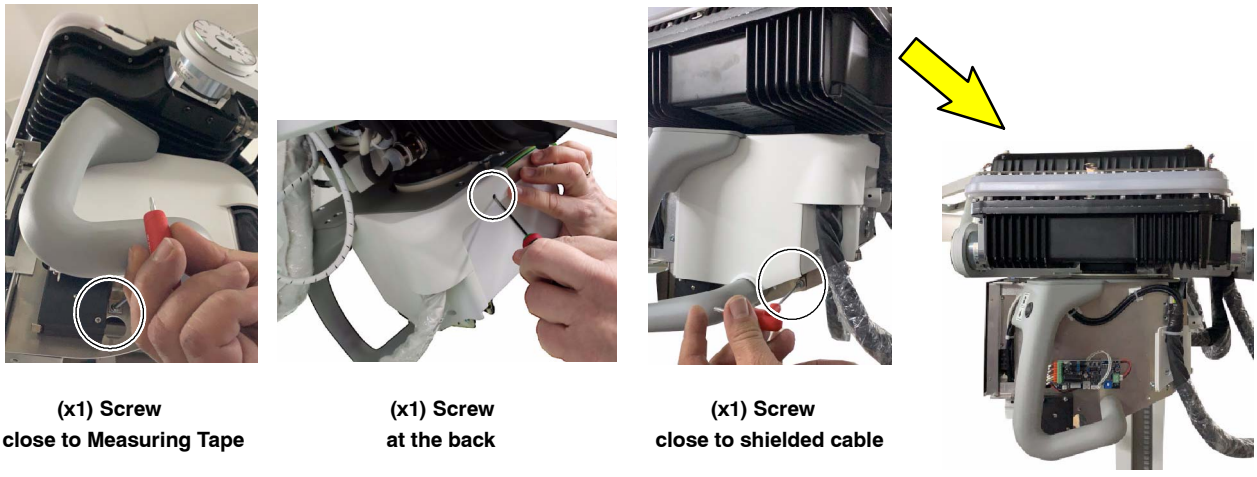


Fixing Screws (x4)

7. Left Lateral Cover (B7): loosen the two (2) Fixing Screws, one down at the front and another behind. Remove the Cover.



8. Right Lateral Cover (B8): loosen the three (3) Fixing Screws and remove the Cover.



(x1) Screw close to Measuring Tape

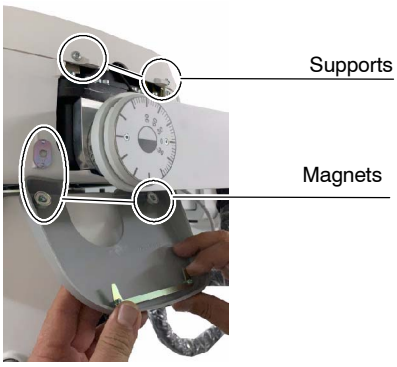
(x1) Screw at the back

(x1) Screw close to shielded cable

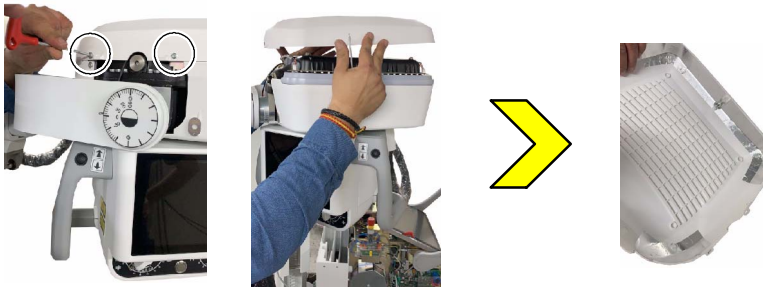
1.2.3 HEAD-ASSEMBLY COVERS IN MOBILE UNITS WITH 4-SECTION ARM

1.2.3.1 MONOBLOCK COVERS

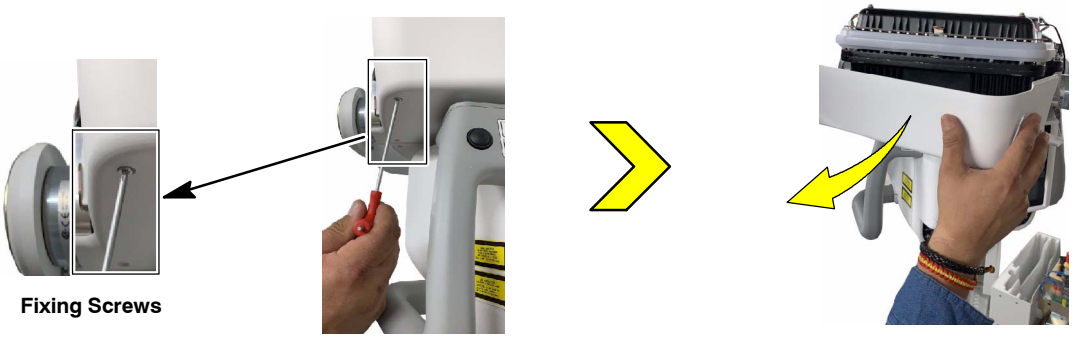
1. Remove the Lateral Covers (B1) loosening them from the lower Magnets and the upper Supports (two Magnets and two Supports on each side).



2. Upper Cover (B2): remove the four (4) Fixing Screws that remain visible after removing the Lateral Covers (two Screws on each side) and pull upwards. This Cover contains an inner Magnet at the front side.



3. Lower Front Cover (B3): remove the four (4) lower Fixing Screws (two on each side). Rotate the Collimator to the left and to the right in order to gain access to the Screws. Then, pull outwards to remove the Cover.



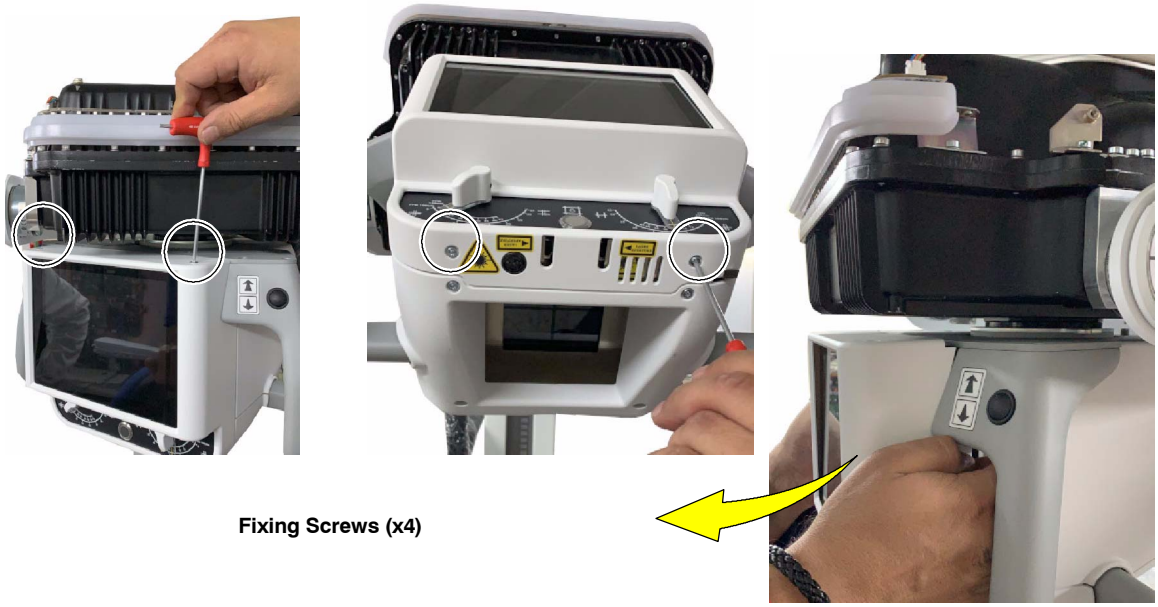
Fixing Screws

4. Lower Back Cover (B4): remove the four (4) Fixing Screws (two on each side, one up and one down). To gain access to the Screws, it is necessary to turn left and right the Collimator.

   Rotate upwards the Tube-Collimator Assembly 45º approximately and separate the shielded cables to easily remove the Cover from behind.

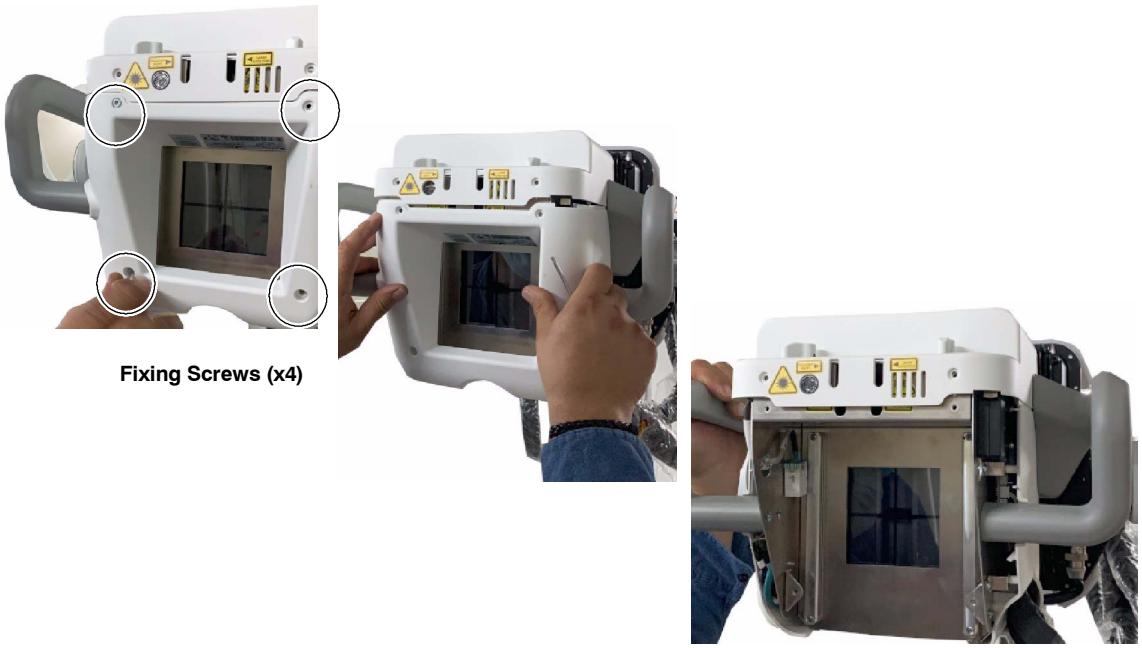
1.2.3.2 COLLIMATOR COVERS

5. Front Cover (B5): remove the four (4) Fixing Screws (two on the top and two at the bottom). To remove the cover carefully, pry from the bottom rear to protect the Proximity Sensor (Focal Skin Distance). Then pull from the cover frontwards.



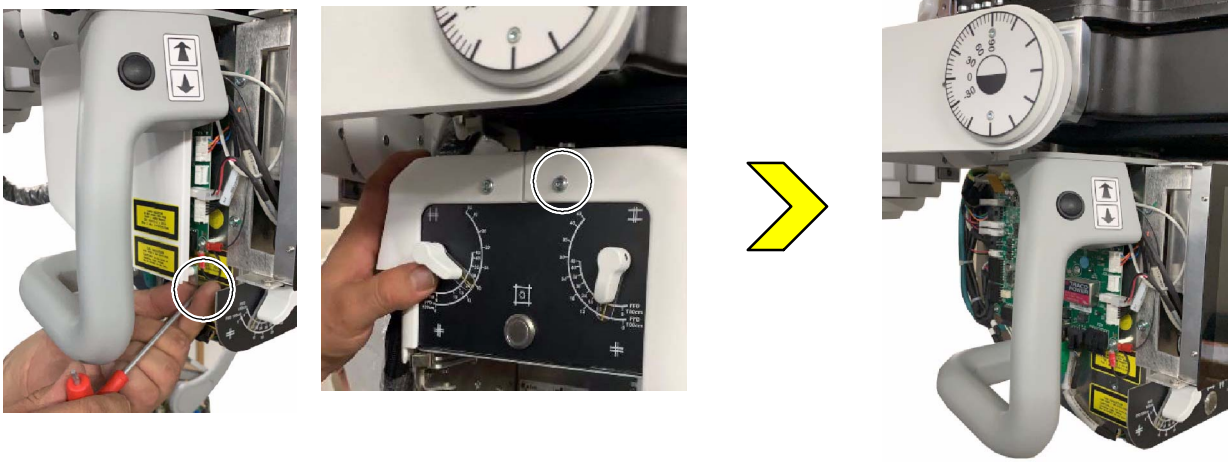
Fixing Screws (x4)

6. Lower Cover (B6): loosen the four (4) Fixing Screws and remove the Cover.

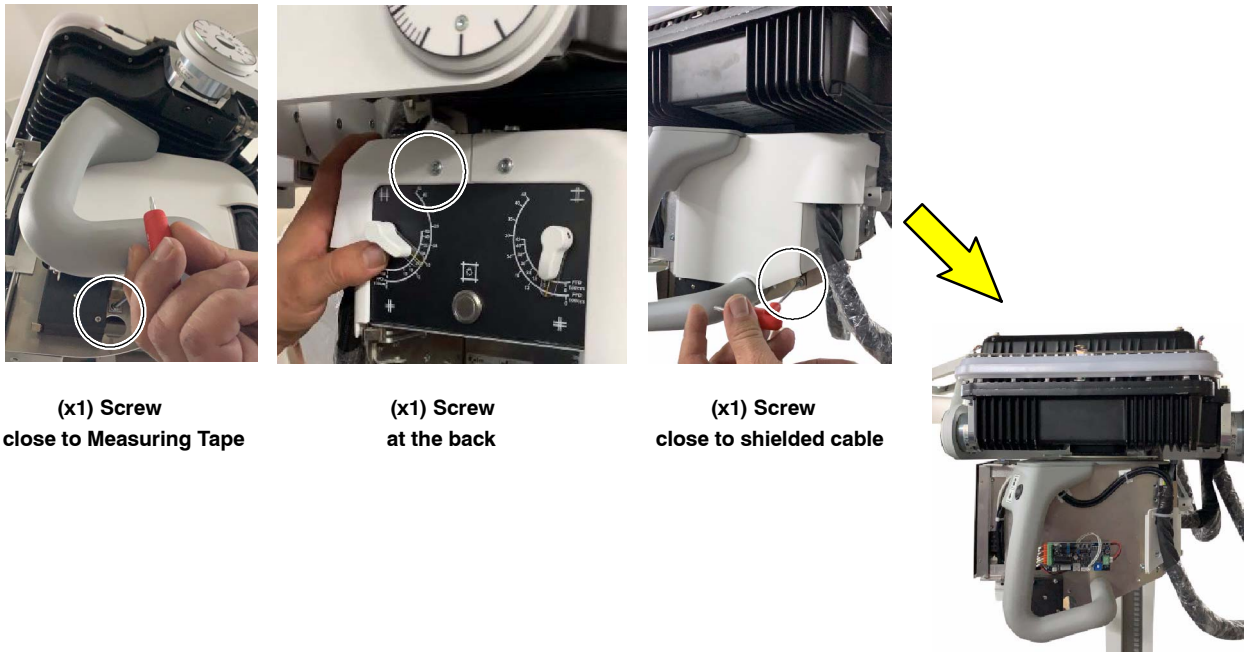


Fixing Screws (x4)

7. Left Lateral Cover (B7): loosen the two (2) Fixing Screws, one down at the front and another behind. Remove the Cover.



8. Right Lateral Cover (B8): loosen the three (3) Fixing Screws and remove the Cover.



(x1) Screw close to Measuring Tape

(x1) Screw at the back

(x1) Screw close to shielded cable

1.3 HANDLEBAR POSITION ADJUSTMENT

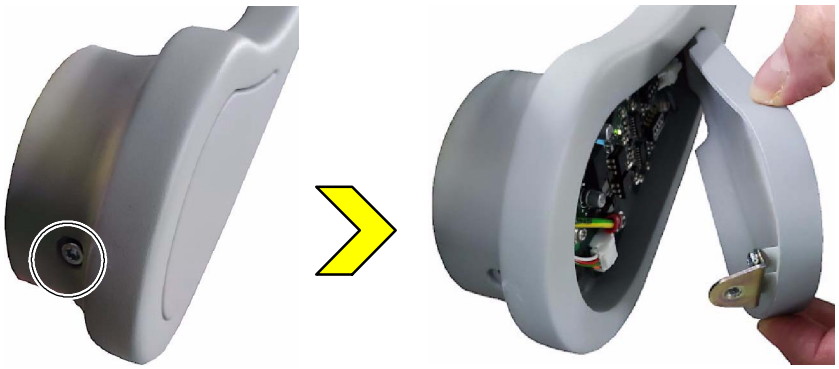
1. Switch OFF the Unit.

2. Dismount the Lateral Covers (A7) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

3. Dismount the handlebar lateral cap at the right side (unit driving view) by removing the screw shown in the following illustration.

4. Remove the four (4) screws shown in the illustration below. Do not remove the central screw.

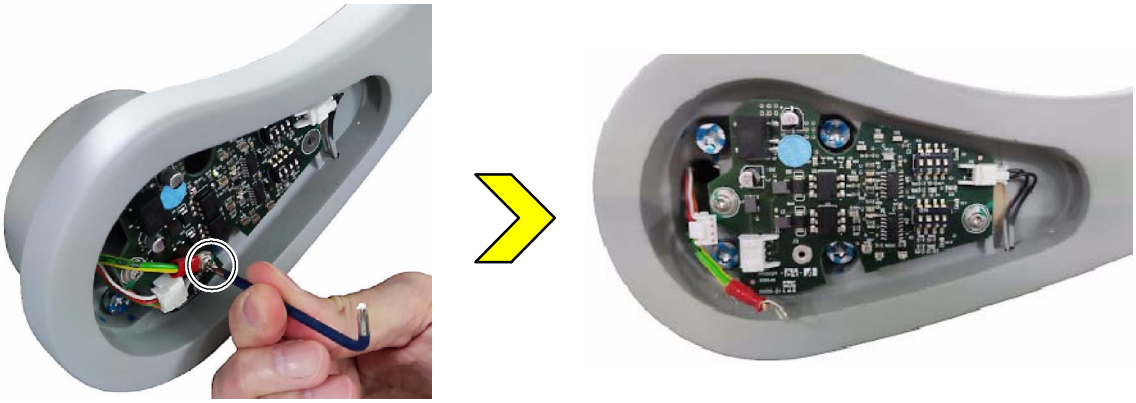
5. Dismount the handlebar lateral cap at the left side (Unit driving view) by removing the screw shown in the illustration.



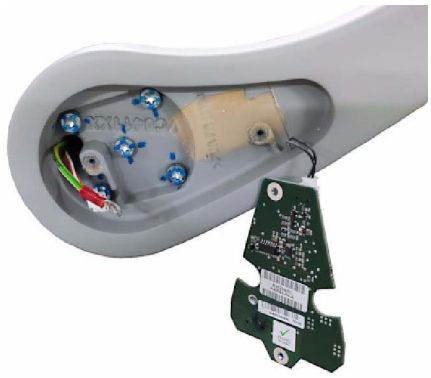
6. Once the left lateral cap is dismounted, the Handlebar Board (A40024-XX) has to be removed in order to get access to the screws.

7. Disconnect the J1 connector shown in the illustration below.

8. Remove the screw which connects the Ground wire (J3) to the board.



9. Extract the Handlebar Board and do not disconnect it from the other connector (J2), as shown in the illustration below.



10. Remove the four (4) screws, as indicated in the illustration. Do not remove the central screw.

11. Once the screws are removed, there are three (3) positions available in order to adjust the handlebar.

12. The Service Engineer will select one of the three (3) positions available, in accordance with the operator preferences.

Low Position

Medium Position

High Position

13. Once the desired position is selected, install the four (4) screws removed previously at step 8.

14. Put in place the Handlebar board, and install the screw which attach the Ground wire to the board.

15. Connect the board to the connector (previously disconnected at step 6).

16. Mount the handlebar lateral cap at the left side (unit driving view) by fixing the screw previously removed at step 4.

17. At the right side (unit driving view) of the handlebar, install the four (4) screws removed previously at step 3.

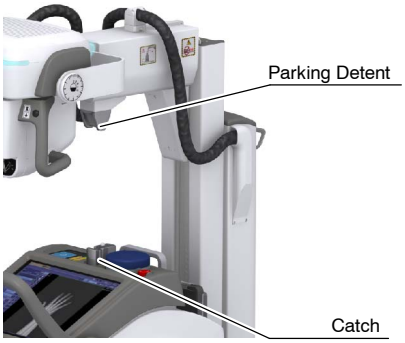
18. Mount the handlebar lateral cap at the right side (unit driving view) by fixing the screw previously removed at step 2.

19. Finally, mount the Lateral Covers of the Main Module of the Unit.

1.4 PARKING POSITION UNLOCKING

Note ☞ *This procedure has been developed as a safety measure for unlocking the Arm from its Parking Position to allow a forced movement of Arm and Column rotation when there is an emergency or failure that impedes the Unit from being released from the Parking Position in the normal way.*

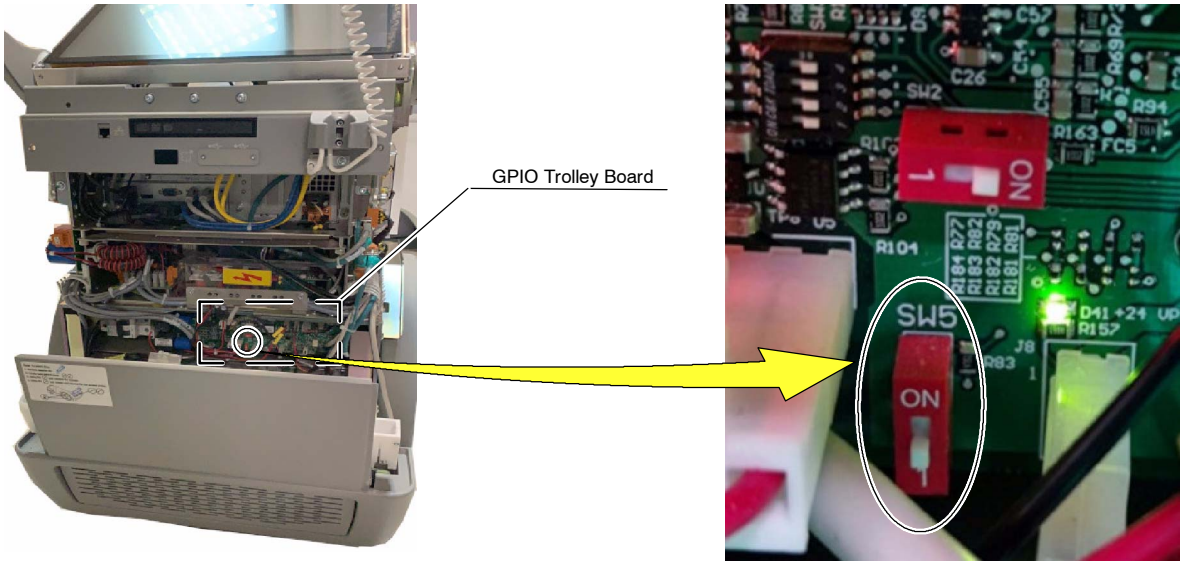
Parking Position



1. Dismount the Upper Back Cover (A8) of the Main Module of the Unit (*refer to Section 1.2*).

2. Check at this point that the Unit is connected to the mains.

3. Set the switch SW5 to ON in order to release the Parking Catch. This switch is located at the GPIO Trolley Board (A40001-XX).



4. Once the Arm is released from the Parking Position, turn the switch SW5 back to OFF and reassemble the Upper Back Cover.

If the problem persists due to a power supply failure or batteries malfunction, it is possible to apply the following alternative procedure in order to mechanically unlock the Parking Catch:

1. Check the Unit is disconnected from the mains.

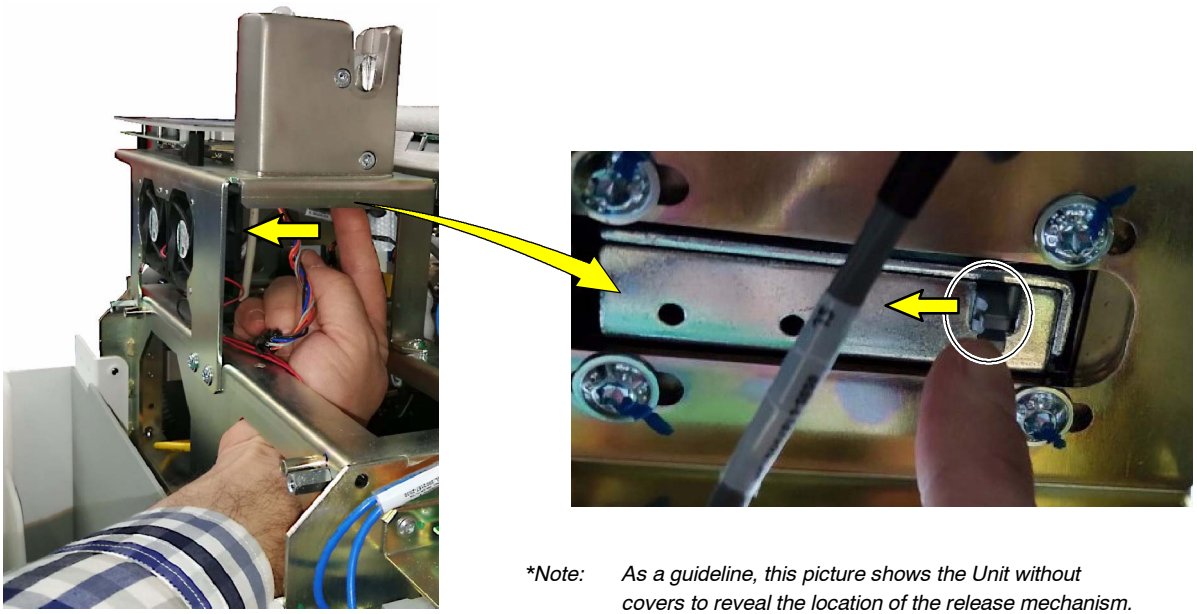
2. It is necessary to dismount the Grid Cover (A3) of the Main Module of the Unit (*refer to Illustration 1-1*).

3. Loosen the two (2) screws at the front, just above the Holder for Detector (A10) at the Front Cover (A2). *Refer to Illustration 1-1*.

4. Elevate the Grid Cover (A3) and rotate it 90º to remove it from its housing.

5. Introduce the hand in the Unit as shown below for getting access to a release mechanism installed under the Catch.

6. Pull the latch of the release mechanism, as shown in the illustration below. At the same time, pull up the Arm for getting out the Parking Detent from the Catch.



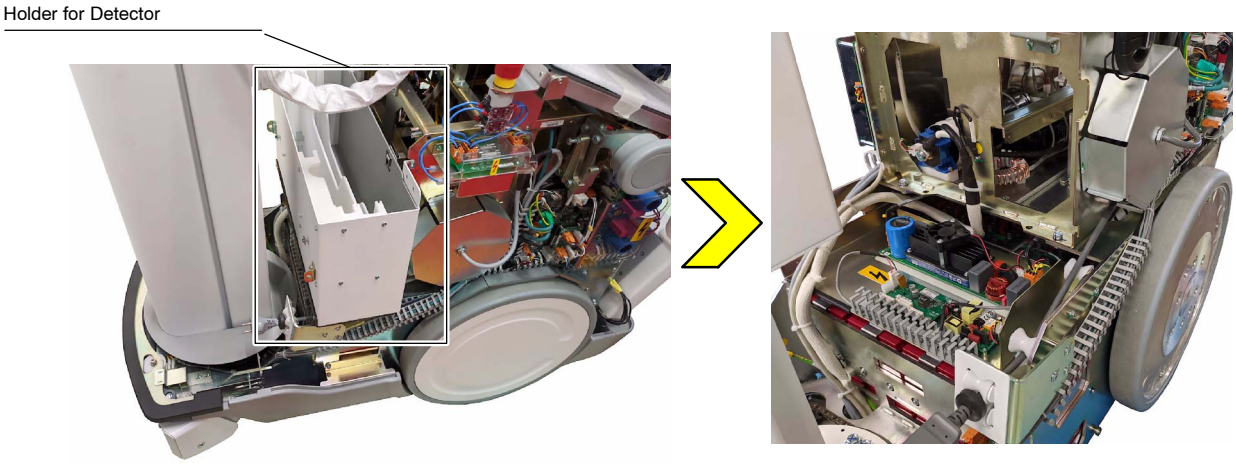
*Note: *As a guideline, this picture shows the Unit without covers to reveal the location of the release mechanism.*

Note ☞ *Once the Arm is released from the Catch, any further movement of the Column will require an extra manual force.*

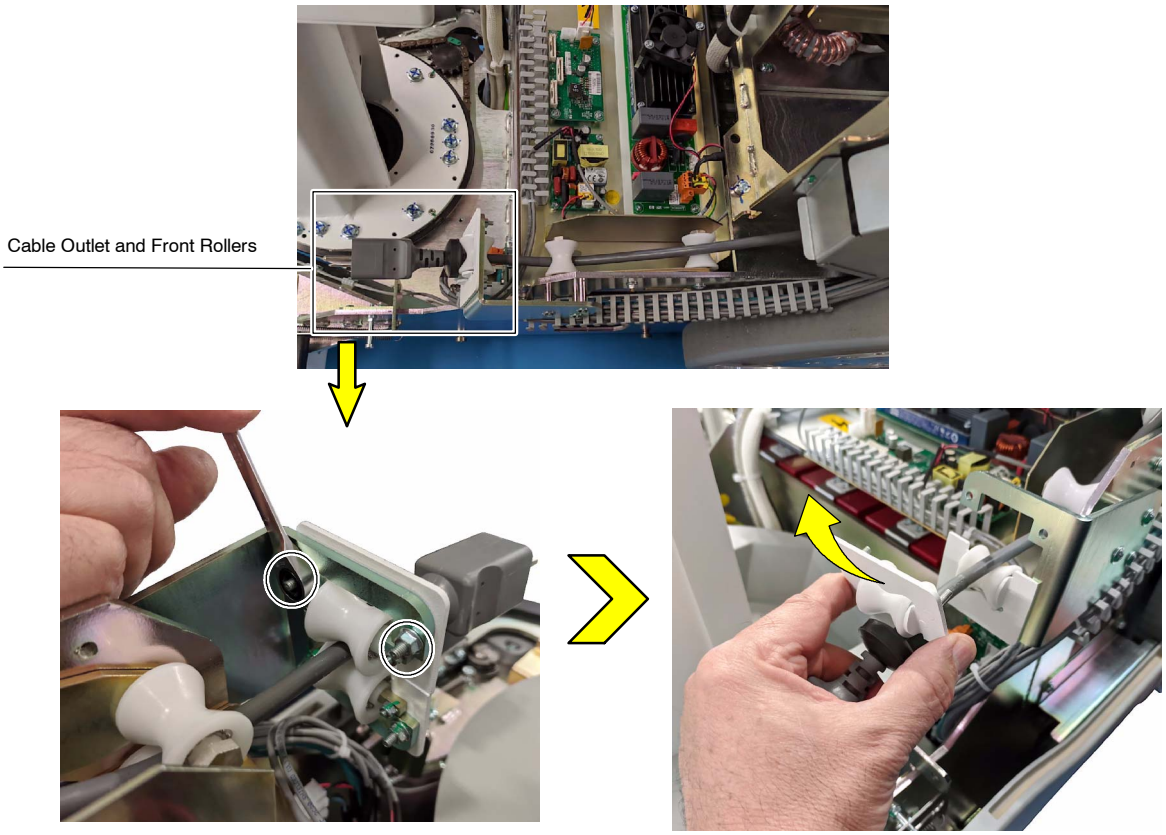
7. Finally, reassemble the Gridholder Cover of the Main Module.

1.5 CABLE REEL REPLACEMENT

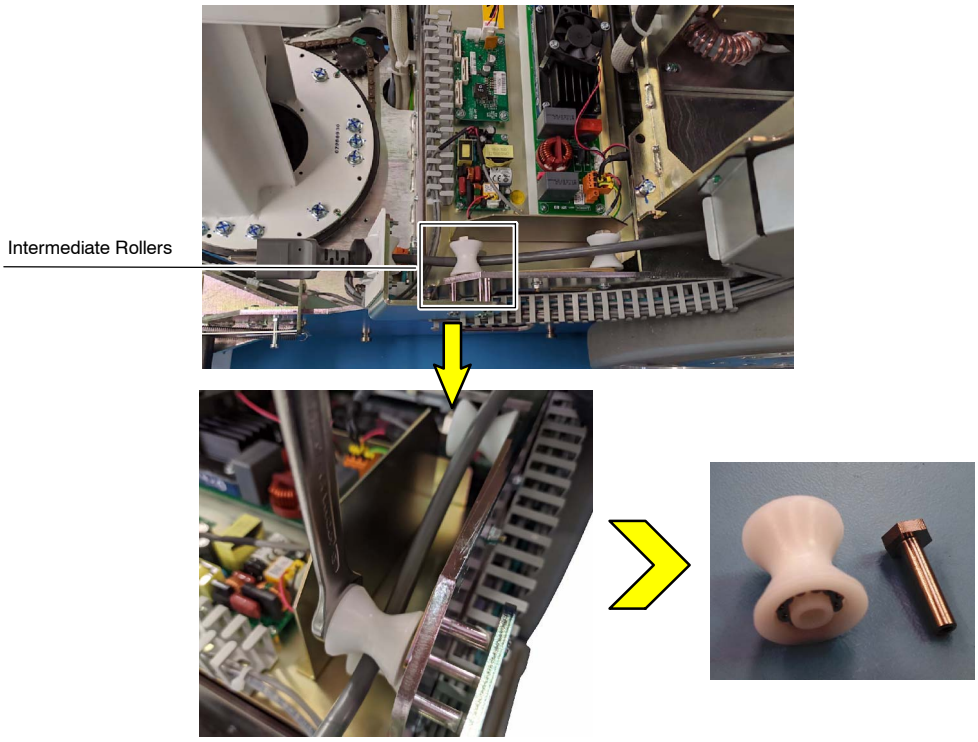
1. Once the right Lateral Cover (A7) has been removed, dismount the Front Holder for Detectors (A10) as described in Section 1.2.1.2. (steps 26. and 27.)



2. Remove the two (2) Screws securing the upper Plate of the cable outlet. Put aside this Plate, which also has the upper Roller of the cable outlet mounted on it.

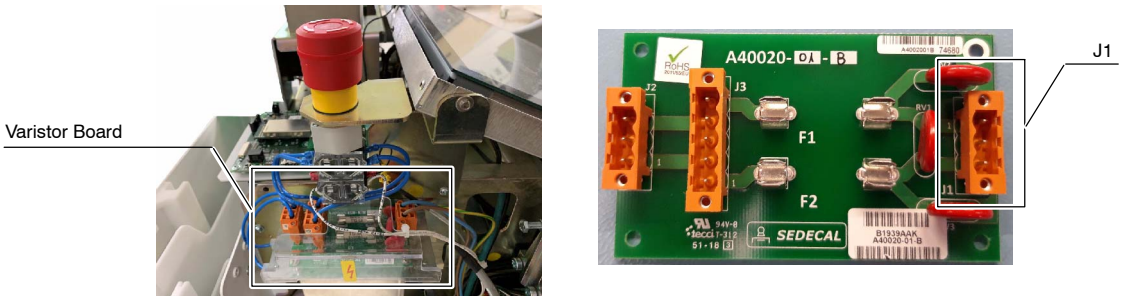


3. Remove the upper intermediate Roller by loosening the screw with a wrench.

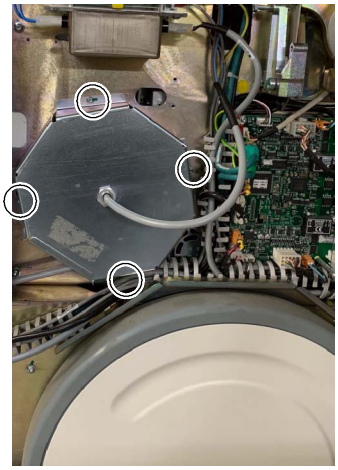


4. At this point, the Cable Plug is clear for removal. Roll up the Power Cable into the Cable Reel.

5. Disconnect the Power and Ground Wires that are connected to Connector J1 of the Varistor Board (A40020-XX).

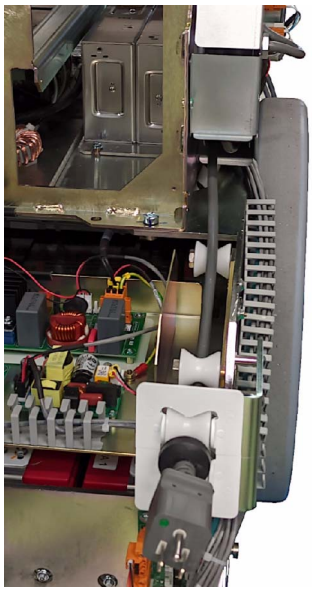


6. To dismount the Cable Reel, unscrew the four (4) Screws shown in the picture. Remove the Cable Reel.



7. Install the new Cable Reel with the four (4) Screws previously removed fixing it to the Chassis of the Mobile Unit, then pass the Power Line Cable through the Rollers below those previously removed.

8. Reassemble the upper intermediate Roller and the Plate with the upper Roller of the cable outlet.



9. Finally, connect the Power and Ground Wires to Connector J1 of the Varistor Board (A40020-XX).

1.6 FUSES REPLACEMENT

Alternatively to this section, the *Renewal Parts* and *Central Listings* chapters can be referred to for detailed information on the Unit's fuses and their location.

Table 1-8
Fuses

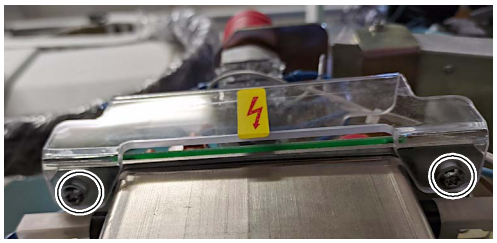
Location in the Unit	Fuse	Voltage	Current	Operating Speed	Breaking Capacity
Input Power Line / Varistor Board (A40020-XX)	F1	*(Refer to values in Table 1-9, depending on the type of fuse)*			
	F2				
GPIO Trolley Board (A40001-XX)	F1	400 VDC	5 A	TIME-DELAY	15 KA
	F2				

Table 1-9
Input Power Line Fuses (by Country/Type)

Country	Reference	Voltage	Current	Operating Speed	Breaking Capacity
Argentina	SAT-53801008	250 VAC	10 A	SLOW	100A - 10KA
Australia / New Zealand					
Mainland China					
United Kingdom					
Switzerland					
United States of America	SAT-CC01020	500 VAC	12.5 A	SLOW	3500A - 20KA
Brazil	SAT-53801028	250 VAC	15 A	SLOW	100A - 10KA
Chile					
Europe					
Israel					
Japan					
South Africa / India					

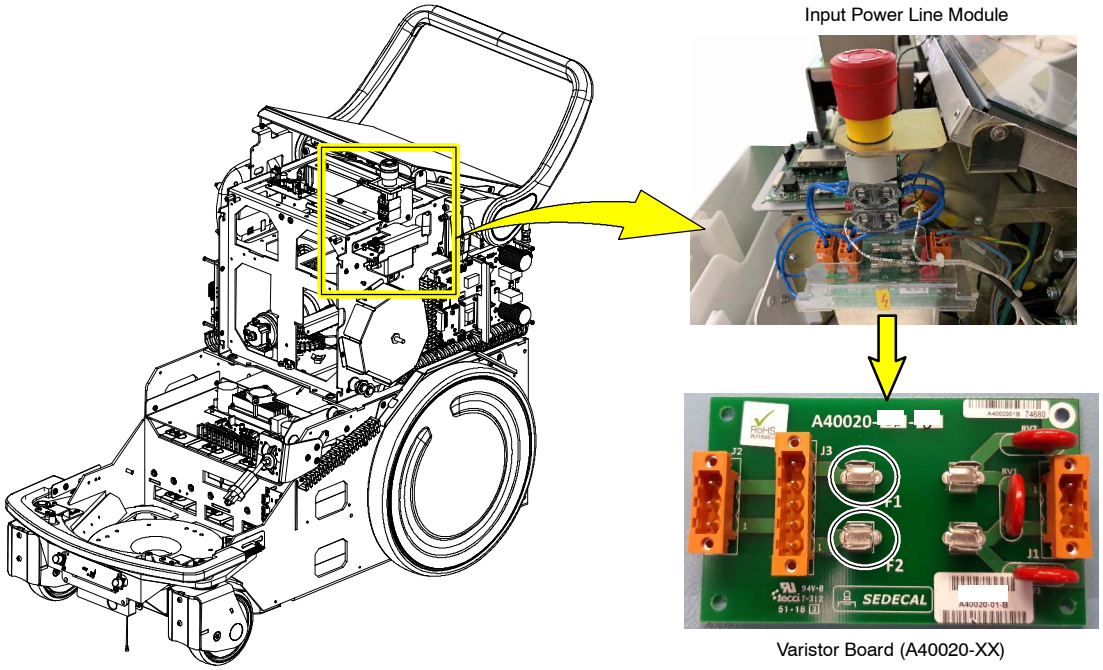
1.6.1 INPUT POWER LINE FUSES REPLACEMENT

1. Turn OFF the Unit.
2. In order to get access to the Input Power Line (Varistor Board – A40020-XX), dismount the Console Cover (A1) and the Right Lateral Cover (A7) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*
3. Disconnect the Power and Ground Wires that are connected to Connector J1 of the Varistor Board.
4. Put aside the protective cover by removing the two screws that hold it to the Input Power Line Module.



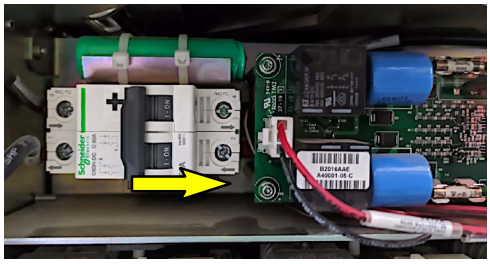
5. Replace fuses F1 and F2.
6. Finally, following the reverse process, reconnect J1 and mount the removed covers.

Illustration 1-8
Input Power Line Fuses Location



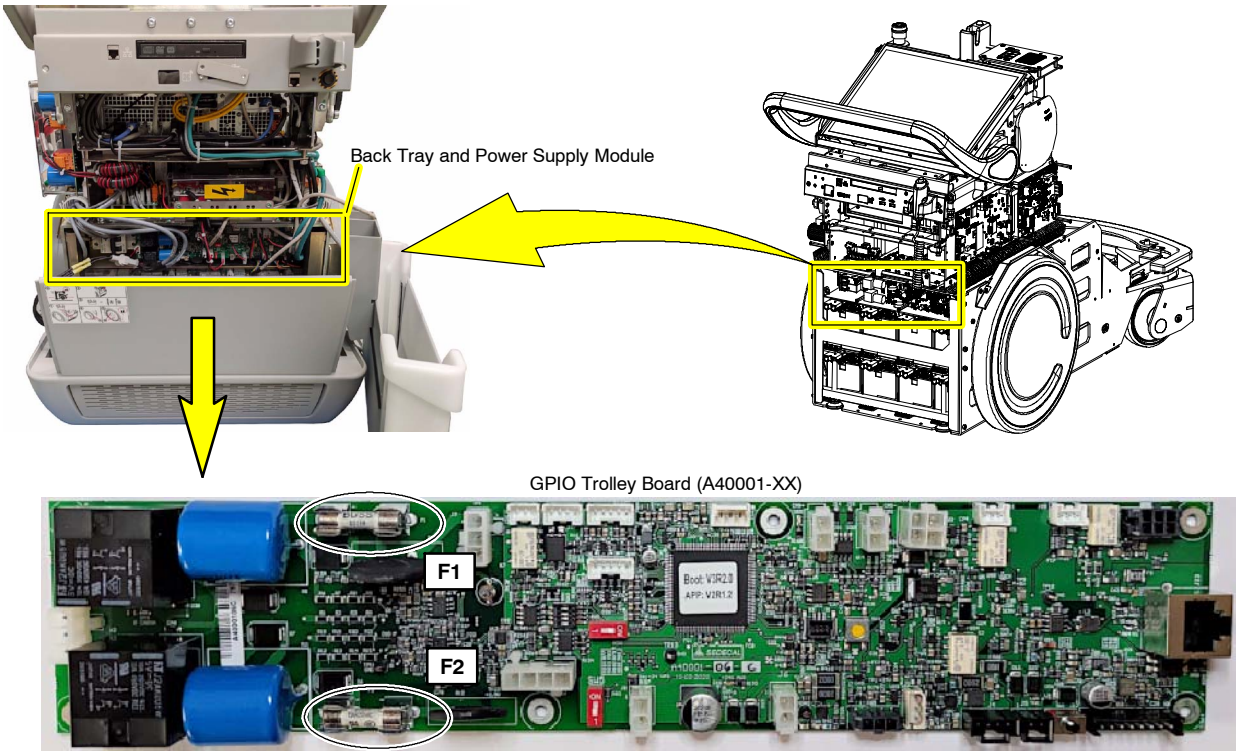
1.6.2 GPIO TROLLEY BOARD FUSES REPLACEMENT

1. Turn OFF the Unit.
2. In order to get access to the GPIO Trolley Board (A40001-XX), dismount the Back Cover (A4) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*
3. Turn OFF the Thermomagnetic Circuit Breaker of the Power Supply Module.



4. Replace fuses F1 and F2.
5. Finally, following the reverse process, turn ON the Thermomagnetic Circuit Breaker and mount the removed covers.

Illustration 1-9
GPIO Trolley Board Fuses Location



1.7 SOFTWARE UPDATE

The ***Downloader*** application is a stand-alone tool that is run on the Unit's PC to perform the software update of all electronic components of the equipment.

This application has been designed with the aim of being able to update the whole electronic equipment software in an unattended way, that is, no human intervention is needed so the upgrade process can be done remotely. However, it is possible to perform the software update with the ***Downloader*** application in "*GUI*" mode (User Interface).

A software package version file will be provide with all the necessary information to be able to update all the components of the equipment. The package version is a ZIP file protected with password that contains BIN files of those components of the system to be updated.

KEEP THE EQUIPMENT PLUGGED INTO THE MAINS AND DO NOT TURN IT OFF AT ANY TIME DURING THE SOFTWARE UPDATE PROCESS.

BEFORE RUNNING THE APPLICATION, MAKE SURE THAT THE SYSTEM IS FULLY OPERATIONAL AND THERE ARE NOT ANY ERROR MESSAGES DISPLAYED ON THE CONSOLE.

Note ☞

*The **Downloader** application will not perform any changes to the PC software. Therefore, all updates to the PC software (Consoles, Servers, etc.) must be carried out independently of this tool.*

- Follow the steps in the following sections in order to perform the software update through the Downloader application in its three alternatives:
  - *Unattended Mode, refer to Section 1.7.1.*
  - *GUI Mode, refer to Section 1.7.2*.
  - *Silent Mode, refer to Section 1.7.3*.
- The application has some configuration parameters that enable service personnel to configure the behavior of the application. *For detailed information of this configuration parameters, refer to Section 1.7.4*.
- A casuistry of possible errors that may occur during the update is detailed in an update troubleshooting list. *Refer to Section 1.7.6*.

1.7.1 SOFTWARE UPDATE IN UNATTENDED MODE

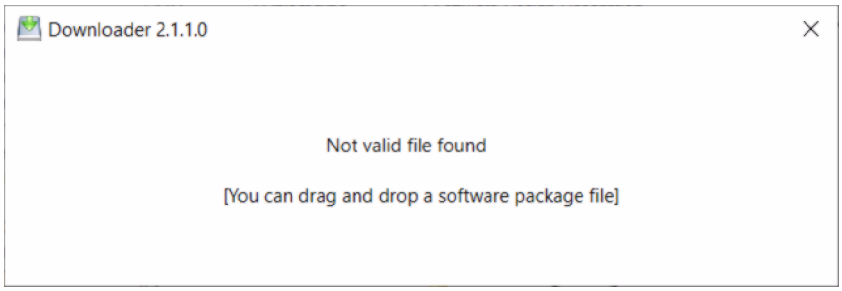
In this mode, the application will run in an unattended and automatic way, displaying a window with the installation progress. This is the default mode of the application.

To perform the update in **Unattended Mode**:

1. Prepare the software package version file to be made available to the application.

   Downloader will look for an update file in this order:

   - **a)** As parameter in the command line: The path of the file can be indicated as a parameter when executing the application (*refer to Section 1.7.3*).
   - **b)** Removable devices like USB flash drives: The application will automatically search in the removable devices available on the computer for a package version.
   - **c)** Configuration parameter "*SearchDirectory*": The application will search the directory indicated by the configuration parameter '*Search directory*' for a package version file (*refer to Section 1.7.4 for detailed information*). If the search results in more than one, it will select the most recent one.
   - **d)** Drag and Drop: If a valid file is not found, a message will be displayed in the application window informing about it, providing the option to drag and drop the file manually.

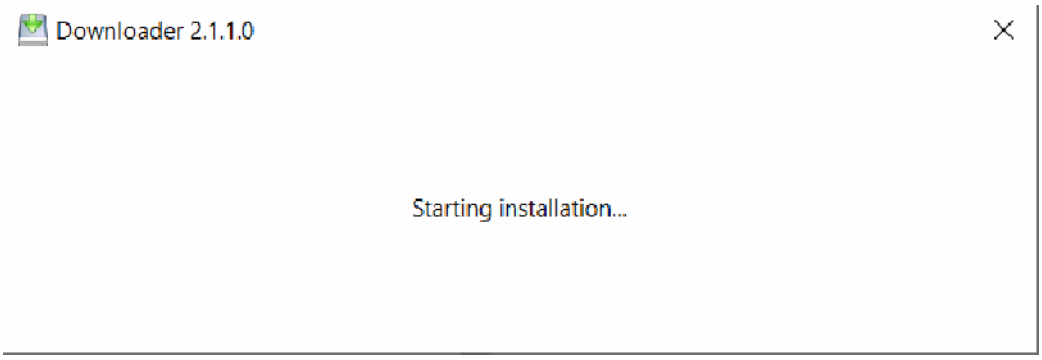


2. Run ***Downloader.exe*** file in path:

   C:\Program Files (x86)\Sedecal\Service Tools\Unattended Downloader

Note ☞ *The Windows Desktop / Start Menu may include one or more shortcuts to the application.*

3. The application will start updating each component listed in the software package version in sequence way.

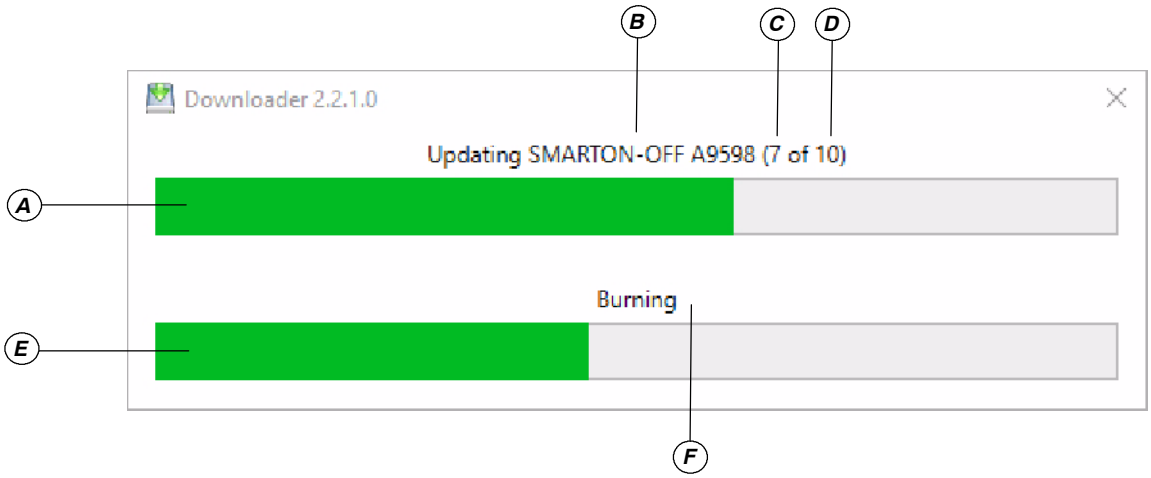


4. Next, the window displays two progress bars indicating the status of the upgrade.

   The first progress bar (**A**) displays the total of components/boards to update. At the top it is indicated the next information:

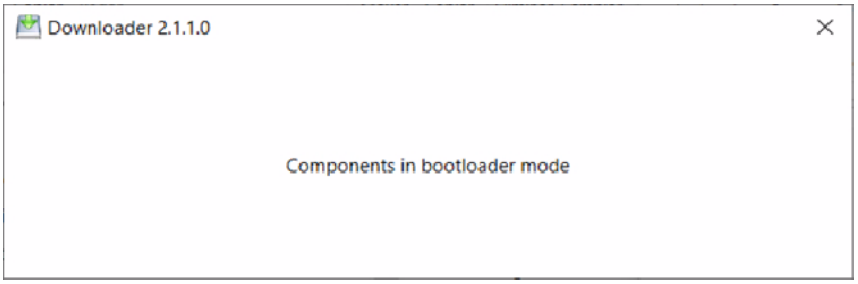
   - Name of the component that is being updated (**B**).
   - The component number being updated (**C**).
   - The total number of components to update (**D**).

   The second progress bar (**E**) shows the update status (**F**) of the component that is being updated.

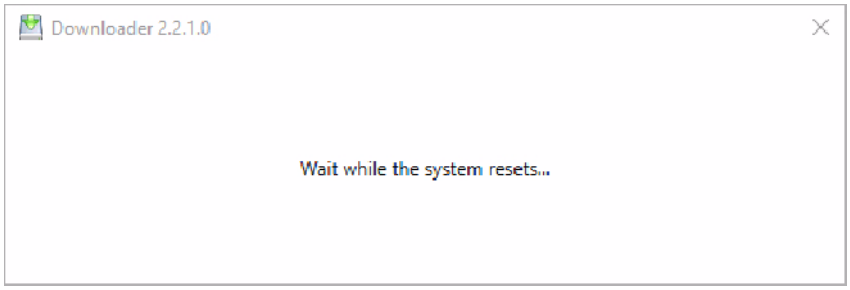


5. In case any of the component/board of the equipment would have had its bootloader mode activated during the update process, the application will display an informative message and will try to manage this issue according to these guidelines:

   - There is no component in bootloader mode: This is the normal situation where the system should operate, the application will proceed as described in the previous step.
   - There is one component in bootloader mode: In this situation the application attempts to update the component in bootloader mode first, and then continue with the rest of the components.
   - There are two or more components in bootloader mode: This is an abnormal system situation that *Downloader* is not able to handle. In this case the application will indicate that the update cannot be continued (*for detailed information refer to Section 1.7.6 - Troubleshooting during Software Update*).

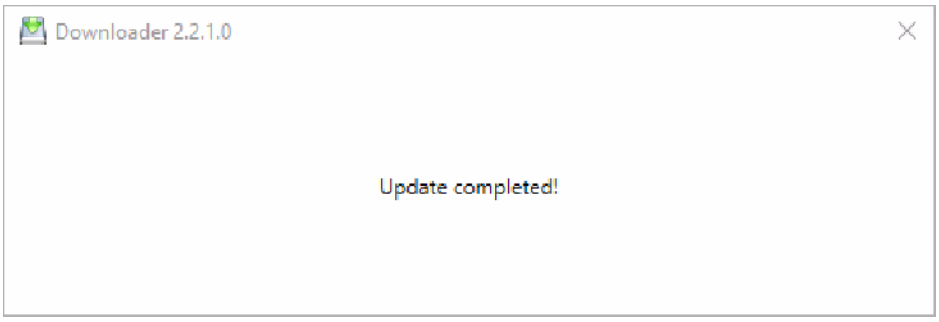


6. In case of a failure to update an equipment component, the application will restart the system and try to retry the update. This action will be repeated until the component is successfully updated or the maximum number of retries defined in the configuration file is reached (*for detailed information refer to Section 1.7.4 - Downloader Configuration*).



When the maximum number of retries is reached updating a component, the application will abort the update of the package version. This means that all components that have been updated so far will revert to the previously installed package version.

7. Once the update process is finished for all components/board, the application will display an confirmation message (*refer to Section 1.7.5*).



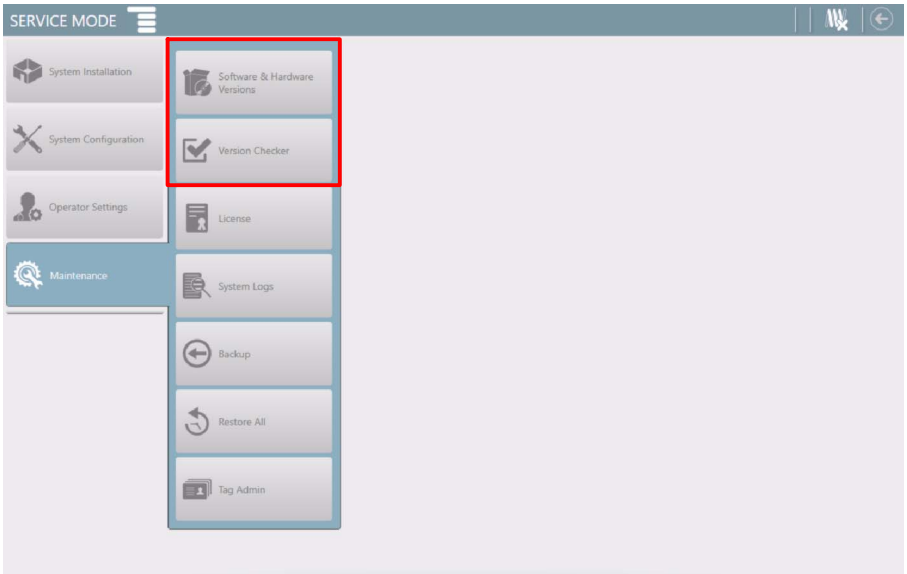
When the update process is complete, the application will generate a report TXT file with a summary of the actions performed. The file name will have the format: *DownloaderReport_YYYYMMDD_X*, where '*X*' represents the number of updates on the same day.

This report file will be created in the following path:
C:\OEM\Downloader\Reports

8. Turn the Unit OFF and ON.

9. Finally check that the software version of the updated components matches the software package version by using the "*Software & Hardware Versions*" and "*Version Checker*" functionalities from the Service Tool / Service Mode.

To do this, run the Service Tool / Service Mode and access the "*Maintenance"* menu. *For detailed information refer to the Configuration and Calibration Chapter of the Service Manual*.



1.7.2 SOFTWARE UPDATE IN GUI MODE (USER INTERFACE)

In this mode, the application requires user interaction to select the software package version file on a graphical interface that displays detailed information on the components to be updated.

To perform the update in **GUI Mode**:

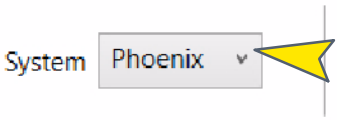
1. Run *GUI Downloader X.X.X* shortcut in path:

   C:\Program Files (x86)\Sedecal\Service Tools\Unattended Downloader

Note ☞ *The Windows Desktop / Start Menu may include one or more shortcuts to the application.*

2. The main window consists of a drop-down menu for System Selection (**A**), software package version file selection (**B**) and the "*Request*" button (**C**).

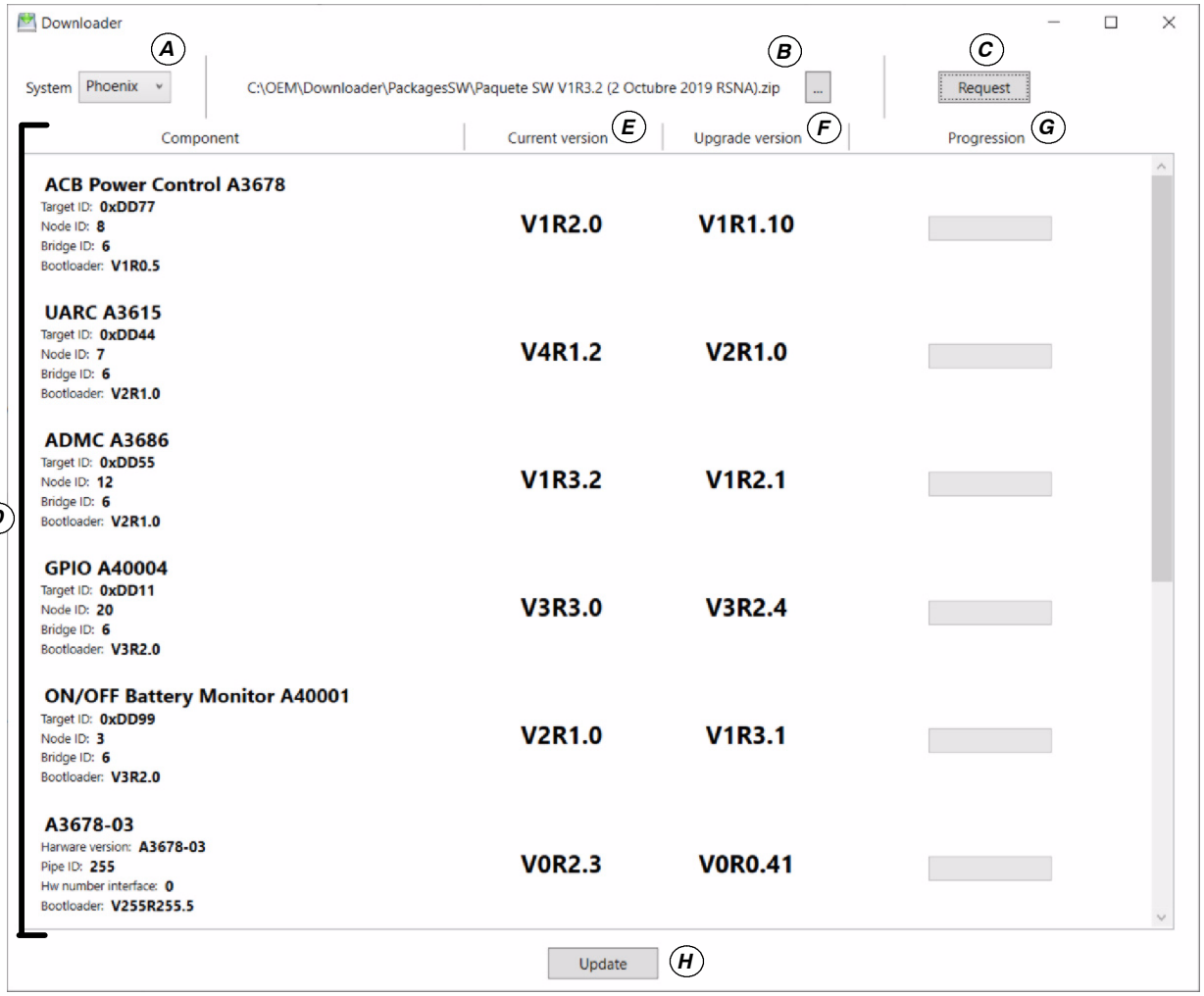
3. Firstly, select "*Phoenix*" from the System Selection drop-down menu.

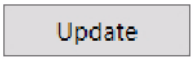


4. Click on the "*Browse*" button and select the ZIP file path of the desired software package version from the file explorer pop-up window.

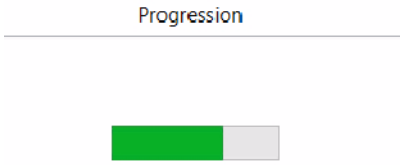
5. Then click the "*Request*" button in order to scan the contents of the software package version file and display detailed information on the components to be updated. The information displayed in the **GUI Mode** window in this step is as follows:

   - Main elements: System Selection (**A**), package version file selection (**B**) and the "*Request*" button (**C**).
   - List of components to be updated (**D**).
   - Currently installed versions of each component (**E**).
   - Versions to which each component will be updated (**F**).
   - Progress of the update of each component once started (**G**).
   - Button to start the update process (**H**).





6. Click the “Update” button to start the components update process. The progress bar of each component in the *Progression* column allows you to monitor the status of the updates.

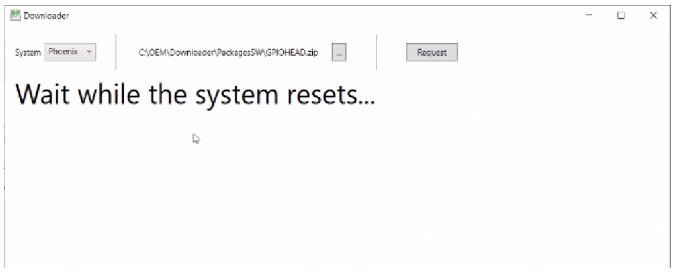


7. In case any of the component/board of the equipment would have had its bootloader mode activated during the update process, the application will display an informative message and will try to manage this issue according to these guidelines:

   - There is no component in bootloader mode: This is the normal situation where the system should operate, the application will proceed as described in the previous step.
   - There is one component in bootloader mode: The component in bootloader mode will be updated before the rest, appearing first in the components list (**D**). The *Current version* column (**E**) will be displayed blank for this row. Then, the rest of the component updates will continue.
   - There are two or more components in bootloader mode: This is an abnormal system situation that *Downloader* is not able to handle. In this case the application will indicate that the update cannot be continued (*for detailed information refer to Section 1.7.6 - Troubleshooting during Software Update*).

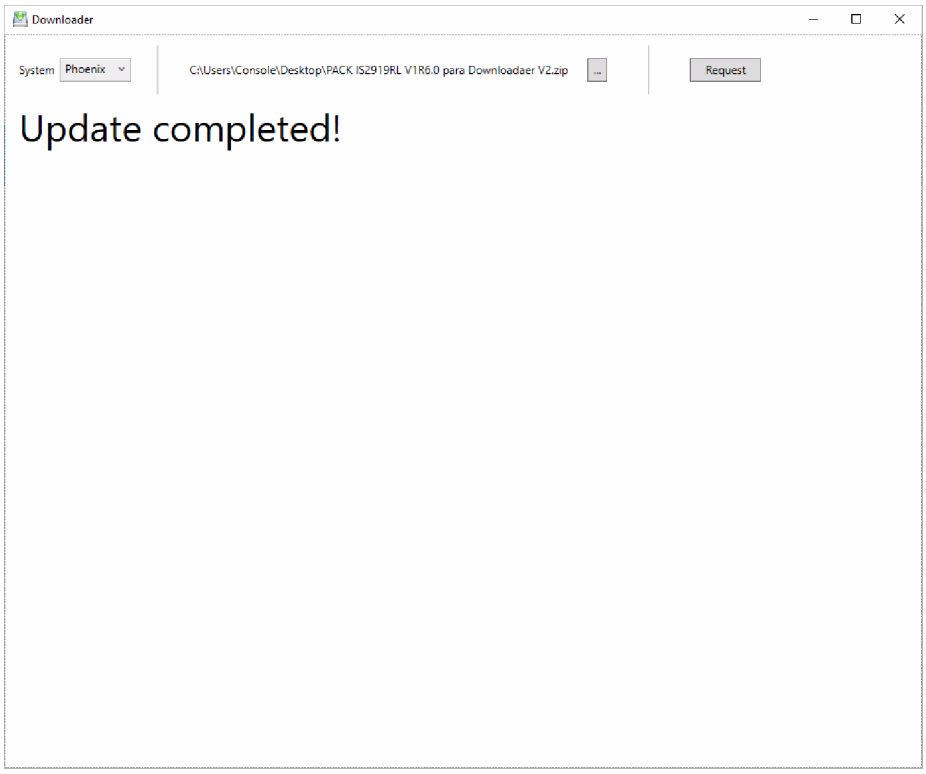
8. In case of a failure to update an equipment component, the application will restart the system and try to retry the update.

   This action will be repeated until the component is successfully updated or the maximum number of retries defined in the configuration file is reached (*for detailed information refer to Section 1.7.4 - Downloader Configuration*).



When the maximum number of retries is reached updating a component, the application will abort the update of the package version. This means that all components that have been updated so far will revert to the previously installed package version.

9. Once the update process is finished for all components/board, the application will display an confirmation message (*refer to Section 1.7.5*).



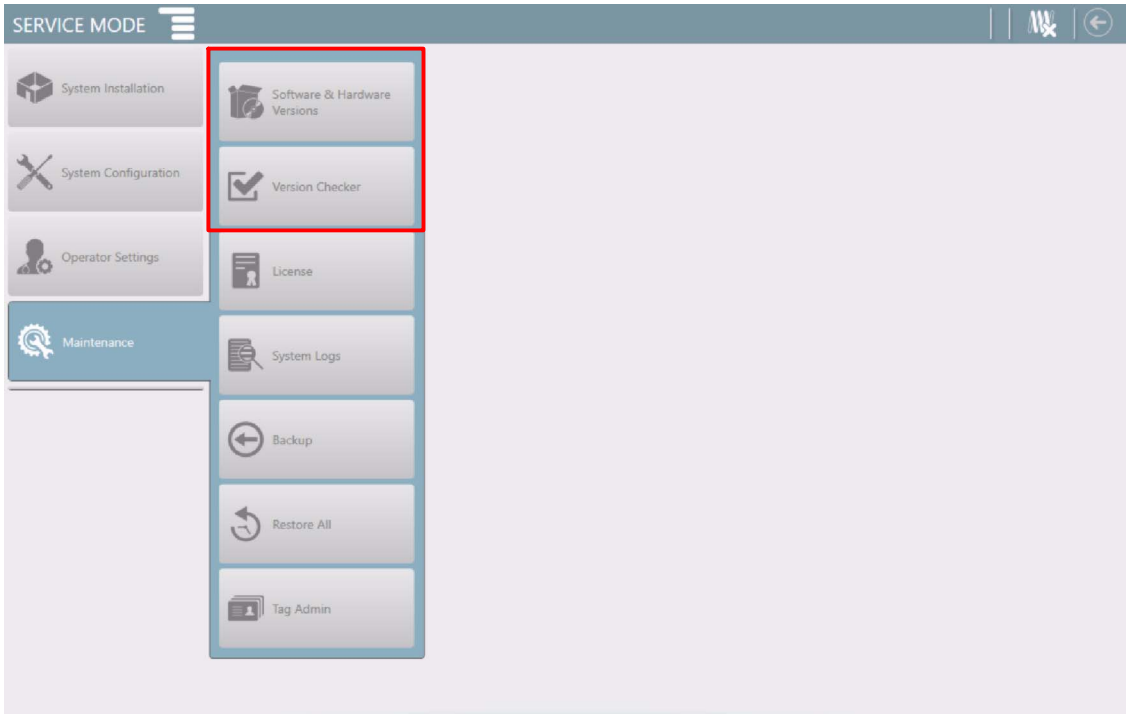
When the update process is complete, the application will generate a report TXT file with a summary of the actions performed. The file name will have the format: *DownloaderReport_YYYYMMDD_X*, where '*X*' represents the number of updates on the same day.

This report file will be created in the following path:
C:\OEM\Downloader\Reports

10. Turn the Unit OFF and ON.

11. Finally check that the software version of the updated components matches the software package version by using the "*Software & Hardware Versions*" and "*Version Checker*" functionalities from the Service Tool / Service Mode.

    To do this, run the Service Tool / Service Mode and access the "*Maintenance"* menu. *For detailed information refer to the Configuration and Calibration Chapter of the Service Manual*.



1.7.3 SOFTWARE UPDATE IN SILENT MODE

Silent Mode functionality is able to run the application through a script in unattended and automatic way.

The application will execute the updates and will return an informative message when finished. In this mode there is no user interaction so the software package version file must be selected when invoking the application.

To perform the update in **Silent Mode**:

1. Locate the software package version file and keep the folder path.

2. Open *Command Prompt* application from Windows and run the application in silent mode.

   To do this, enter the parameter "*silent*" before the folder path of the package file when invoking the application.

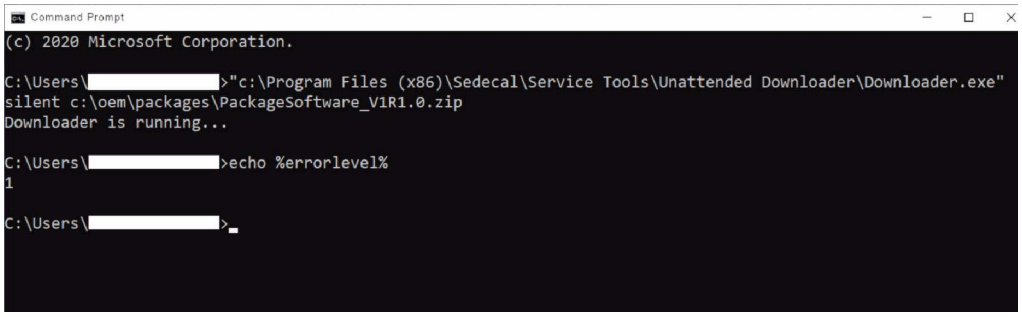
   Example command for the application installed in the default folder:

```
C:\>  "C:\Program  Files  (x86)\Sedecal\Service  Tools\Unattended
Downloader\Downloader.exe" silent [Package File Folder Path]
```

3. Once the software update is finished, you can check the result/status of the process by entering the following command in *Command Prompt*:

```
C:\> echo %errorlevel%
```

   This command will return a message code with the result. *Refer to Section 1.7.5 for the meaning of the returned code*.



4. In case any of the component/board of the equipment would have had its bootloader mode activated during the update process, the application will display an informative message and will try to manage this issue according to these guidelines:

   - There is no component in bootloader mode: This is the normal situation where the system should operate, the application will proceed as described in the previous step.
   - There is one component in bootloader mode: In this situation the application attempts to update the component in bootloader mode first, and then continue with the rest of the components.
   - There are two or more components in bootloader mode: This is an abnormal system situation that *Downloader* is not able to handle. In this case the application will indicate that the update cannot be continued (*for detailed information refer to Section 1.7.6 - Troubleshooting during Software Update*).

5. In case of a failure to update an equipment component, the application will restart the system and try to retry the update. This action will be repeated until the component is successfully updated or the maximum number of retries defined in the configuration file is reached (*for detailed information refer to Section 1.7.4 - Downloader Configuration*).

   When the maximum number of retries is reached updating a component, the application will abort the update of the package version. This means that all components that have been updated so far will revert to the previously installed package version.

6. Once the update process is complete, the application will generate a report TXT file with a summary of the actions performed. The file name will have the format: *DownloaderReport_YYYYMMDD_X*, where '*X*' represents the number of updates on the same day.

   This report file will be created in the following path:
   C:\OEM\Downloader\Reports

7. Turn the Unit OFF and ON.

8. Finally check that the software version of the updated components matches the software package version by using the "*Software & Hardware Versions*" and "*Version Checker*" functionalities from the Service Tool / Service Mode.

   To do this, run the Service Tool / Service Mode and access the "*Maintenance"* menu. *For detailed information refer to the Configuration and Calibration Chapter of the Service Manual*.

1.7.4 DOWNLOADER CONFIGURATION

Downloader has some configuration parameters that enable the configuration of the application behavior . These parameters are set in a configuration file located in the installation path of the application, named ***Downloader.exe.config***

Note ☞ *It is recommended not to modify the default configuration values of the application parameters, except for specific service actions.*

In case modifications are required, this file must be edited with the desired parameters before launching the application. Some parameters are only applicable to the **Unattended Mode** (*refer to Section 1.7.1*).

Below is a list of the different parameters that can be added:

Table 1-10
Downloader Configuration Parameters for Software Update

PARAMETER	TYPE	DESCRIPTION
Backup	Boolean	***True*** value: Application will perform a backup process when all attempts to update a component are reached. ***False*** value: Application will continue the update of the next component avoiding the backup restore.
BackupPath	String	This parameter is used to establish the path to the backup file (absolute path).
CheckEquipmentVersion	Boolean	***True*** value: Application will find out the current version of the components in the system. ***False*** value: Application will update all the components in the package version without check the current version.
CheckAllComponents	Boolean	***True*** value: Application will check that all system components are operational. ***False*** value: N/A.
Close	Boolean	***True*** value: Application will be closed after completing the update of all components. ***False*** value: Application will display the summary window.
MasterResetTime	Int	This parameter is used to set the time value (*ms*) that the application will wait for the system reboot to complete.
Overwrite	Boolean	***True*** value: In case the version of the component to be updated matches the version currently installed, the application will overwrite the component software. ***False*** value: Application will skip this update and continue with the next one.
ResetMasterAfter	Boolean	***True*** value: Application will reboot the system after updating all the components. ***False*** value: N/A.
ResetMasterBefore	Boolean	***True*** value: Application will reboot the system before starting with the software update process. ***False*** value: N/A.

Table 1-7 (Cont.)
Downloader Configuration Parameters for Software Update

PARAMETER	TYPE	DESCRIPTION
Retries	Int	This parameter is used to set the number of retries that will be performed when a component update fails (the value is limited to 10).
SearchDirectory	String	This parameter is used to establish the directory where it will find package version available.
System	String	This parameter is used to establish the system to be updated. Such as: Phoenix, SHFR, Challenge-X, etc.
WaitTimeToTheNext	Int	This parameter is used to set the timeout value (*ms*) between the update of one component and the next.
ZipPass	String	Contain the package version password cipher with AES encryption (64 base format).

1.7.5 DOWNLOADER APPLICATION INFORMATIVE MESSAGES

Whenever an event occurs during the update process, an informative message will be displayed on the application. The following table shows the different messages that can be displayed:

Table 1-11
Downloader Informative Message

MESSAGE TEXT	CODE	DESCRIPTION
Update completed!	0	The update of all components was successfully.
No matches found	1	A valid software package version file was not found.
Components in bootloader mode	2	Two or more components are in bootloader mode. The update process cannot be continued.
No response from some component	3	Some system components are not operational.
Update failed!	4	Component update failed and no backup restore is configured.
-	5	Another instance of the application is running.
	200	Unknown error.

1.7.6 TROUBLESHOOTING DURING SOFTWARE UPDATE

A casuistry of possible errors that may occur during the update process. Follow the instructions below in case of errors.

PREVIOUS CONSIDERATIONS

IN CASE IT IS REQUIRED TO PERFORM A PROCEDURE THAT INVOLVES DISCONNECTING THE UARC BOARD (A3615-XX), MAKE SURE TO WAIT AT LEAST 10 MINUTES AFTER COMPLETELY SHUTTING DOWN THE UNIT FOR THE CAPACITORS TO DISCHARGE (AT THE TIME OF SHUTDOWN, THE VOLTAGE AT CONNECTOR J10-1&3 IS 70 VDC).

ALSO ENSURE THAT THE "HAZARDOUS VOLTAGE" INDICATOR ("LP1" ON THE BOARD) IS COMPLETELY TURNED OFF.

It is necessary to keep monitoring the update process in order to identify which software component is being updated by the Downloader application. In the event of an error, it is essential to know the component in which it originated.

Note ☞ *Turn the Unit OFF and ON after a software update.*

Note ☞ *There may be a temporary turn-off of the touch screens during the update of some of the components.*

Note ☞ *There may be a temporary turn-off of the Status Light Indicator of the Head-Assembly during the software update of the GPIO Head Board (A40004-XX).*

The first action to be taken in the event of a component update failure is to activate the bootloader mode of the component individually. Due to this, the bootloader switches of the main unit boards are listed below.

Table 1-12
Bootloader Mode Activation

BOARD	SWITCH	POSITION
Universal Advanced Rotor Control (UARC) Board - A3615-XX	SW2-8	ON
Advanced Control Board (ACB) - A3678-XX (Master Microcontroller)	SW1-1	ON
Advanced Control Board (ACB) - A3678-XX (Power Control Microcontroller)	SW1-2	ON
Advanced Digital Motion Control (ADMC) Board - A3686-XX	SW2-8	OFF
GPIO Trolley Board - A40001-XX	SW2-1	OFF
GPIO Head Board - A40004-XX	SW1-1	OFF
RFID Board (A9598-XX)	SW1-2	ON

Note ☞ *For detailed information on Boards elements location refer to Central Listings Chapter of the Service Manual.*

Note ☞ *If any problems are detected during the update, it is advisable to run the Downloader Application in GUI Mode in order to get detailed information. Refer to Section 1.7.2.*

DOWNLOADER TROUBLESHOOTING

Table 1-13
Downloader Troubleshooting

CASE	PROBLEM	SERVICE ACTION
The UARC Board (A3615-XX) has been disconnected or Bootloader Mode has been activated.	No information is received from the Power Control Microcontroller of the ACB Board (A3678-XX) and the application detects that two components are not responding, therefore the update is not performed.	It is necessary to perform operations with *Downloader V1.x* application.
A power failure or forced system shutdown occurs during the software update of the UARC Board (A3615-XX).	No information is received from both, the UARC Board and the Power Control Microcontroller of the ACB Board (A3678-XX). Update process crashes.	1) Switch OFF the Unit and press the Emergency Button. Wait at least 10 minutes for the capacitors on the board to discharge (*refer to Section 2.8 of this Chapter*). 2) Ensure the "Hazardous Voltage" indicator (*LP1* on the board) is completely turned off and proceed to disconnect the UARC Board. 3) It is necessary to update the Power Control Microcontroller on the ACB Board with *Downloader V1.x* application. 4) Reconnect the UARC Board and set it in Bootloader Mode. Then, update its software with *Downloader V1.x* application.
A power failure or forced system shutdown occurs during the software update of the Master Microcontroller on the ACB Board (A3678-XX).	The Unit does not turn ON.	1) To power ON the Unit, set the Dip Switch SW1-2 to ON position on the RFID Board (A9598-XX), in order to force bootloader mode (*refer to Section 2.5 for detailed information about RFID Board Procedures*). 2) Then press and hold the ON/OFF button for about 10 seconds. 3) It is necessary to update the Master Microcontroller on the ACB Board with *Downloader V1.x* application.
Bootloader Mode has been forced on the Master Microcontroller of the ACB Board (A3678-XX) during the software update.	The application does not detect the equipment configuration.	It is necessary to update the Master Microcontroller on the ACB Board with *Downloader V1.x* application.
A power failure or forced system shutdown occurs during the software update of the Power Control Microcontroller on the ACB Board (A3678-XX).	Update process crashes.	It is necessary to update the Power Control Microcontroller on the ACB Board with *Downloader V1.x* application.
Bootloader Mode has been forced on the Power Control Microcontroller of the ACB Board (A3678-XX) during the software update.	No information is received from the UARC Board (A3615-XX) and the application detects that two components are not responding, therefore the update is not performed.	It is necessary to perform operations with *Downloader V1.x* application.
Golden Mode has been forced on the FPGA of the ACB Board (A3678-XX) during the software update.	The update of the FPGA component is completed, but the update process of the other components remains interrupted.	Turn the equipment OFF and ON.

Table 1-10 (Cont.)
Downloader Troubleshooting

CASE	PROBLEM	SERVICE ACTION
Installation of the FPGA on the ACB Board (A3678-XX) software update is aborted.	The timeout configuration parameter between the update of one component and the next is not met. The application remains on standby indefinitely.	Restart the application and relaunch the update.
Installation of the ADMC Board (A3686-XX) software update is aborted.	No response from the application during ADMC Board software update.	1) Check if the bootloader version of the board is V2R3P0. *(*)* 2) If so, set the Dip Switch SW2-8 to OFF position on the ADMC Board, in order to force bootloader mode. 3) Repeat the update process.
A power failure or forced system shutdown occurs during the software update of the ADMC Board (A3686-XX).	No information is received from both, the UARC Board and the Power Control Microcontroller of the ACB Board (A3678-XX). Update process crashes.	1) Set the Dip Switch SW2-8 to OFF position on the ADMC Board, in order to force bootloader mode. 2) Repeat the update process. 3) If the unit emits an acoustic signal and displays an error message on the console, turn the unit off and on again.
A power failure or forced system shutdown occurs during the software update of the GPIO Trolley Board (A40001-XX).	The Unit does not turn ON.	It is necessary to update the GPIO Trolley Board software via BUS-CAN with *Downloader V1.x* application.
Installation of the GPIO Head Board (A40004-XX) software update is aborted.	Update process crashes.	Reboot the System and repeat the update process.
A power failure or forced system shutdown occurs during the software update of the GPIO Head Board (A40004-XX).		
Installation of the RFID Board (A9598-XX) software update is aborted.		
A power failure or forced system shutdown occurs during the software update of the RFID Board (A9598-XX).	The Unit does not turn ON.	Press and hold the ON/OFF button for about 10 seconds and boot up the PC with the Shell Mode deactivated. Repeat the update process.
**** NOTE**: Bootloader version of the ADMC Board causing this problem is V2R3P0.*		

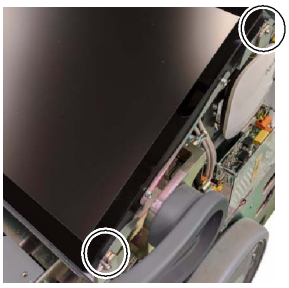
SECTION 2 MAIN MODULE ASSEMBLIES AND BOARDS REPLACEMENT

2.1 TOUCHSCREEN MONITOR REPLACEMENT

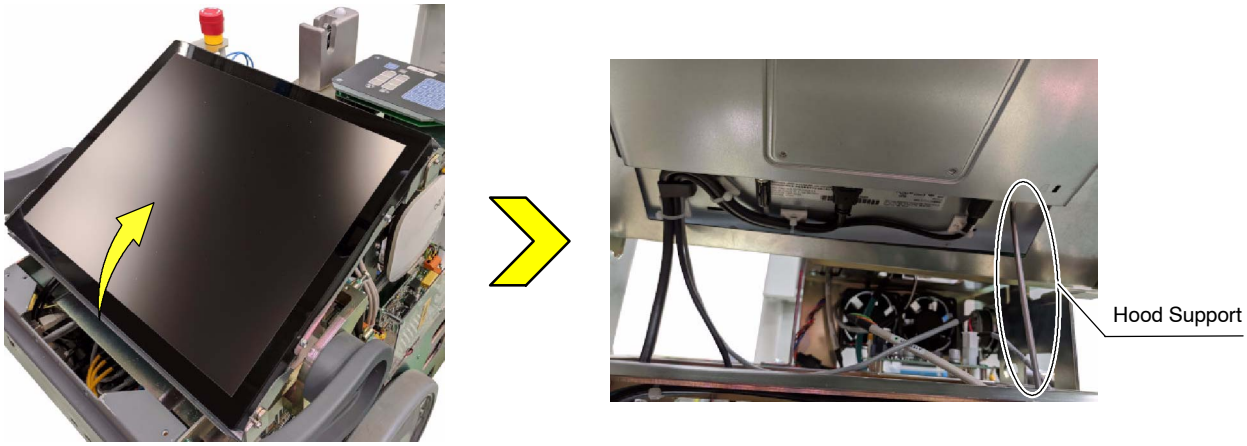
2.1.1 TOUCHSCREEN MONITOR REPLACEMENT WITH 3-SECTION ARM

1. Follow steps 1. to 5. from Section 1.2.1.1 to remove the Console Cover.

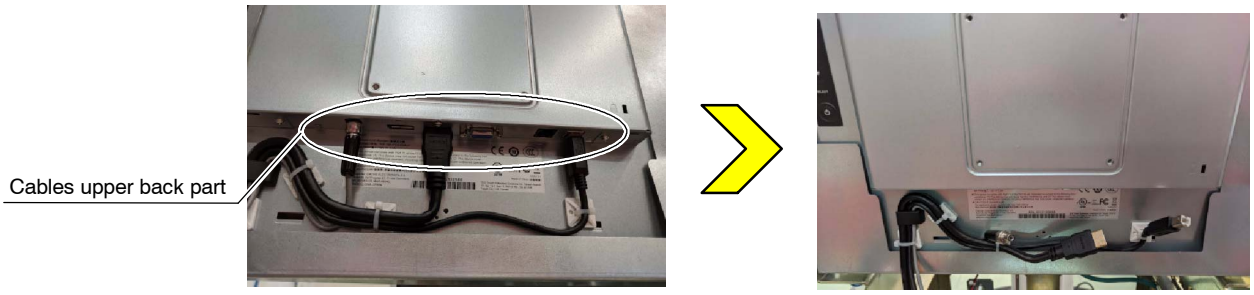
2. Loosen the four (4) screws, one on each corner of the Monitor, that hold the Touchscreen Monitor Assembly to the Tray Supports.



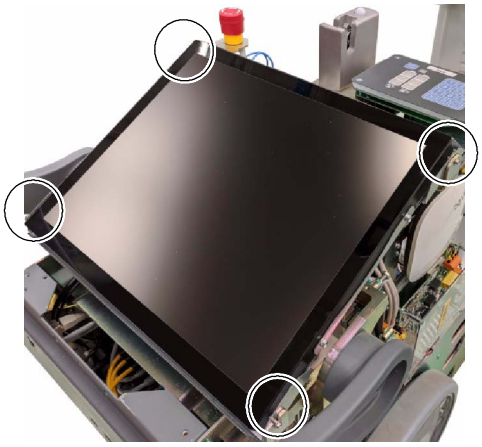
3. Lift the Monitor Assembly and use the Hood Support to keep the Monitor lifted, in order to gain access from beneath.



4. Disconnect the three (3) cables connected on the upper back part of the Monitor, and cut the tie-wraps which fix the cables.



5. Lower the Monitor Assembly and remove the four (4) screws, one on each corner of the Monitor, shown in the illustration below.



6. Once removed the screws, the Monitor Assembly can be removed pulling carefully upwards.

7. Mount the new Monitor Assembly in the same position and tighten the screws placed at the upper part of the Monitor, which were removed at step 5.

Note ☞ *Do not tighten these screws fully to the Tray Supports in order to allow the Monitor Assembly to be lifted for accessing the cables on the upper back part of the Monitor.*

8. Lift the Monitor Assembly and hold it with the Hood Support.

9. Connect the three (3) cables on the upper back part of the Monitor, and use new tie-wraps to fix the cables.

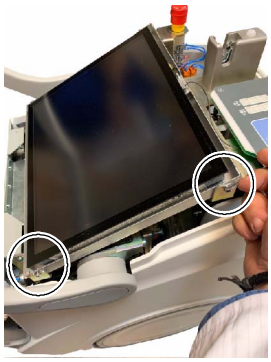
10. Lower the Monitor Assembly and tighten the four (4) screws fully, one on each corner of the Monitor, which were removed at step 5.

11. Finally, mount the Console Cover previously removed at step 1.

2.1.2 TOUCHSCREEN MONITOR REPLACEMENT WITH 4-SECTION ARM

1. Follow steps 1. to 5. from Section 1.2.1.1 to remove the Console Cover.

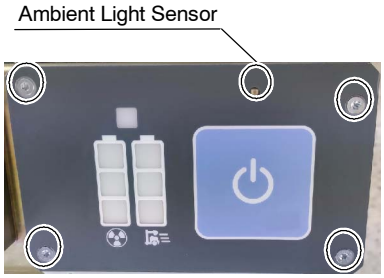
2. Loosen the four (4) Screws, one on each corner of the Monitor, that hold the Touchscreen Monitor Assembly to the Tray Supports.



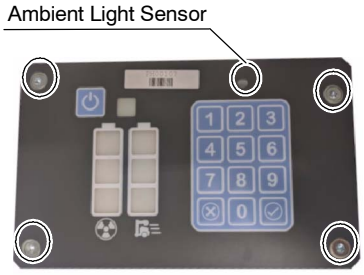
Note ☞ *The Touchscreen Monitor Replacement includes the Ambient Light Sensor Board, which is connected to the Monitor Assembly with a cable. Therefore, it is necessary to detach the Ambient Light Sensor Board before removing the Monitor Assembly.*

3. Remove the four (4) screws that fix the Power ON/OFF Device to the Unit.

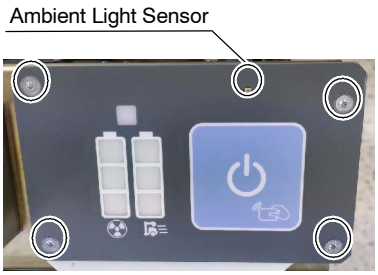
Note ☞ *The Power ON/OFF Device can be one of the following:*



ON/OFF Button



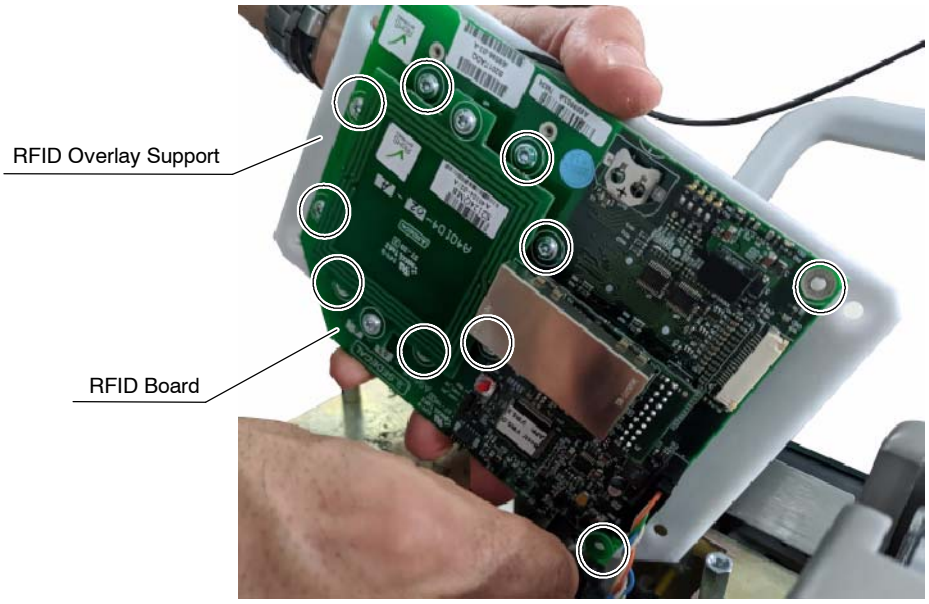
ON/OFF Button + Keypad System



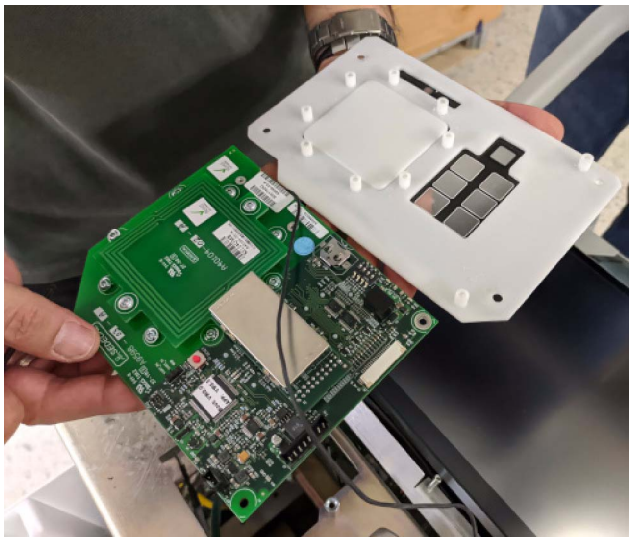
ON/OFF Button + RFID System

Note ☞ *The next steps of this procedure are described using the RFID Device as example, but the procedure is similar for the other Power ON/OFF Devices.*

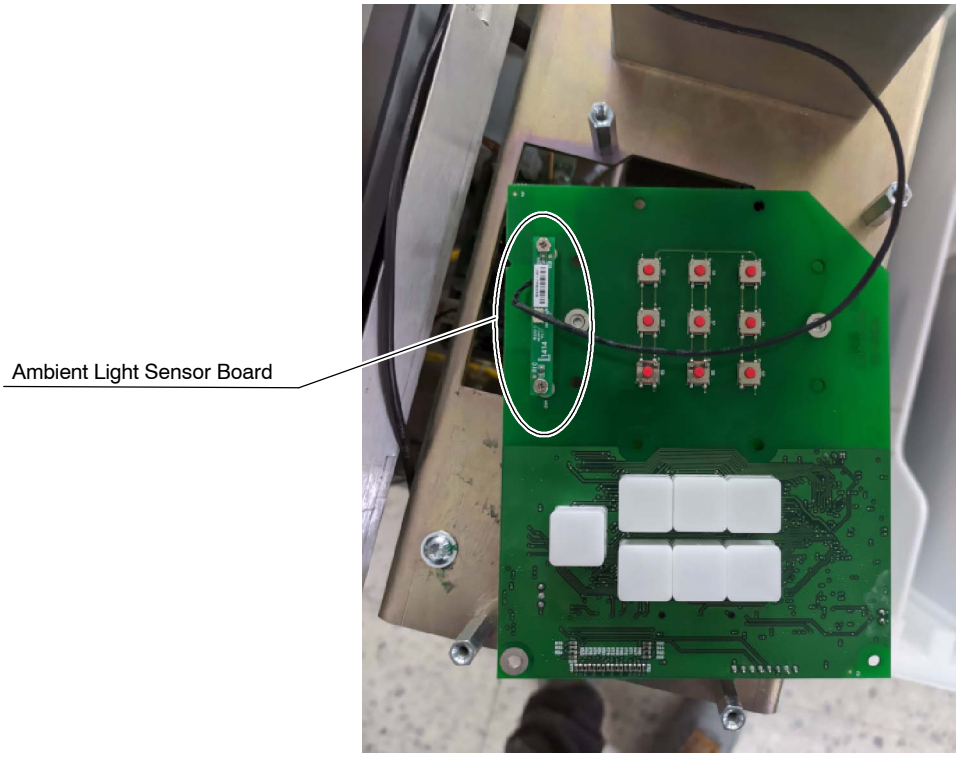
4. Turn the board over and remove the ten (10) screws that fix the RFID Board (A9598-XX) to the RFID Overlay Support.



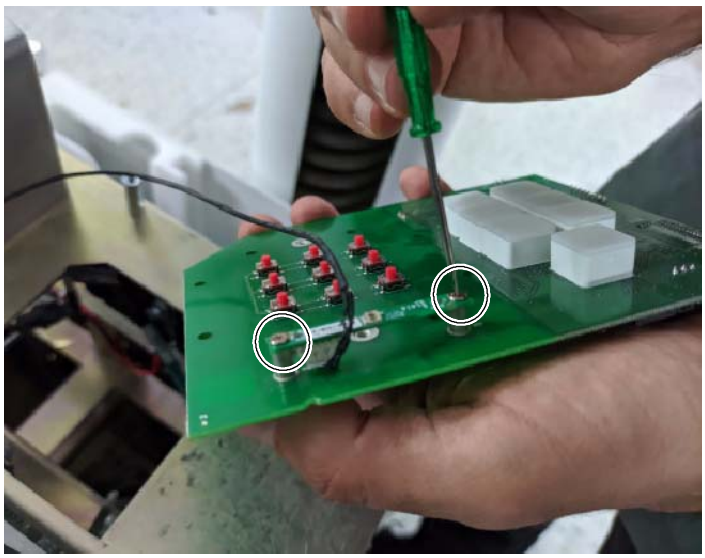
5. Once the ten (10) screws have been removed, detach the RFID Board from the RFID Overlay Support.



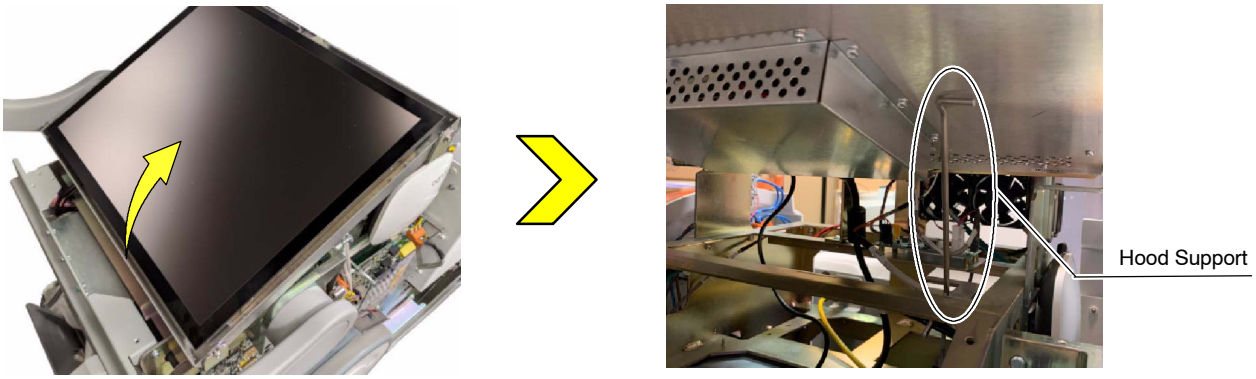
6. Turn the RFID Board around in order to get access to the Ambient Light Sensor Board.



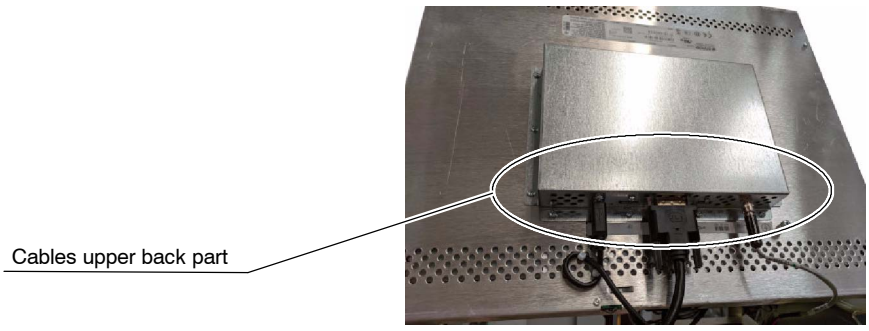
7. Remove the two (2) screws for detaching the Ambient Light Sensor Board from the RFID Board. Then, put the RFID Board aside because the Ambient Light Sensor Board of the new Touchscreen will be installed on the RFID Board.



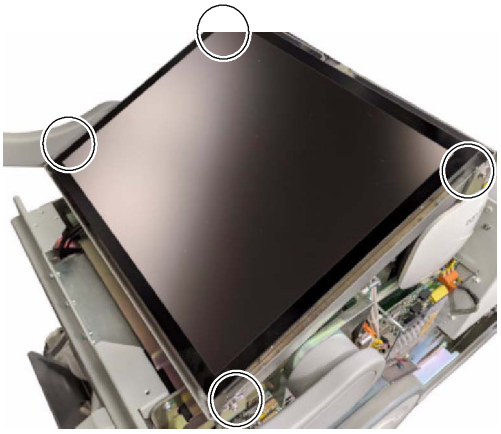
8. Lift the Monitor Assembly and use the Hood Support to keep the Monitor lifted, in order to gain access from beneath.



9. Disconnect the three (3) cables connected on the upper back part of the Monitor, and cut the tie-wrap which fix the cables.



10. Lower the Monitor Assembly and remove the four (4) screws, one on each corner of the Monitor.

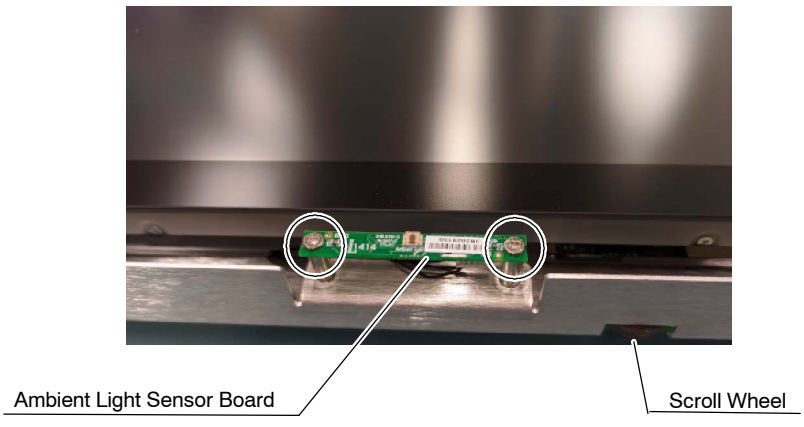


11. Once removed the screws, the Touchscreen Monitor Assembly can be removed pulling carefully upwards.

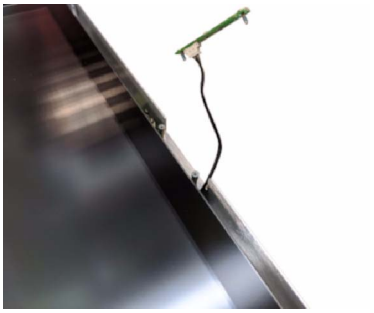
12. Mount the new Monitor Assembly in the same position and tighten the screws placed at the upper part of the Monitor, which were removed at step 10.

Note ☞ *Do not tighten these screws fully to the Tray Supports in order to allow the Monitor Assembly to be lifted for accessing the cables on the upper back part of the Monitor.*

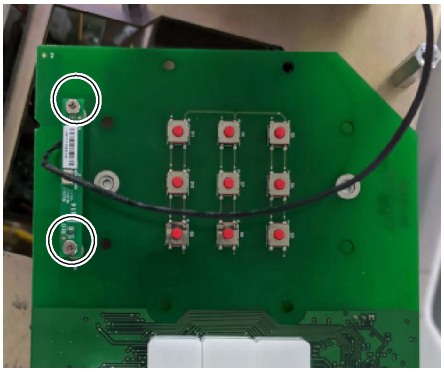
13. Remove the two (2) screws which fixes the Ambient Light Sensor to the Monitor Assembly (the new Monitor Assembly includes an Ambient Light Sensor Board which has to be connected to the RFID Board).



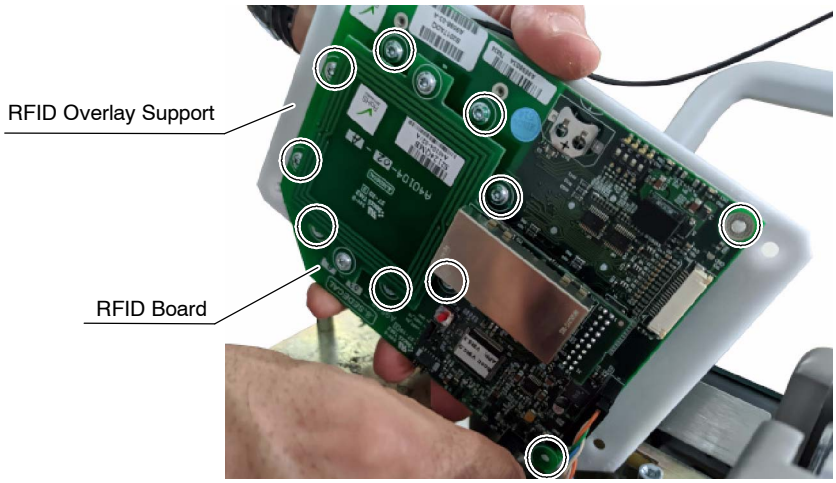
14. Once the Ambient Light Sensor Board has been unscrewed, pull carefully from the board in order to get out the cable. It is necessary to extend the cable for installing the Ambient Light Sensor Board on the RFID Board.



15. Install the Ambient Light Sensor Board on the RFID Board by screwing the two (2) screws.



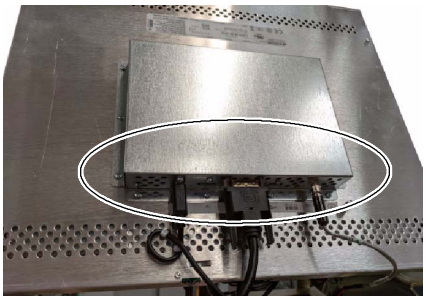
16. Turn the board over and install the RFID Board on the RFID Overlay Support by screwing the ten (10) screws.



17. Mount the RFID Device on the Unit by screwing the four (4) screws.

18. Lift the Monitor Assembly and hold it with the Hood Support.

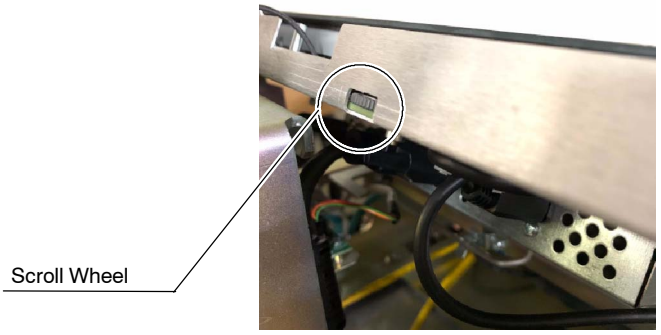
19. Connect the three (3) cables on the upper back part of the Monitor, and use new tie-wraps to fix the cables.



20. Lower the Monitor Assembly and tighten the four (4) screws fully, one on each corner of the Monitor, which were removed at step 10.

CAUTION

The Screen has a scroll wheel on top used to configure and adjust settings such as contrast, brightness, luminosity, etc. These parameters are factory set. It is not necessary to use this control.

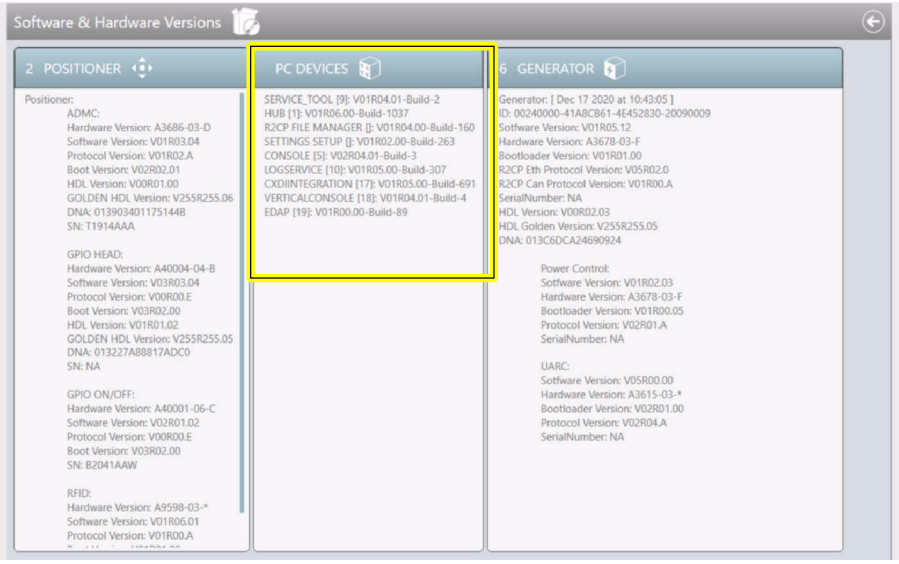


21. Finally, mount the Console Cover previously removed at step 1.

2.2 COMPUTER AND DVD DRIVE REPLACEMENT

1. Firstly enter the Service Tool / Service Mode, select “Maintenance” from the main menu and then “Software and Hardware Versions”. In the “PC Devices” tab, write down the versions displayed for each component.

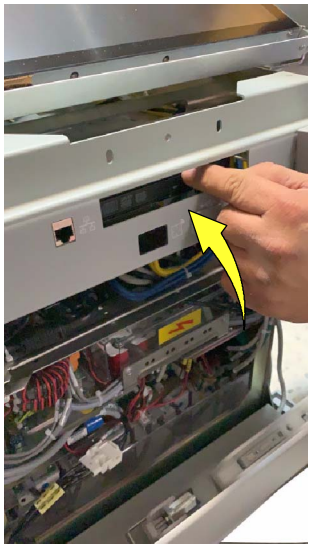
   Refer to Configuration and Calibration Chapter for further information.



2. Follow the instructions for removing the Unit covers, up to *step 22.* in *Section 1.2.1.3*.

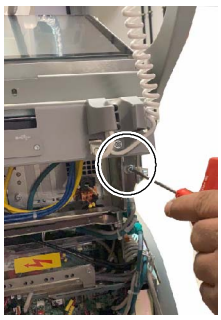
3. Turn OFF the Unit.

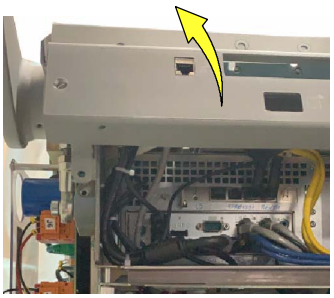
4. Unscrew the three (3) Screws that hold the DVD Support and push the DVD inwards.



5. Only if it is needed to replace the DVD, go to step 2. of Section 2.1 "*Replacement of the Touchscreen Monitor*" and unscrew the two (2) Screws that hold the Touchscreen on its lower part. Loosen a little bit the two (2) Screws that hold the Touchscreen in the upper part in order to lift the screen leaving space enough to disconnect the DVD cables and replace the DVD inside the Unit.

6. Remove the two (2) Screws below the Connections Panel and elevate the Connections Panel Cover by rotating it around 70^{o} up to gain access inside the Unit.





7. Disconnect all the PC cables, remove the Screws that hold the Computer on its lateral parts, and carefully remove the PC.

8. Install the new PC.

9. Following the reverse process, reconnect the cables according to the labels on the connection ports, reassemble the Connections Panel Cover and turn ON the Unit.

10. Re-enter the "Software & Hardware Versions" window of the Service Tool / Service Mode. Verify that the component versions in the "PC Devices" tab correspond to those recorded in step 1.

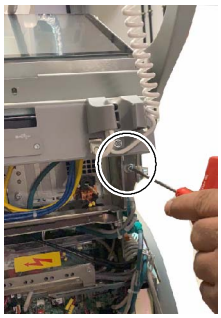
    If mismatches are detected during the comparison, perform a software update.

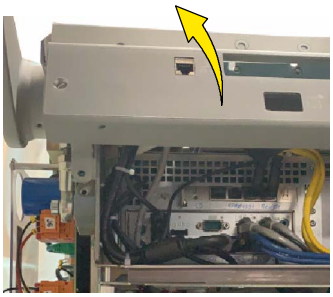
11. Finally, mount the remaining removed covers.

2.3 OPTIONAL HARD DISK UPGRADE/REPLACEMENT

1. Follow step 22. in *Section 1.2.1.3* to remove the Back Covers of the Unit.

2. As described in Section 2.2, in order to gain access inside the Unit, remove the two (2) Screws below the Connections Panel and elevate the Connections Panel Cover by rotating it around 70º.



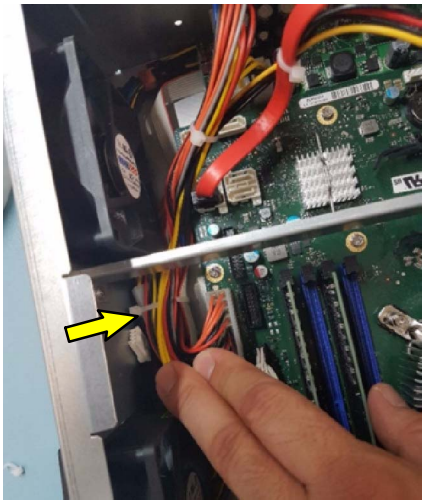


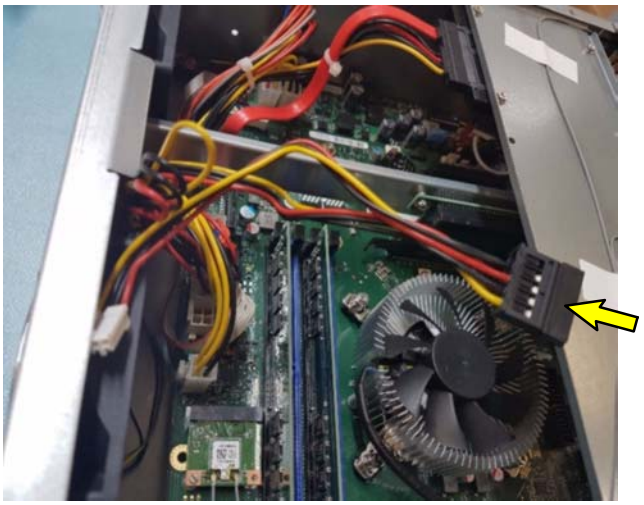
3. Disconnect all the PC cables and remove the screws that hold the computer on its lateral parts, in order to carefully remove the PC.

4. Take the PC out of the Unit frame and place it on a flat surface to easily gain access to its internals.

5. Remove the PC Cover by removing the three (3) T8 Torx screws securing it and slide the Cover off.

6. Cut the tie-wraps that holds the power supply cables needed to connect the additional hard disk, releasing the end with the 5 pin connector.



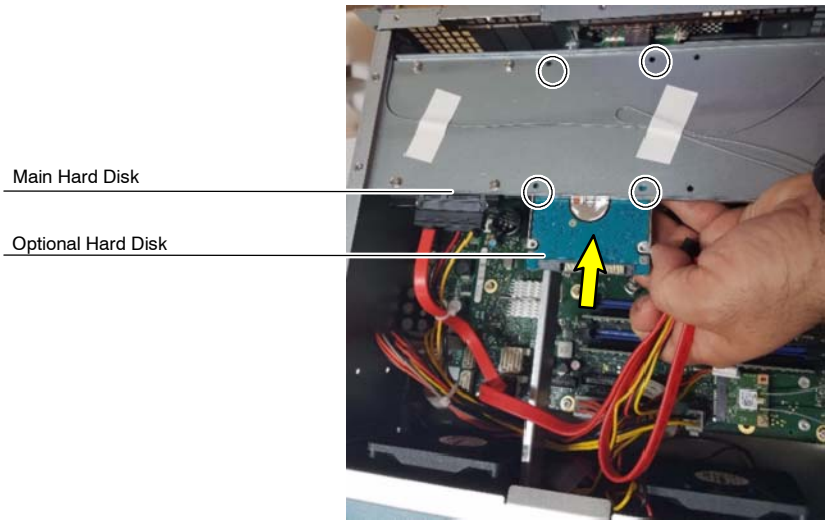


Note ☞ *In case of hard disk replacement, reuse the cables already installed (it is not necessary to release them).*

7. Take the SATA cable included with the optional hard disk and connect it to the available connector on the PC motherboard, next to the one occupied by the same cable corresponding to the main hard disk.

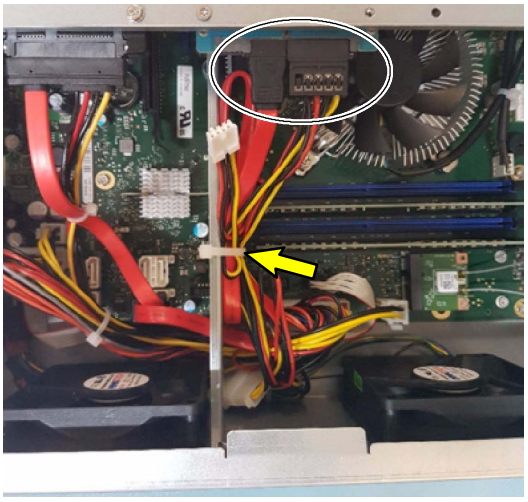
Note ☞ *In case of hard disk replacement, reuse the cable already installed.*

8. Install the second hard disk, screwing it in the slot next to the one used for the main hard disk (4 Torx screws).



Note ☞ *In case of hard disk replacement, disconnect the cables, unscrew the corresponding hard disk from its slot and replace it.*

9. Connect the cables to the ports of the new hard disk and route them, bundling the cables carefully with tie-wraps.



10. Reassemble the PC Cover and reinstall the PC in its position on the Unit frame by fastening the screws that hold the computer on its lateral parts.

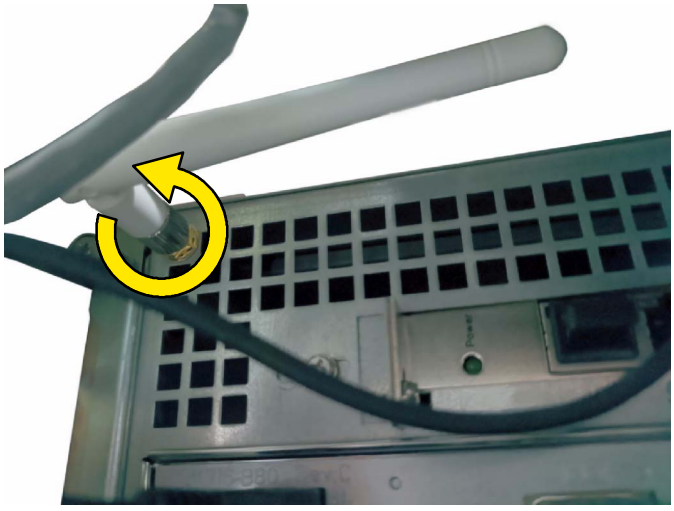
11. Reconnect the PC cables and return the Connections Panel Cover to its original position.

12. Finally, mount the Back Covers.

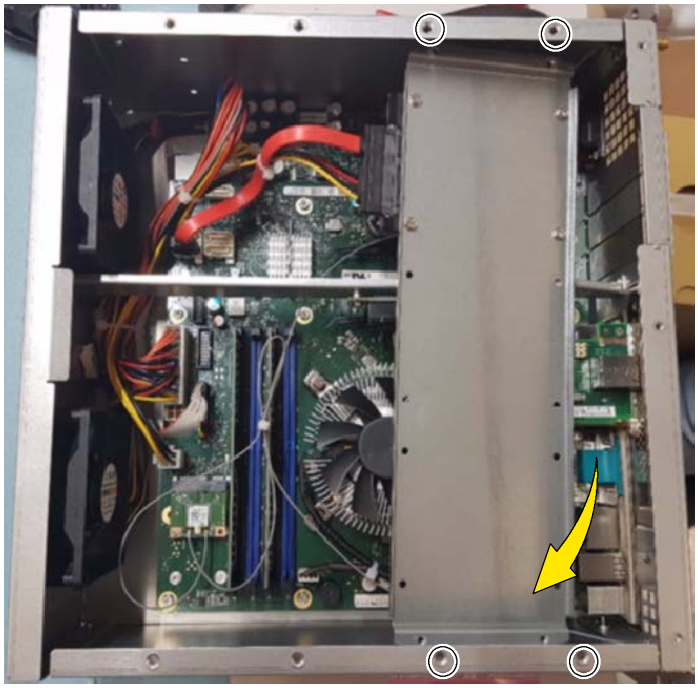
2.4 MINI PCI-E WIFI-AC BOARD REPLACEMENT

1. Follow steps 1. to 5. from *Section 2.3 Optional Hard Disk Upgrade / Replacement* to put the PC aside from the Unit.

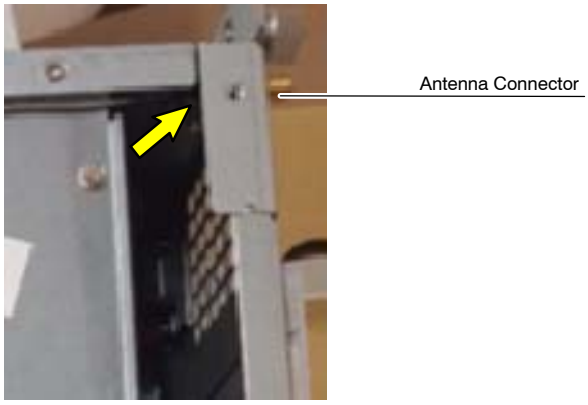
2. Remove the wireless antennas located on the outside of the PC Connectors Panel by unscrewing them.



3. Loosen the four (4) screws of the hard disk mounting plate to be able to move it laterally and allow access to the inner area of the Connectors Panel.



4. Release the antennas cables from their routing and loosen the connectors threads to remove them from the Panel.

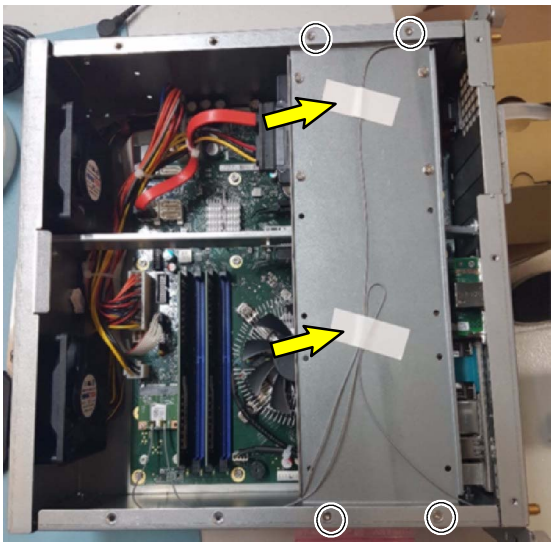


5. Once released the antennas cables, unscrew the Mini PCI-E WiFi-AC Board and remove it.

6. Install the new Mini PCI-E WiFi-AC Board by fixing it in its slot with the two screws.

7. Screw the connector threads of the antenna cables to the PC Connectors Panel.

8. Reattach the hard disk mounting plate by fastening the four (4) fixing screws and route the antennas cables (it is recommended to use masking tape or similar to secure them).



9. Reattach the wireless antennas to the connectors on the outside of the PC.

10. Reassemble the PC Cover and reinstall the PC in its position on the Unit frame by fastening the screws that hold the computer on its lateral parts.

11. Reconnect the PC cables and return the Connections Panel Cover to its original position.

12. Finally, mount the Back Covers.

2.5 RFID DEVICE PROCEDURES

2.5.1 RFID DEVICE TROUBLESHOOTING

When the Unit cannot be started using the RFID Device, two possible situations can be present:

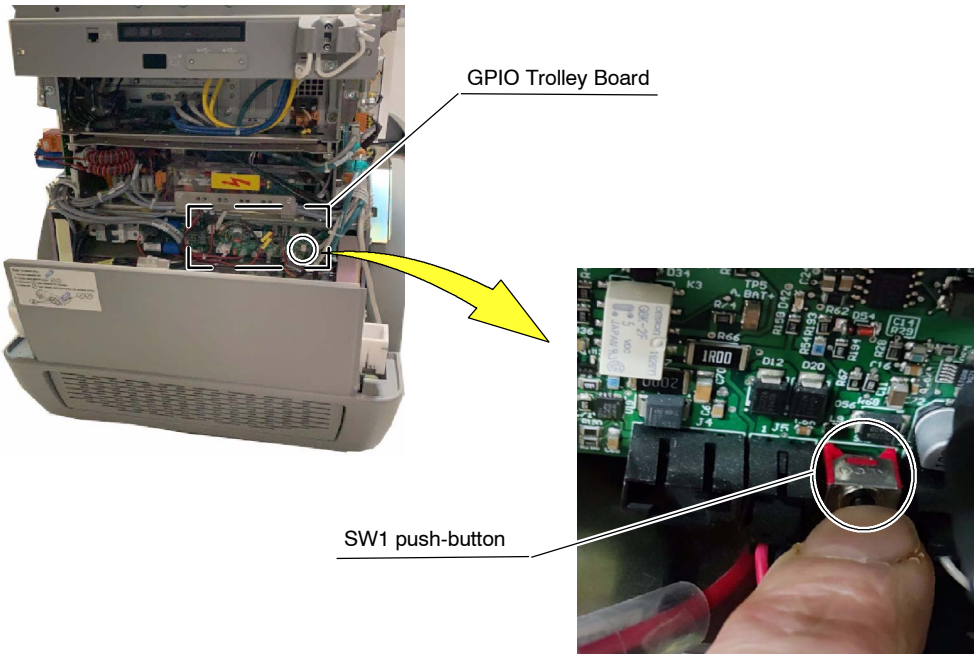
- ON/OFF Button failure.
- RFID Card Reader does not read any RFID Card due to:
  - The RFID Cards are not registered or defective, or
  - The RFID Card Reader fails.

  Once the System is initialized with the ON/OFF Button, if a RFID Card is not read (while the Status Indicator is blinking cyan), check first the RFID Cards. Then, if the Device does not read any Card, suppose that the RFID Card Reader has failed.

ON/OFF BUTTON FAILURE

1. With the Unit OFF, press the ON/OFF Button.
2. If the Status Indicator does not blink cyan (System Initialization), bypass the ON/OFF Button by:
   - Plugging the Unit into the mains, or
   - Alternatively, pressing the push-button SW1, located at the GPIO Trolley Board, for eight (8) seconds approximately.
     - In this case, with the Unit OFF, dismount the Upper Back Cover (A8) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

- Then, press the push-button SW1, located at the GPIO Trolley Board, for eight (8) seconds approximately.



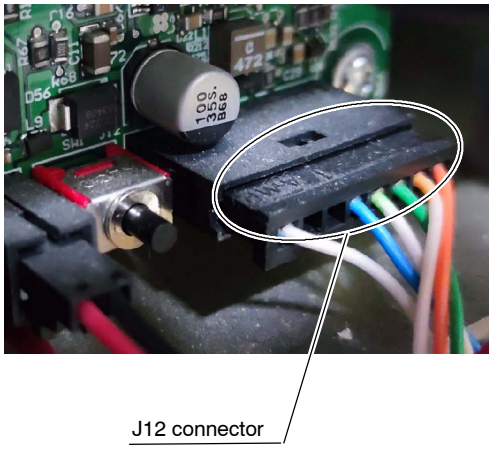
3. Depending on whether the System initializes normally or not:

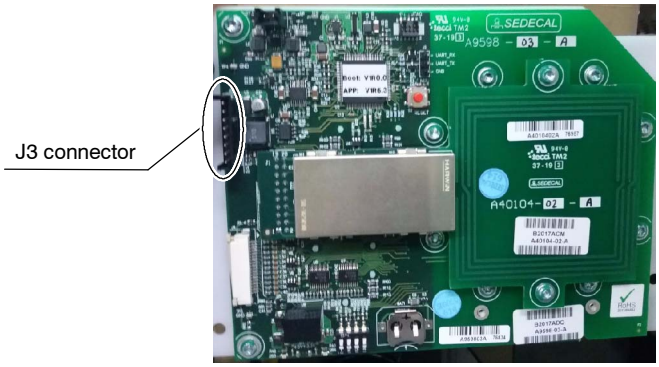
   a. <u>If the System initializes normally (Status Indicator blinking cyan)</u>:

   - The RFID Device must be replaced. For detailed information, *refer to Section 2.5.2 RFID Device Replacement.*
   - Until the RFID Device could be replaced, the System can be initialized by plugging the Unit into the mains and then swiping the corresponding RFID Card over the RFID Card Reader.

b. <u>If the System does not initialize (Status Indicator remains OFF)</u>:

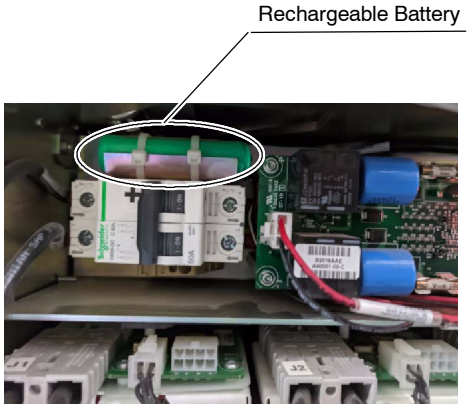
- Check the wiring between the connector J12 on the GPIO Trolley Board (A40001-XX) and the connector J3 on the RFID Board (A9598-XX).

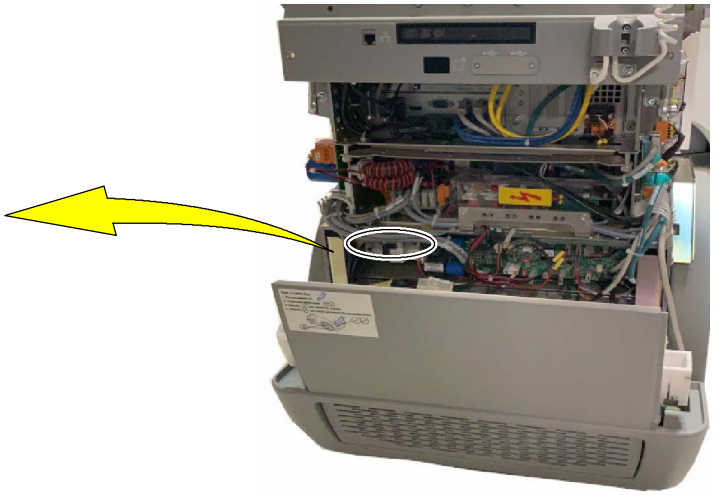




Note ☞ *In order to check the wiring, dismount previously the Console Cover (A1) of the Main Module of the Unit to access the RFID Board. For detailed information, refer to Section 1.2.*

- If the wiring is correct, replace the Rechargeable Battery with a new one.





- Then, with the Unit OFF, press the ON/OFF Button in order to check again if the Status Indicator blinks cyan (System Initialization). If the System remains inoperative replace the RFID Device. For detailed information, *refer to Section 2.5.2 RFID Device Replacement.*

UNREGISTERED OR DEFECTIVE RFID CARDS

If a RFID Card is swiped over the RFID Card Reader while Status Indicator blinks cyan, but the Unit does not turn ON, it could be due to the RFID Card is unregistered or defective:

- If the System emits three (3) beeps and the System ON/OFF Indicator blinks orange, the RFID Card is not registered on the System.
  For detailed information on RFID Cards Management, *refer to Appendix "Administrator User" in the Operation Manual and the "Configuration and Calibration" chapter of the Service Manual.*

- If the System does not emit any beep, the RFID Card could be defective. Then, repeat the operation with other RFID Cards:

  - If another RFID Card turns the Unit ON, it means that the former RFID Card is defective. Replace it with a new one.

  - If any RFID Card does not turn the Unit ON, it means that the RFID Card Reader fails. Apply the following "RFID Card Reader Failure" procedure.

RFID CARD READER FAILURE

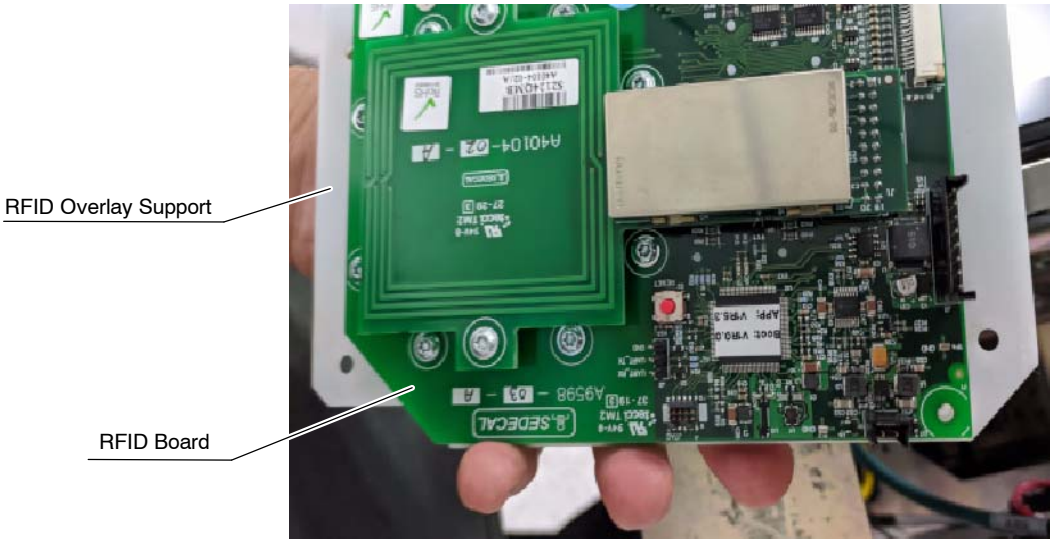
If the RFID Card Reader does not read any RFID Card, after applying the "Unregistered or Defective RFID Cards" procedure, the RFID Device must be replaced. For detailed information, *refer to Section 2.5.2 RFID Device Replacement.*

Until the RFID Device could be replaced, the Unit can be used applying the following procedure:

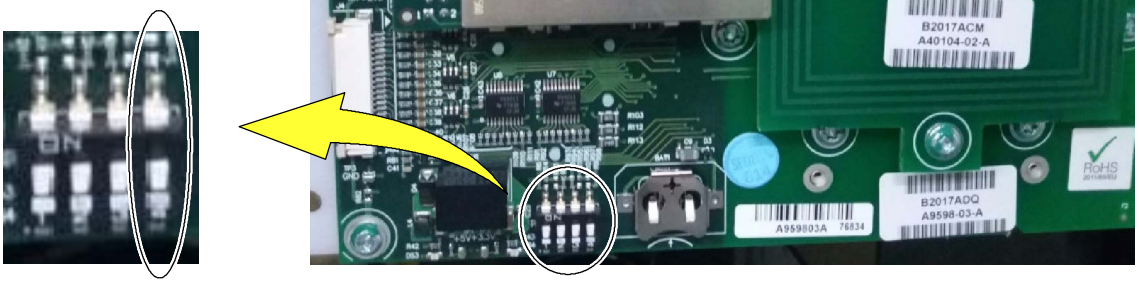
1. With the Unit OFF, dismount the Console Cover (A1) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

2. Remove the four (4) screws that fix the RFID Device to the Unit.

3. Turn the RFID Device over in order to get access to the Dip Switch SW1-4 on the RFID Board (A9598-XX).



4. Set the Dip Switch SW1-4 to ON position on the RFID Board, in order to bypass the RFID Card Reader and allow the Unit could be started.



5. Mount the RFID Device on the Unit by screwing the four (4) screws previously removed at step 2.

6. Switch ON the Unit by pressing the ON button on the RFID Device.

7. Mount the Console Cover of the Main Module of the Unit.

Note ☞ *This alternative way for starting the Unit should only be used until the RFID Device could be replaced..*

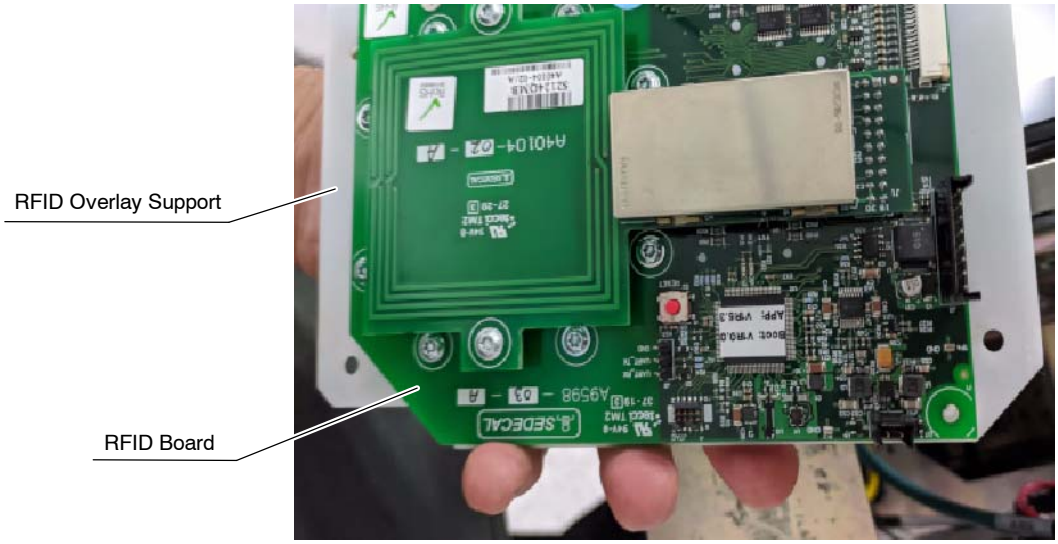
2.5.2 RFID DEVICE REPLACEMENT

1. Before the replacement, write down the firmware version currently installed in the RFID Board (A9598-XX) to be replaced. In order to do it, at the Service Tool, select “Maintenance” and then “Software and Hardware Versions”. At the “Positioner Tab” appear the versions installed in the RFID Board.

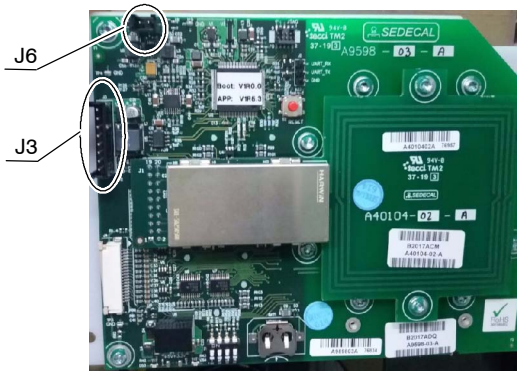
2. With the Unit OFF, dismount the Console Cover (A1) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

3. Remove the four (4) screws that fix the RFID Device to the Unit.

4. Lift the RFID Device and turn it over.



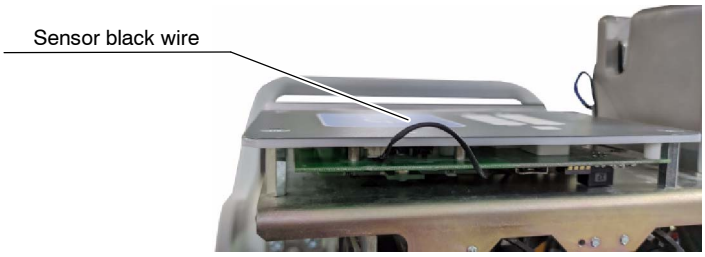
5. Disconnect the cables from connectors J6 and J3 on the RFID Board (A9598-XX).



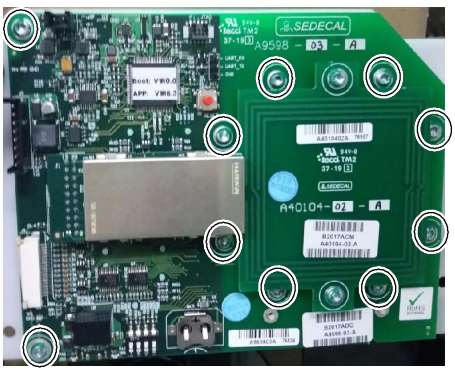
6. Depending on the Touchscreen Monitor model, an Ambient Light Sensor Board could be installed on the RFID Board:

   a. <u>If the Ambient Light Sensor is installed on the RFID Board</u>:

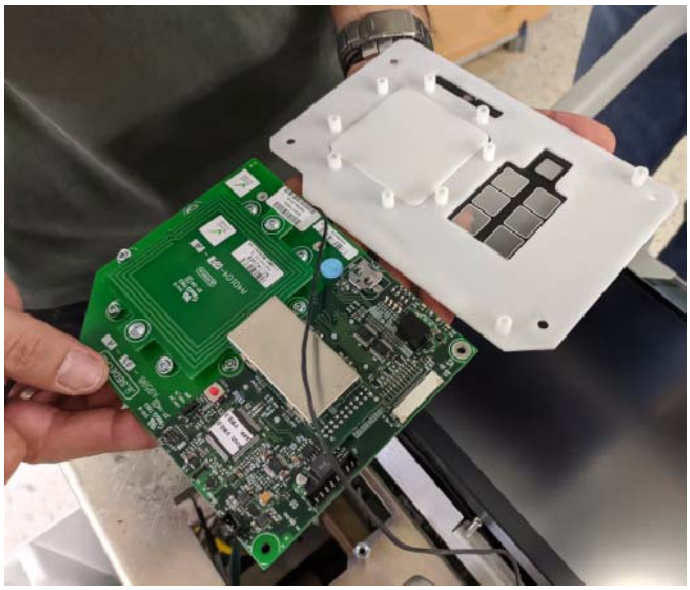
Note ☞ *In this case, a black wire is present. It connects the Touchscreen Monitor to the Ambient Light Sensor located at the RFID Device.*



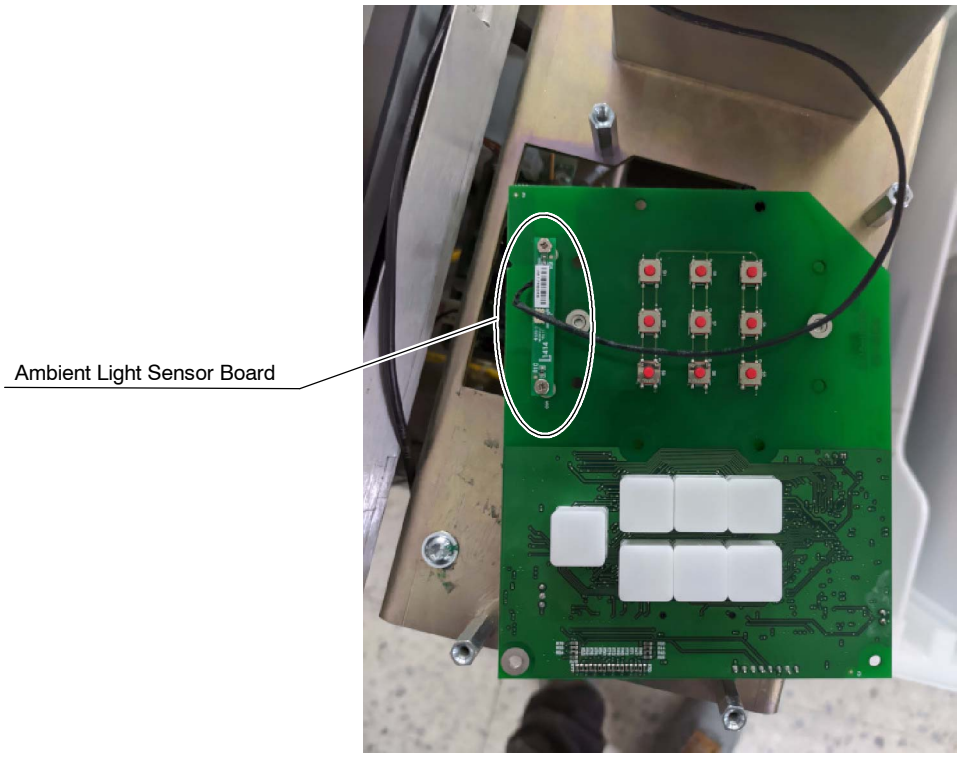
- Remove the ten (10) screws that fix the RFID Board to the RFID Overlay Support.



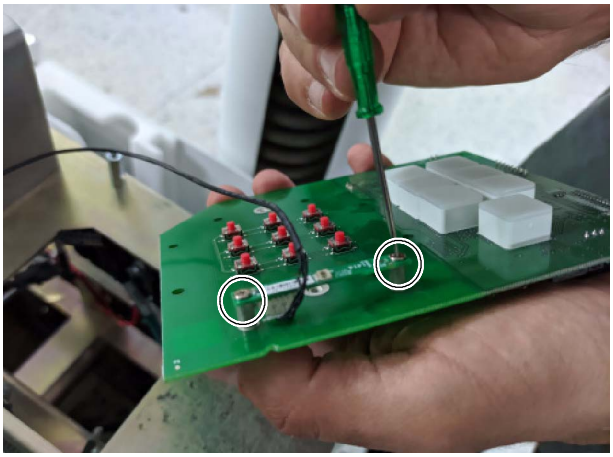
- Once the ten (10) screws have been removed, detach the RFID Board from the RFID Overlay Support.



- Turn the RFID Board over in order to get access to the Ambient Light Sensor Board.



- Remove the Ambient Light Sensor Board from the current RFID Board and re-install it on the new RFID Board.



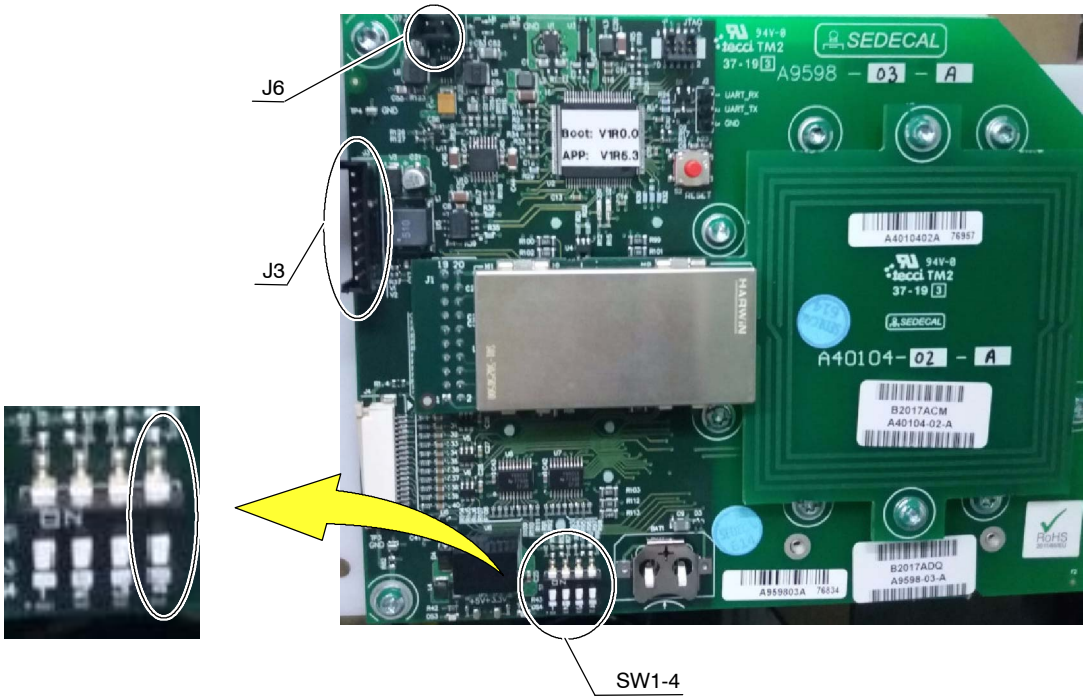
- Assemble the new RFID Device, following the steps described above.

b. If the Ambient Light Sensor is not installed on the RFID Board:

- Replace the RFID Device with the new one.

7. Connect the cables to the connectors J6 and J3 on the new RFID Board.

8. Set the Dip Switch SW1-4 to ON position.



9. Mount the RFID Device on the Unit by screwing the four (4) screws previously removed at step 3.

10. Switch ON the Unit by pressing the ON button on the RFID Device, and verify the firmware version installed in the new RFID Board matches the original one.

11. Open the Windows Explorer.

12. Open the file “Version.txt” located at the folder *C:\OEM\logs\Console*, and check the proper Software Version of the Generator is installed.

13. Register a RFID Card in the Acquisition Software.

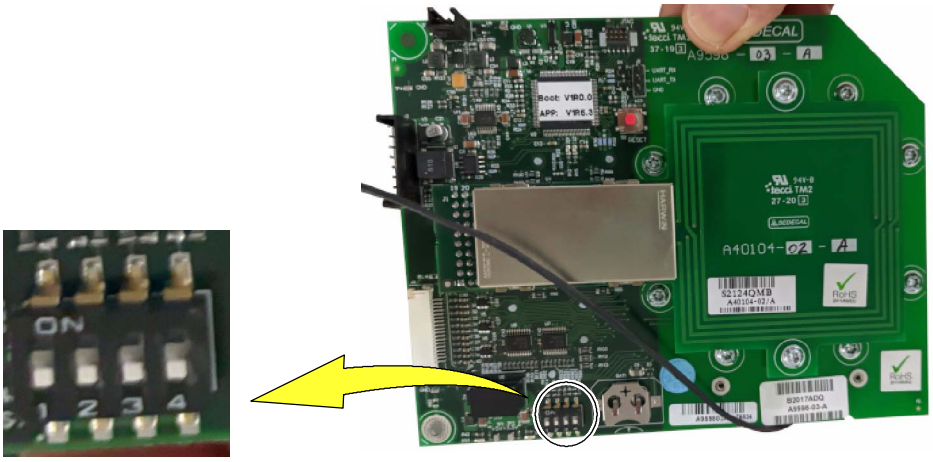
Note ☞ *Refer to Appendix “Administrator User“ in the Operation Manual for detailed information on RFID Cards Management.*

14. Switch OFF the Unit.

15. Remove the four (4) screws that fix the RFID Device to the Unit.

16. Lift the RFID Device and turn it over in order to get access to the Dip Switch SW1-4 on the RFID Board.

17. Set the Dip Switch SW1-4 to OFF position.



18. Install the RFID Device on the Unit using the four (4) screws that were previously removed.

19. Switch ON the Unit using the corresponding registered Card.

20. Exit from the Acquisition Software in order to access to the operating system desktop.

21. Launch the Service Tool application.

22. Register all the Movements or Panel Out RFID Cards that are used on this Unit by setting the correct permission of each Card. For detailed information about this process, *refer to Section Tag Admin in the Configuration and Calibration Chapter.*

23. Exit from the Service Tool application.

24. Switch OFF the Unit.

25. Perform a functional check of the RFID to make sure that the RFID Card has been properly registered and it works.

26. Finally, mount the Console Cover of the Main Module of the Unit.

2.6 BATTERIES AND CHARGERS

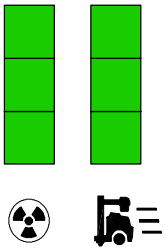
ALWAYS USE PROTECTIVE GLOVES TO PREVENT ELECTRIC SHOCK AND SAFETY GLASSES WHEN HANDLING BATTERIES OR BATTERY CHARGERS.

IN CASE OF BATTERY CASING RUPTURE, ELECTROLYTE LOSS OR ANY OTHER EXPOSURE TO THE ELECTROLYTE, RINSE WITH WATER. IN CASE OF CONTACT WITH EYES, RINSE FOR AT LEAST 15 MINUTES AND IMMEDIATELY CONSULT A DOCTOR.

WHEN IT IS NECESSARY TO DISMOUNT ANY BATTERIES TRAY, ENSURE THAT THE MOBILE UNIT IS IN PARKING POSITION, IN ORDER TO AVOID ANY RISK OF IMBALANCE.

2.6.1 PRELIMINARY TEST OF BATTERY AND CHARGER CONDITIONS

Before performing this procedure, verify that the Unit has been connected to the mains for 8 hours (while it was switched off), until the Battery Charge Level Indicators on both columns stop scrolling and the upper Green Indicators remain illuminated. This will ensure that the Batteries are fully charged and are in floating mode after those 8 hours.



This section describes how to determine the condition of the Batteries and Battery Chargers:

1. Dismount the Covers of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

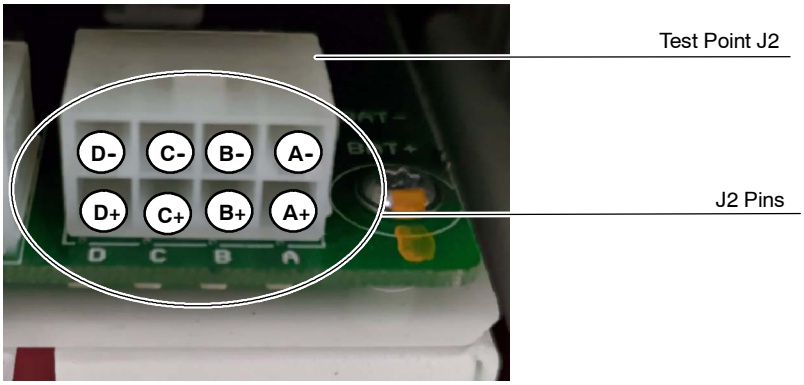
2. With the Unit in charging mode, that is connected to mains with the Emergency Switch-Off not pressed, check that the Battery Charge Level Indicators are ON.

Note ☞ *If after 8 hours of charging the charger has not entered floating mode, there could be a problem with the chargers (an error in the float voltage or an incorrect current limitation) or, eventually, a problem with the batteries. In this case it would be necessary to check and test the Chargers or the Batteries (refer to Sections 2.6.2 and 2.6.3, respectively).*

3. Measure between both pins of the J2 test point on the Battery Charger Board (A9591-XX), (*i.e. between A+ and A-, B+ and B-, C+ and C-, and D+ and D-)*. The voltage measured for a Battery sector must be between 13.6 VDC [minimum voltage in Floating Mode (LED lights green and blue)] and 14.7 VDC [maximum voltage in Charging Mode (LED lights green)] depending on the Battery Status.

Note ☞ *13.6 VDC to 13.8 VDC is the standard voltage range for each Battery Sector in Floating Mode.*

Note ☞ *As a protective measure, the Battery Charger Boards (A9591-XX) contain fuses that open if a short circuit occurs. This will not affect the performance of the system, but a short circuit will alter the reading.*



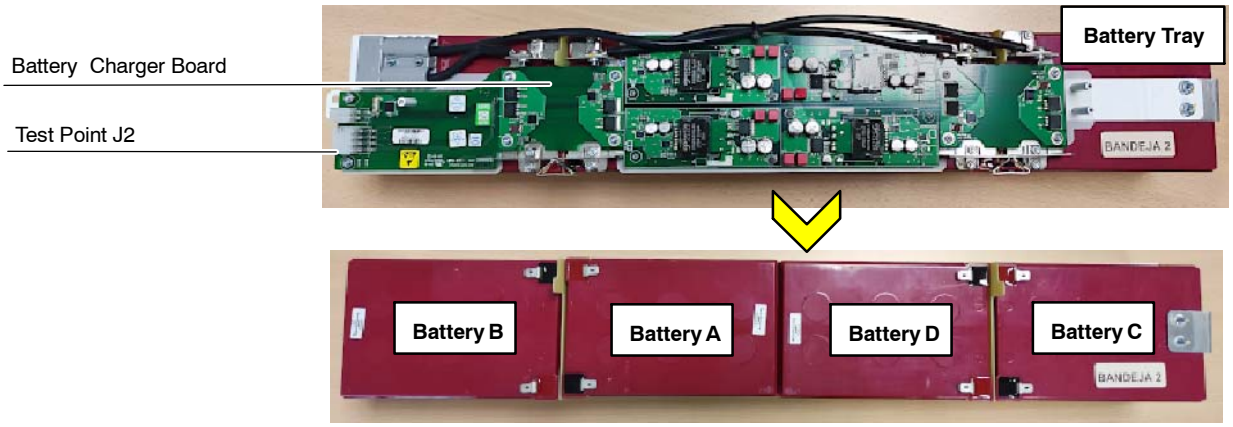
If the voltage measured between any pair of points on the connectors is incorrect or out of limits, ensure that the unit is connected to the mains, and the Emergency Switch-Off button is not pressed.

If the problem persists, perform a Battery Charger Test (*refer to Section 2.6.2*).

4. Cut the power supply by unplugging the Unit, or pressing the Emergency Switch-Off.

5. Check the Battery by measuring between both pins of the J2 test point, i.e. between *A+ / A-*, *B+ / B-*, *C+ / C-*, and *D+ / D-*. The voltage measurement should be around 13 VDC. If the voltage measured is not around 13 VDC, note the Battery which is giving the low voltage in order to be able to replace it.

The following illustration shows the correspondence between the designation of the Batteries and their location in the Battery Tray.



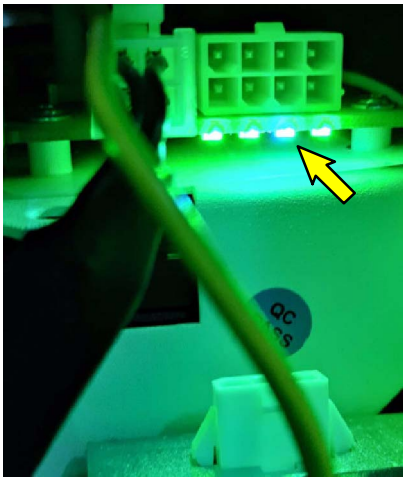
2.6.2 BATTERY CHARGERS TESTING

Each Battery Charger Board consists of four Battery Charge Sectors. Each Sector charges one 12 Volt Battery, supplying approximately 14 Volts to the Battery (during the charging process).

Each Sector has:

- A green “Charge” LED under J2 test point indicates that the Charging Sector receives voltage from the PFC 1600 Board (A9577-XX), i.e. a LED will always light in green if the Unit is plugged to the mains.

- A blue “Float” LED indicates that the Batteries have entered in floating mode and charging will continue at a voltage level close to 13.7 VDC. When the Unit is plugged to the mains, the green and blue LEDs will light simultaneously.



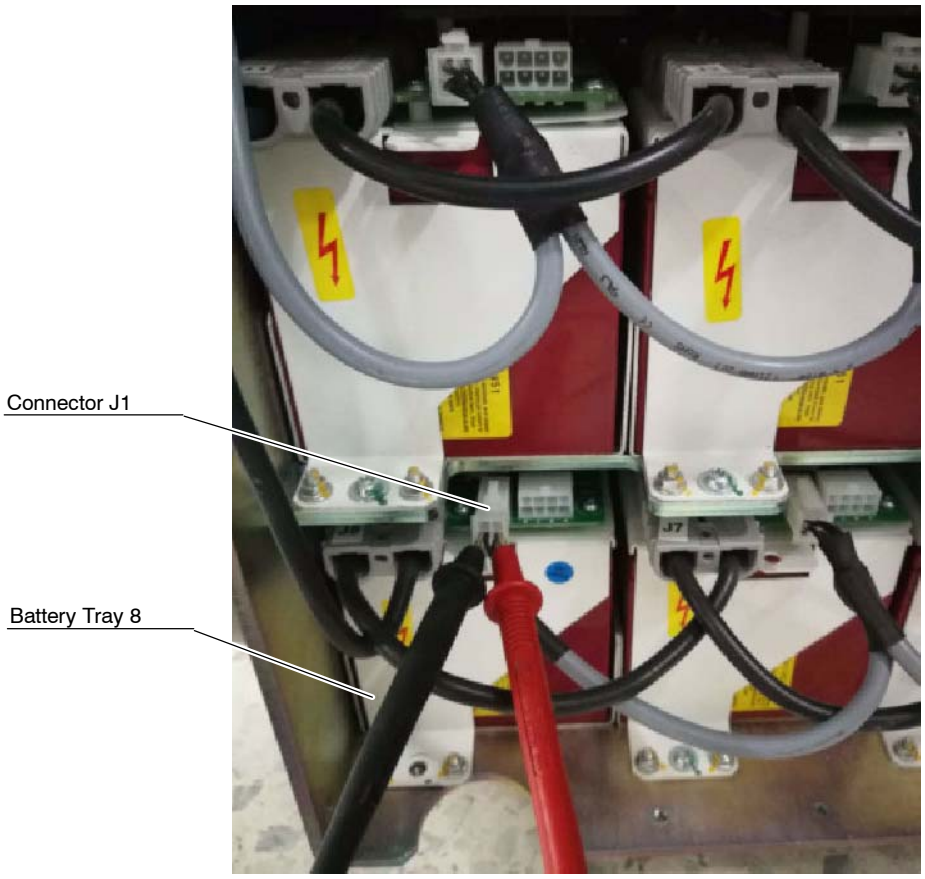
If, in addition to the float status of the chargers, all the Battery Charge Level Indicators are ON, it means that the batteries are fully charged.

Battery Chargers testing procedure:

1. Dismount the Covers of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

2. Set the Unit in charging mode.

3. Ensure that the PFC 1600 Board (A9577-XX) supplies a voltage of approximately 380 VDC to each Battery Tray. Check this voltage in the Molex connector J1 of the Battery Tray 8 (wired pins).

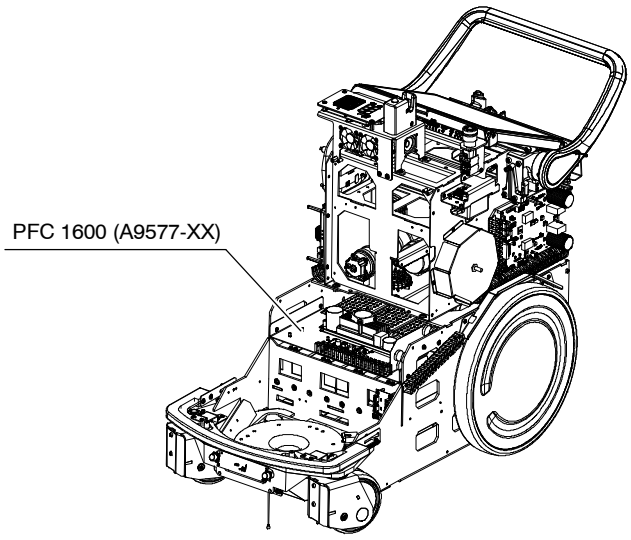


If the voltage is correct, proceed to the next step.

If 380 VDC is not present in the connector J1 of the Battery Tray 8, check this voltage in the connector J1 of the Battery Tray 1. If the voltage is present, check the cable connections in each J1 connector of the Battery Trays, but if this voltage is not present, check the cable connections between the J1 connector of the PFC 1600 Board and the J1 connector of the Battery Tray 1, replacing the PFC 1600 Board or repairing the connections as necessary.

If the PFC 1600 Board is faulty, all LEDs in Charging Sectors will be OFF while the Unit is connected to the mains.

PFC 1600 Board is located on the Front Tray under the Front Holder for Detectors and above the Chassis Frame of the Battery Trays. It is equipped with a Protective Cover.



4. Visually check that the green LED of every Charging Sector lights on each Battery Charger.

5. If a LED on a Sector is OFF or blinking, this Sector may be faulty and the respective Charger Board or batteries should be replaced (*refer to Section 2.6.4*).

Note ☞ *Although the Chargers may be replaced, the batteries may have suffered from faulty Charger Boards. Recharge the batteries once the Charger Board has been replaced.*

Note ☞ *For further information about identifying a faulty battery, please refer to Section 2.6.3.*

2.6.3 IDENTIFYING FAULTY BATTERIES

Battery lifetime depends on environmental and working conditions. If deeply or completely discharged, capacity diminishes over time and sulfation may occur, which impedes recharge.

A physical inspection for sulfation of all battery connection points should be part of not only the regular maintenance tasks but also part of any service intervention involving the power supply.

Note ☞ *If Batteries do not complete a charge cycle, they eventually lose their maximum charge capacity and reduce output.*

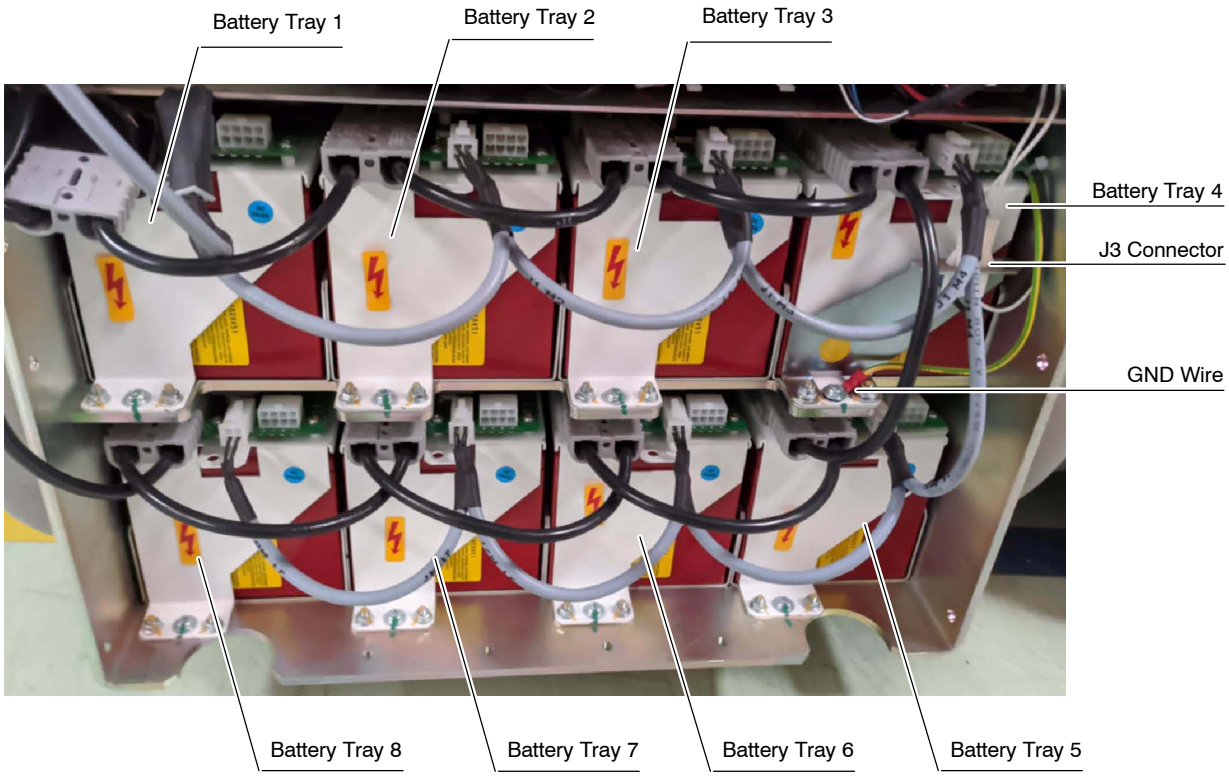
Tools required to determine which Batteries are defective:

- Digital Multimeter.
- Load Resistance of at least 3.3 Ω, > 50 Watts (recommended 4 or 5 Ω, > 100 Watts).
- A heatsink is also recommended.

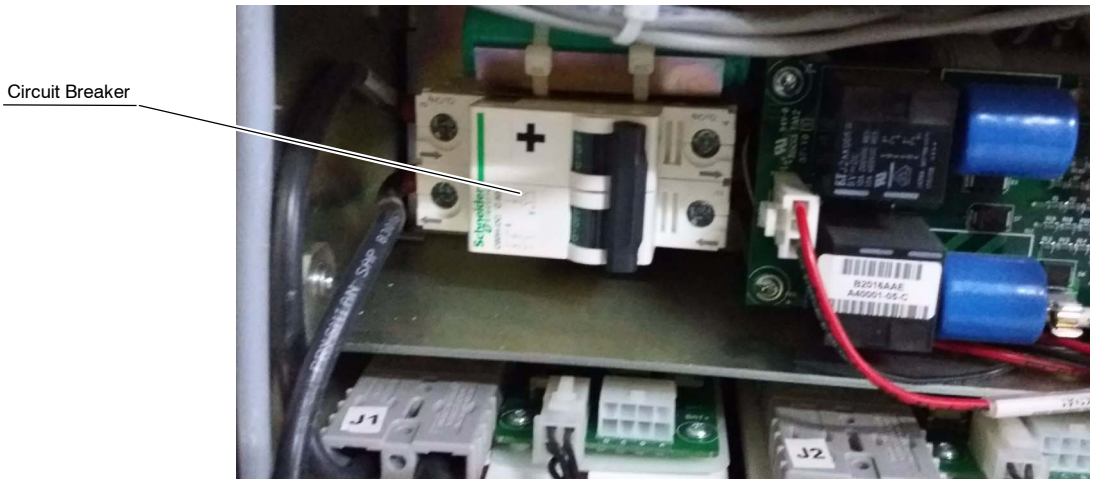
Note ☞ *Before performing the following procedure, the Unit must be connected to the mains for at least 8 hours with the Generator OFF in order to ensure a complete charging cycle.*

1. Once fully charged, turn OFF the unit and disconnect the Power Line Cable from mains.

2. Dismount the Covers of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*



3. Set the Circuit Breaker located on the left side of the GPIO Trolley Board (A40001-XX) to OFF, in order to isolate the Generator from the Batteries.

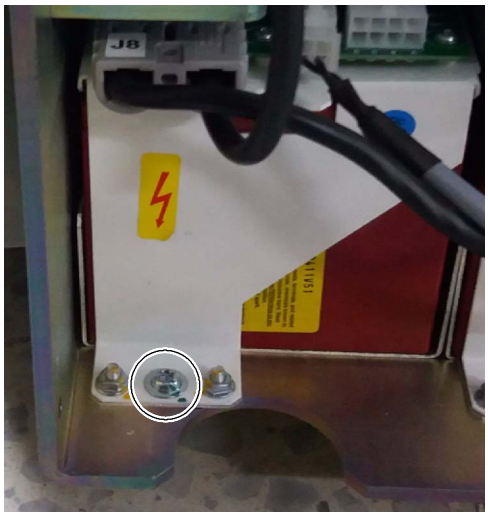


4. Disconnect the Anderson and Molex connectors of the selected Battery Tray.

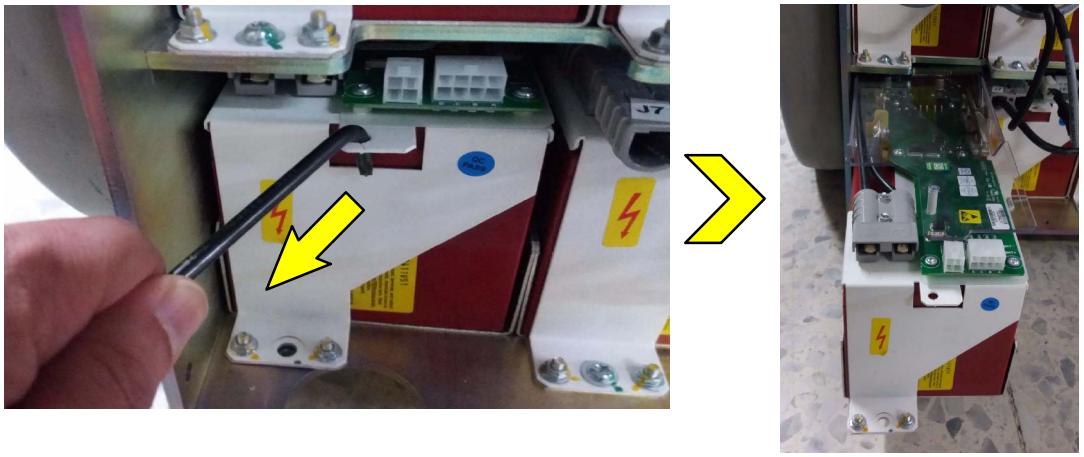
   Anderson connectors: J1 for Tray 1, J2 for Tray 2, J3 for Tray 3, J4 for Tray 4, J5 for Tray 5, J6 for Tray 6, J7 for Tray 7 and J8 for Tray 8.

   Molex connectors: J2 in each Battery Charger Board (A9591-XX).

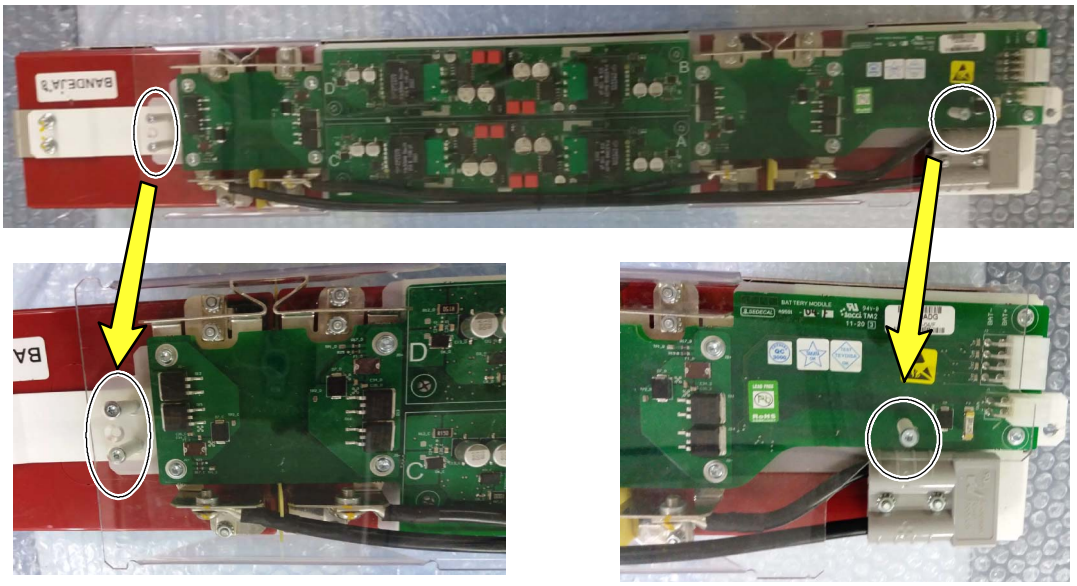
5. Remove the screw that holds the Battery Tray on the Chassis Frame of the Unit.



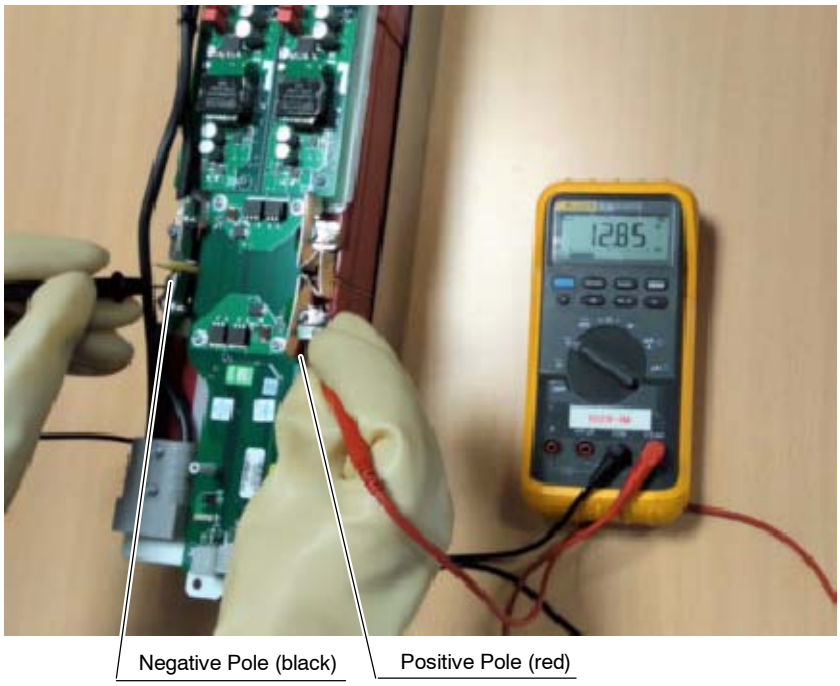
6. Slide the Battery Tray out from the Unit and place it on a workbench.



7. Remove the 3 screws that hold the plastic Protective Cover on the Battery Tray.

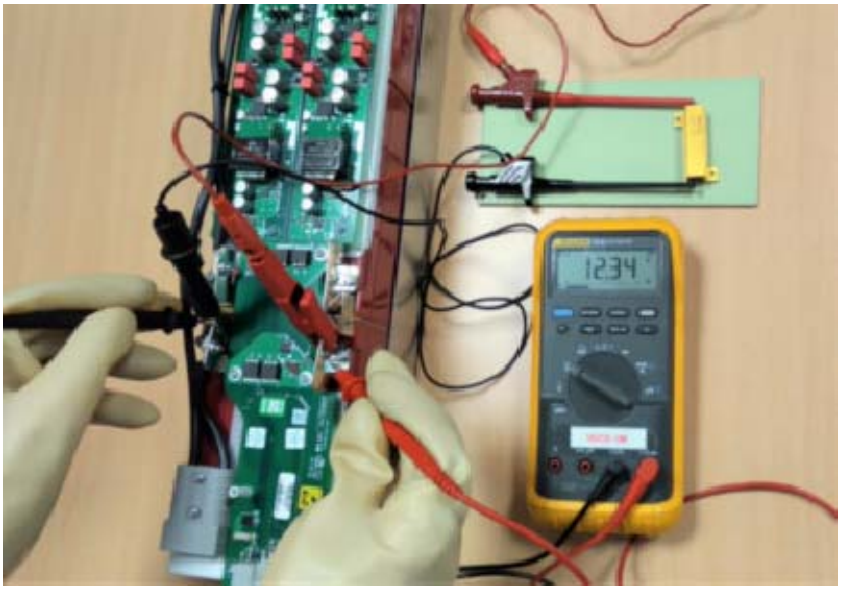


8. Identify the positive and negative poles of the Battery to be measured. Measure for around 12 - 13 V.



Note ☞ *Measuring Battery Output Voltage is not enough to determine the Battery status. The same test must be performed with a Load.*

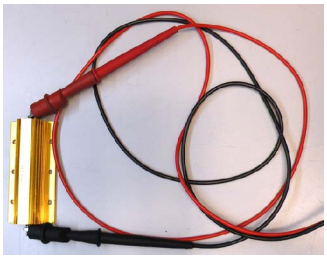
9. Repeat measurement with a Load Resistance of at least 3.3 Ω, > 50 Watt (recommended 4 or 5 Ω, > 100 Watts), connected to the positive and negative Battery poles. This Voltage should be around 12 - 13 V, which are considered standard values.



WARNING

A HEATSINK IS RECOMMENDED AS THE LOAD RESISTANCE WILL HEAT UP DURING THE TEST.

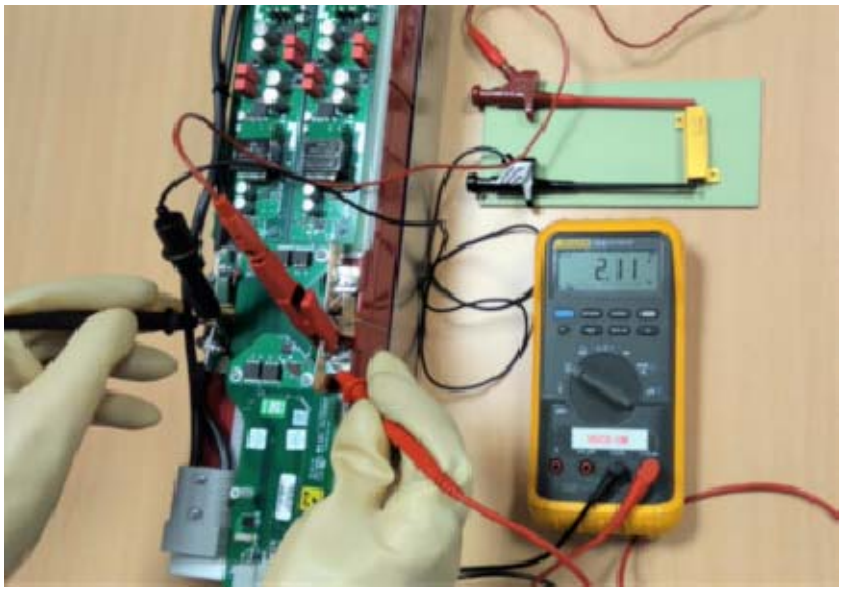
Load Resistance



Note ☞

The measurement with a Load have to be read once the voltage value stabilizes, which happens approx. after 10 - 15 seconds.

10. If Voltage with Load is less than 12 V (usually close to 0 V), the Battery is faulty.

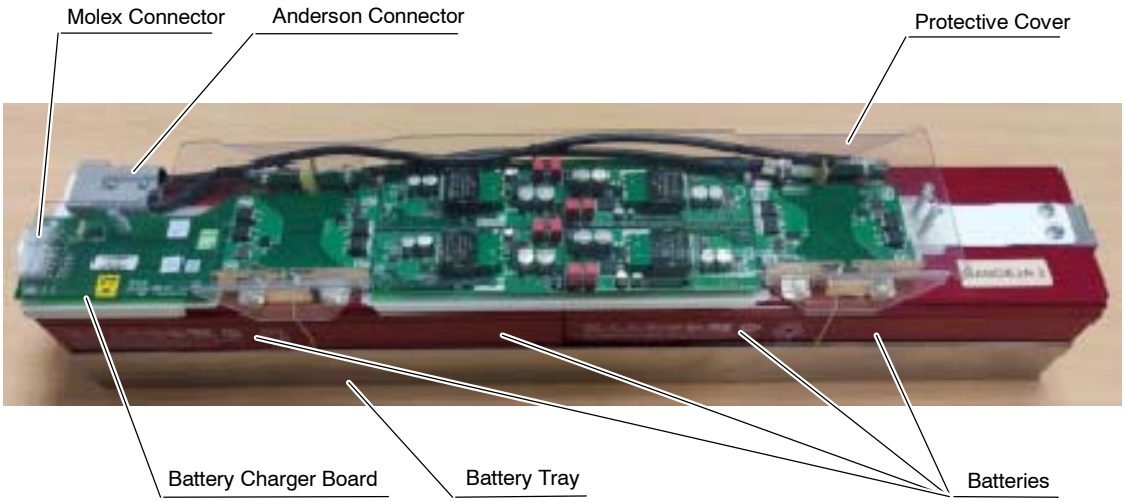


Note ☞ *A voltage less than 12 V is a sign of battery failure, while a voltage between 12 V and 13 V corresponds to expected values within the standard range.*

11. If needed, repeat from step 6 in order to identify other faulty Batteries.

12. Continue with *Section 2.6.5* for replacing the faulty Batteries/Trays and for reassembling the Battery Trays inside the unit.

2.6.4 REPLACING BATTERY CHARGER BOARDS



1. To access to the Battery Charger Boards, turn OFF the unit and disconnect the Power Line Cable from mains.

2. Dismount the Covers of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

3. Set the Circuit Breaker located on the left side of the GPIO Trolley Board to OFF, in order to isolate the Generator from the Batteries.

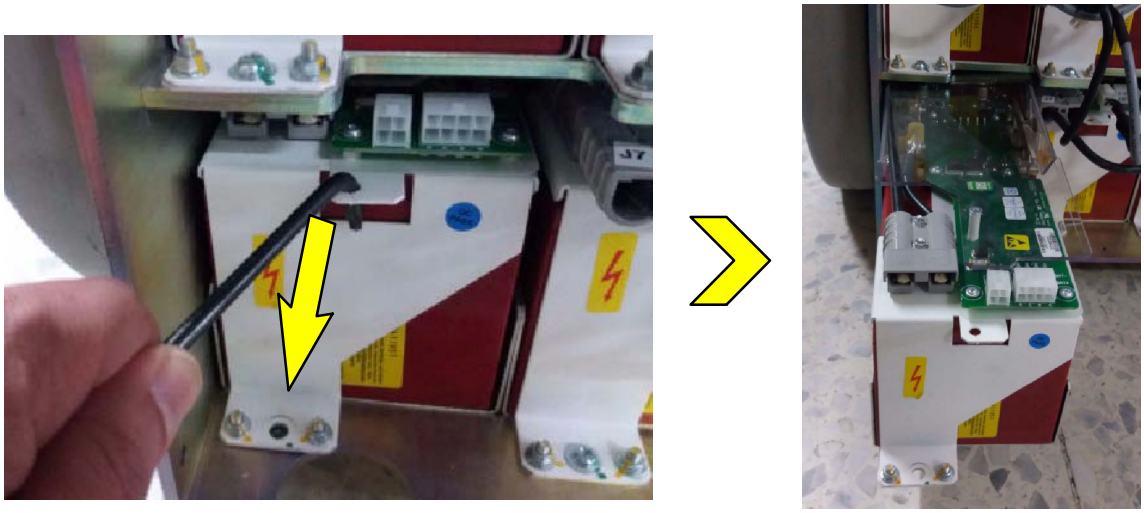
4. Disconnect the Anderson and Molex connectors of the selected Battery Tray.

   Anderson connectors: J1 for Tray 1, J2 for Tray 2, J3 for Tray 3, J4 for Tray 4, J5 for Tray 5, J6 for Tray 6, J7 for Tray 7 and J8 for Tray 8.

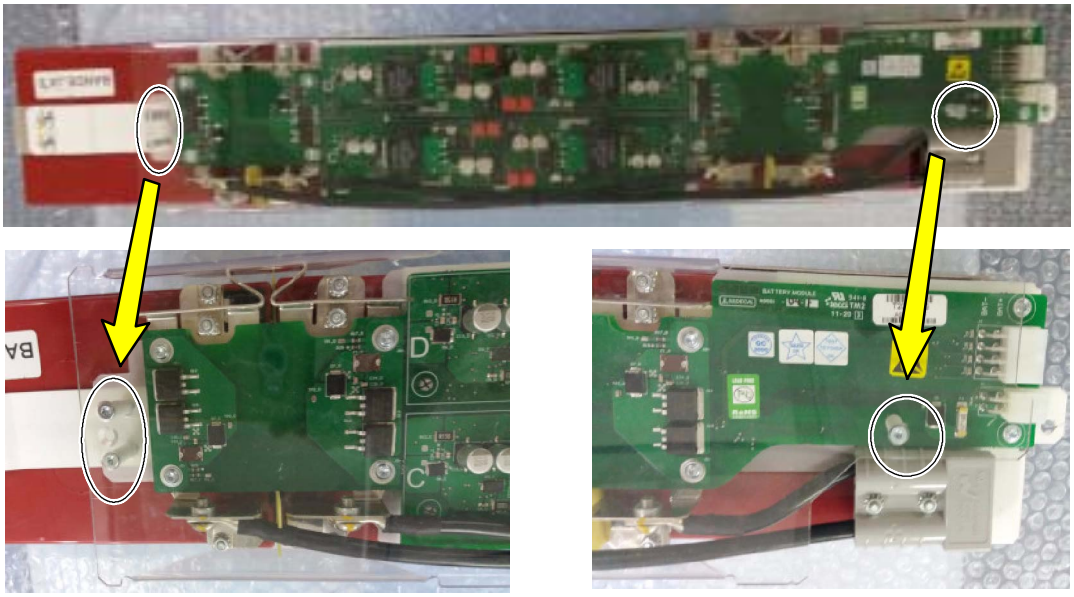
   Molex connectors: J2 in each Battery Charger Board (A9591-XX).

5. Remove the screw that holds the Battery Tray on the Chassis Frame of the Unit.

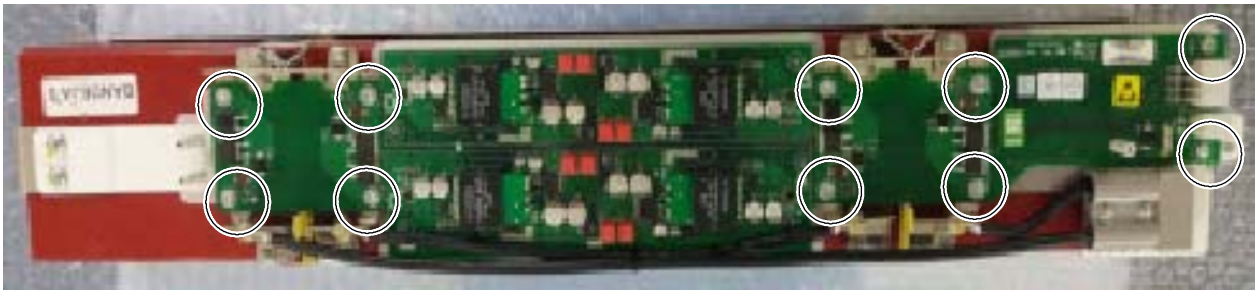
6. Slide the Battery Tray out from the Unit and place it on a workbench.



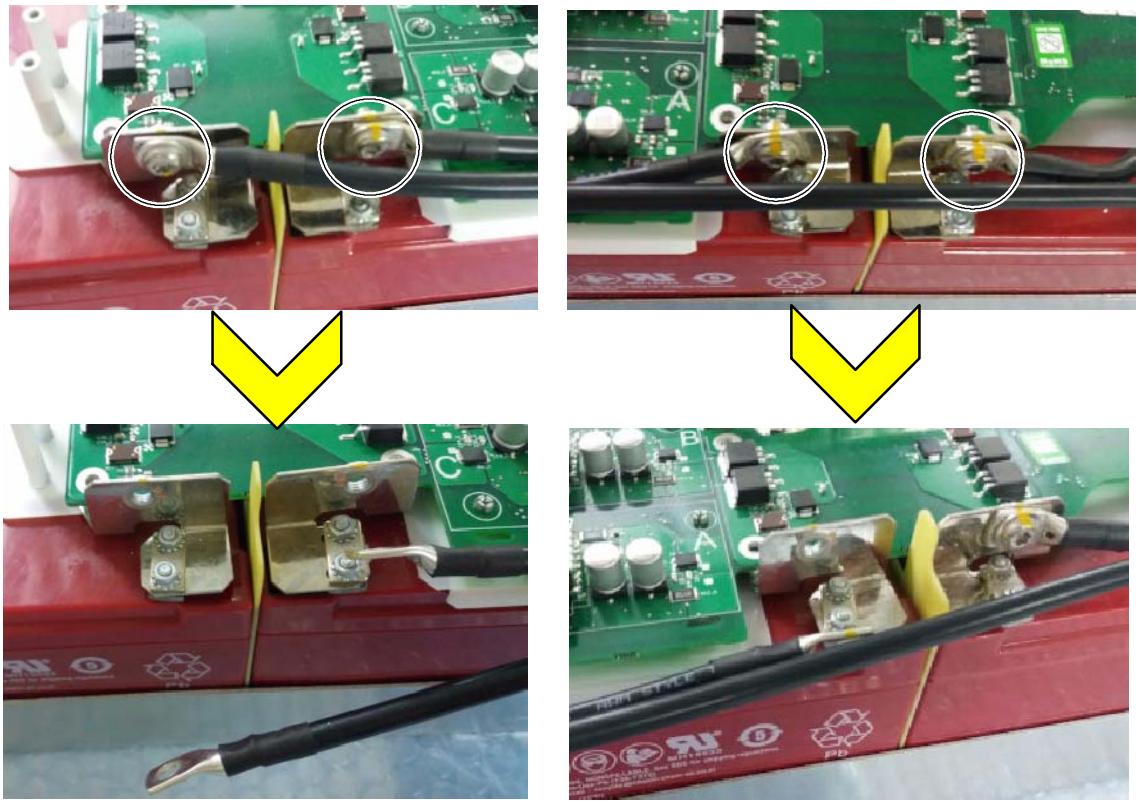
7. Remove the 3 screws that hold the plastic Protective Cover on the Battery Tray.



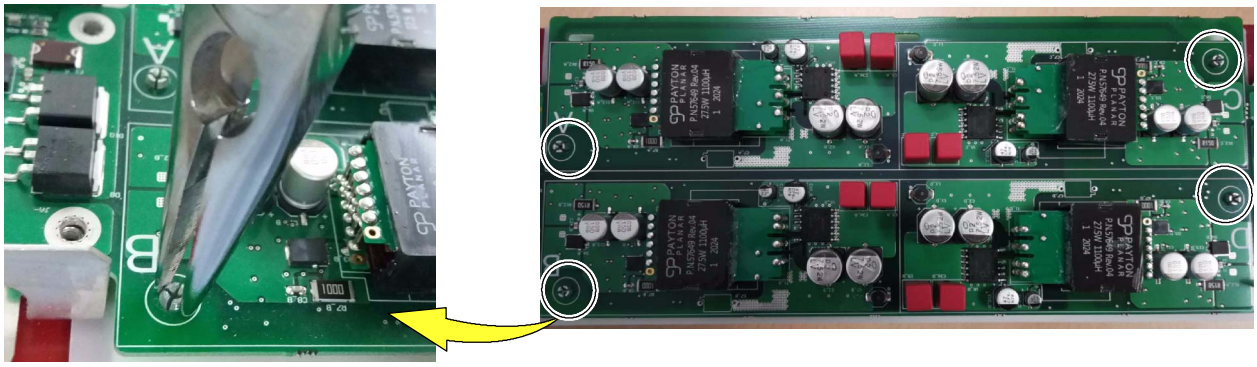
8. Remove the 10 screws that hold the Battery Charger Board on the Batteries.



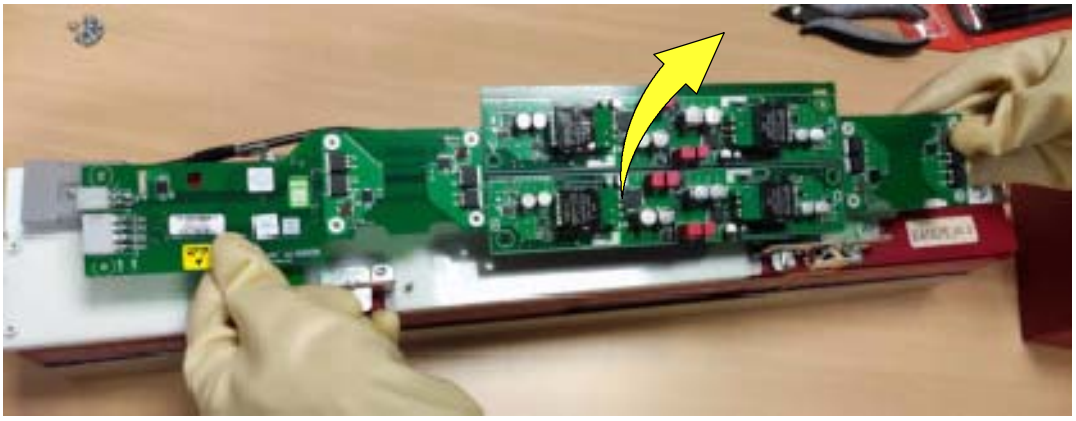
9. Remove the screws that fix the cables to the Connection Terminals shown on the following illustration and isolate these terminals.



10. Tighten the Board Support Latch Pin as shown on the following illustration, in order to remove the Battery Charger Board.



11. Remove the Battery Charger Board by pulling it upwards.

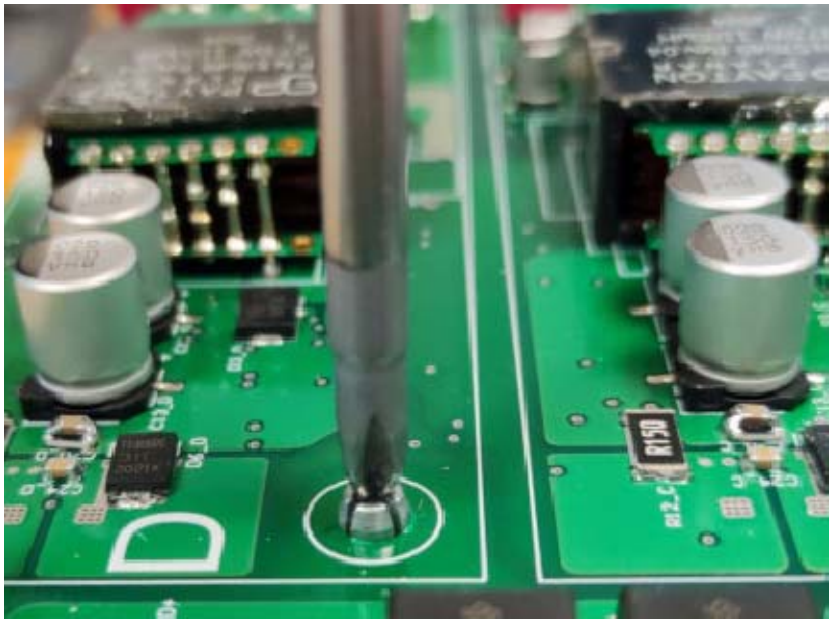


CAUTION

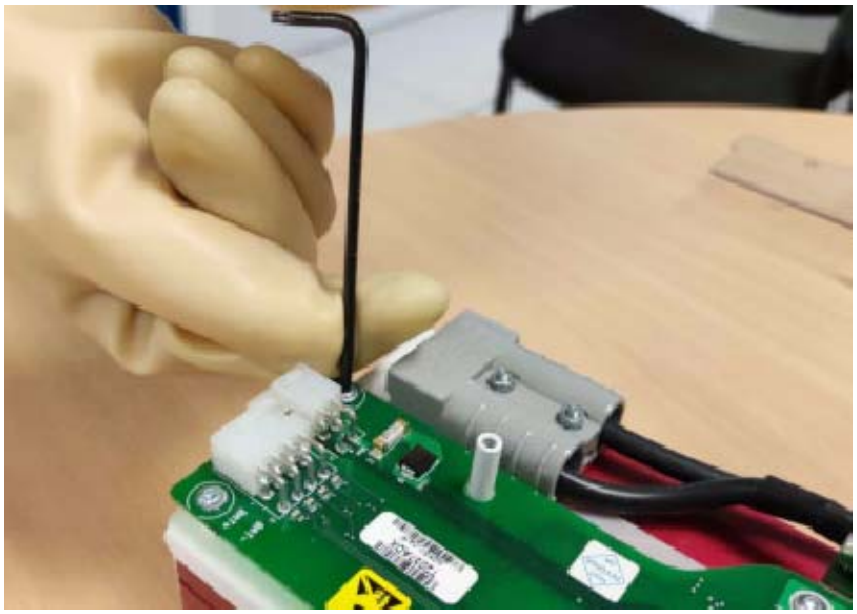
The Battery Charger Board has electronic components mounted at the back side of the Board.

Please, handle this Board with care in order to avoid any possible damage on these components.

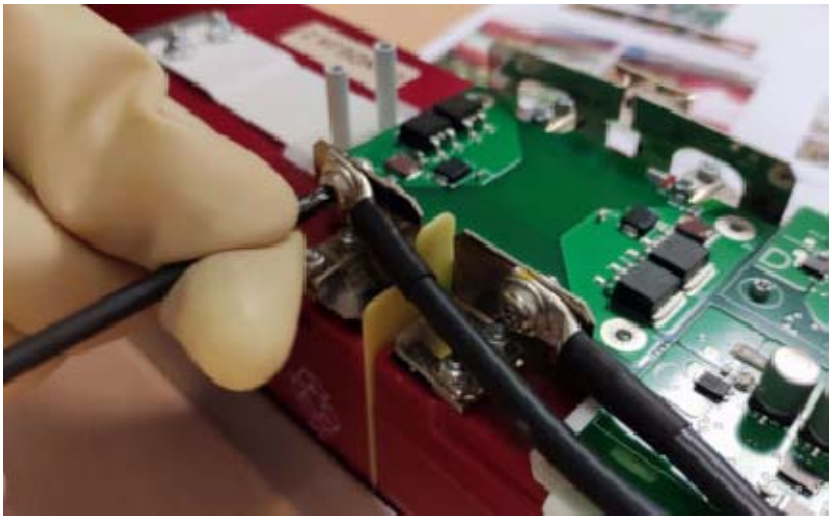
12. Install the new Battery Charger Board. Insert this Board in the Board Support Latch Pins. Then use a screwdriver, as shown on the following illustration, for pressing the head of each Pin in order to fix the Battery Charge Board.



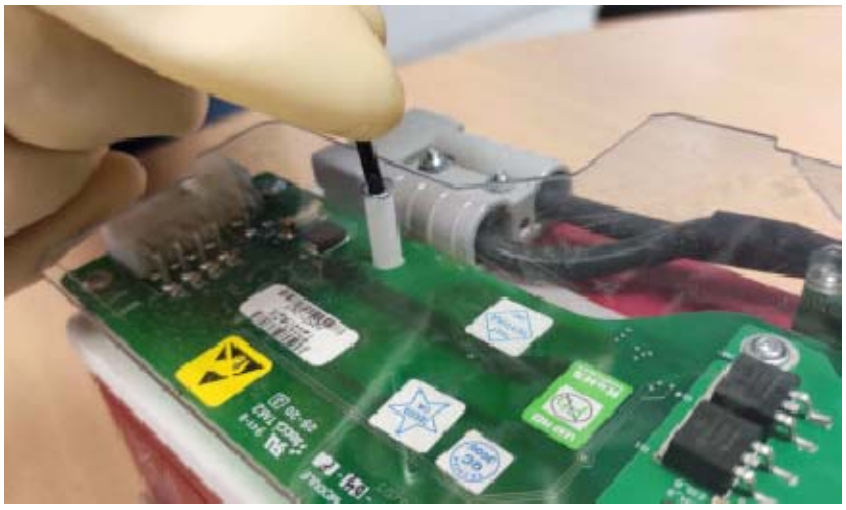
13. Install the 10 screws that hold the Battery Charger Board to the Batteries.



14. Install the cables removed previously at step 9.



15. Install the plastic Protective Cover on the Battery Tray using the screws removed previously.



16. Slide the Battery Tray inside the Unit, and tighten the screw that holds the Battery Tray on the Chassis Frame of the Unit.

17. Connect the Anderson and Molex connectors to the Battery Tray.

18. Turn the Circuit Breaker ON.

19. Turn ON the Unit, and perform a functional check of the Unit.

20. Turn OFF the Unit, and install the Covers of the Unit.

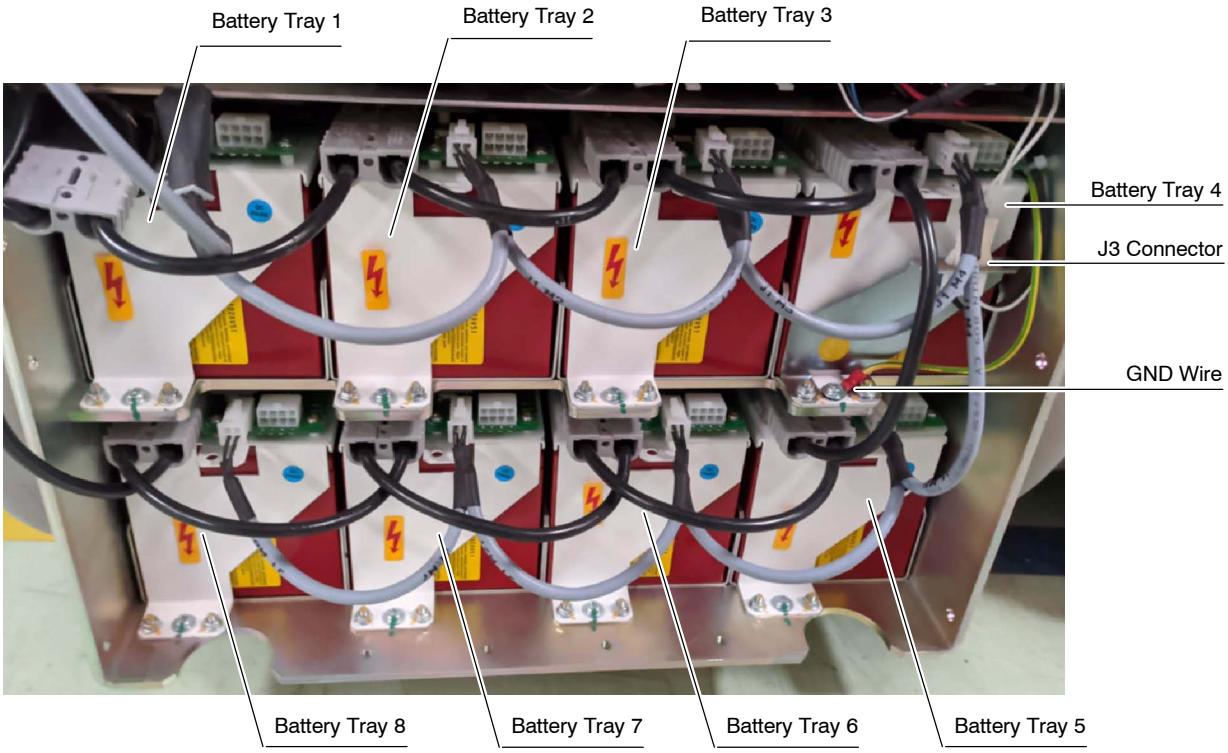
2.6.5 REPLACING FAULTY BATTERIES

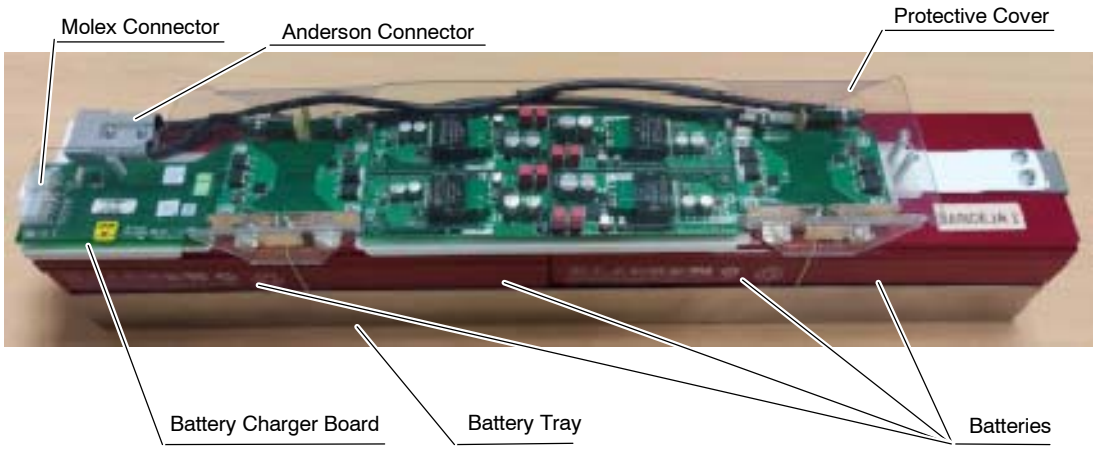
BATTERIES DISASSEMBLY

Note ☞

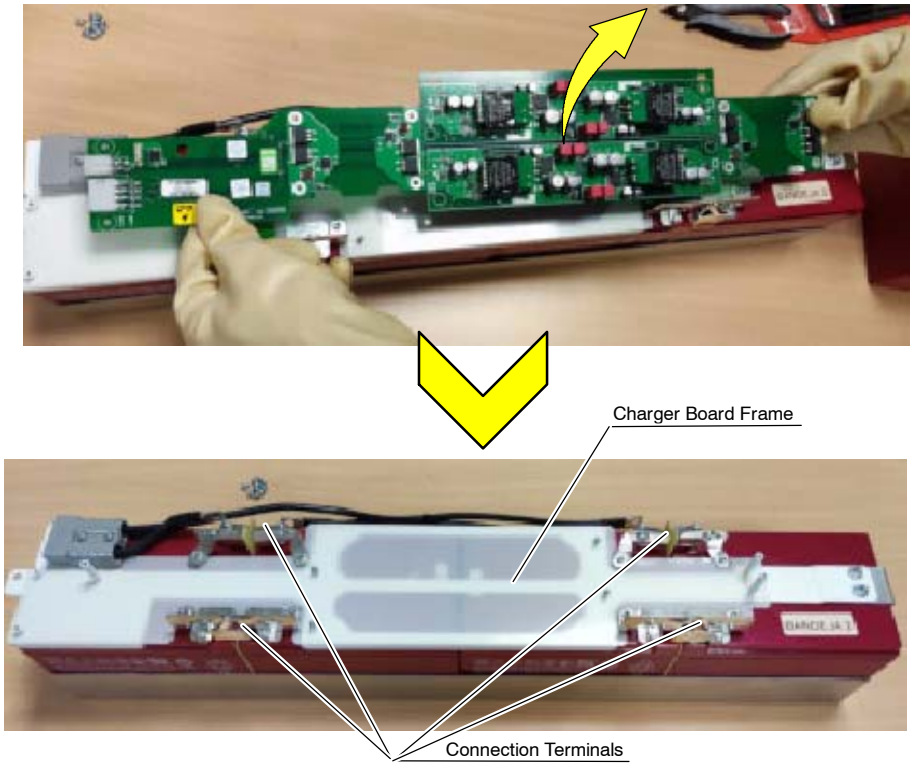
All the Battery Trays have identical connection, except the number 4 which includes a Ground (GND) wire and a connector to draw voltage from the Unit's Manual Driving Brake Release Button.

Ensure every Battery Tray is placed at the right position in accordance with the numbering system.

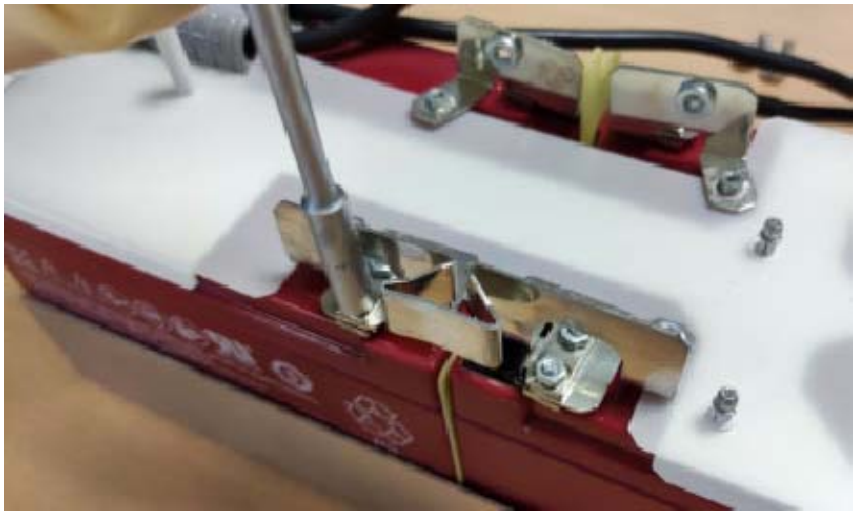




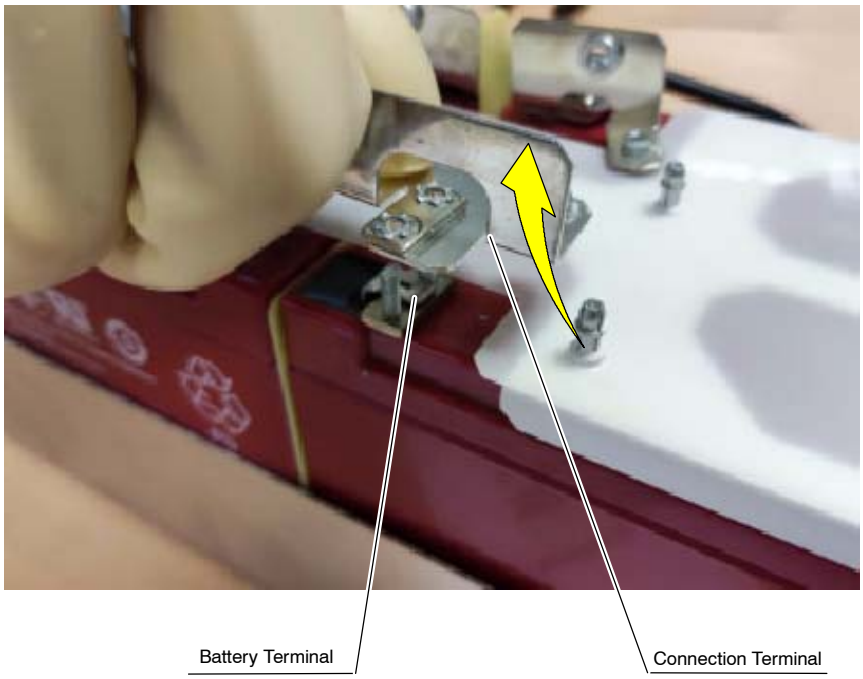
1. In order to access the Batteries, it is necessary to remove the Battery Charge Board. Please, *refer to Section 2.6.4* and proceed with steps 7 to 11.



2. At the side of the Tray with no cables, loose the nuts which fix the Connection Terminals to the Battery Terminals.

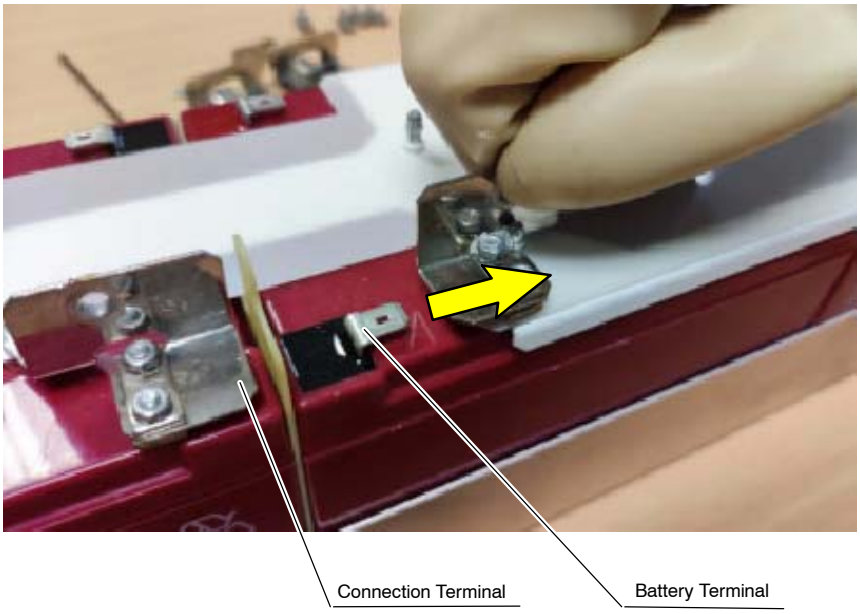


3. Remove the Connection Terminals.



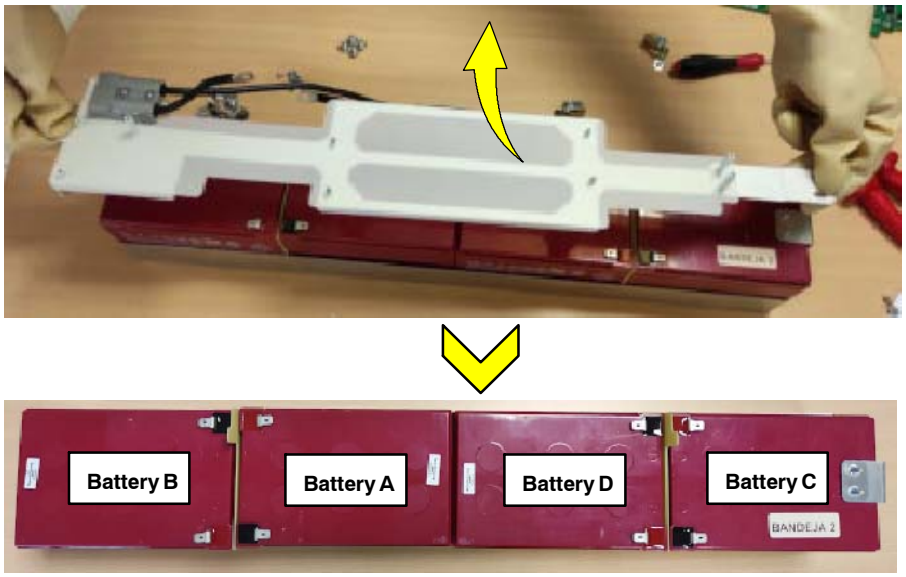
4. At the side of the Tray with cables, loose the nuts which fix the Connection Terminals to the Battery Terminals.

5. Extract the Connection Terminals without removing totally the nuts.



6. Remove the 4 screws which fix the Charger Board Frame to the Battery Tray.

7. Remove the Charger Board Frame by pulling it upwards.



8. Extract the batteries from the trays.

BATTERIES ASSEMBLY

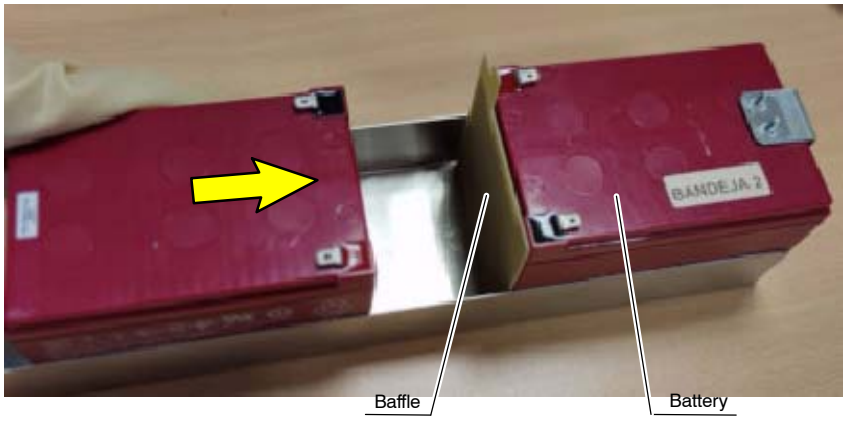
Note ☞ *Ensure that the Positive and Negative markings on the replacement battery coincide with those on the Battery Tray.*

Note ☞ *All the Battery Trays have identical connection, except the number 4 which includes a Ground (GND) wire and a connector to draw voltage from the Unit's Manual Driving Brake Release Button.*

It is important to reconnect the GND wire and J3 connector to Battery Tray 4 when indicated, and ensure every Battery Tray is placed at the right position in accordance with the numbering system.

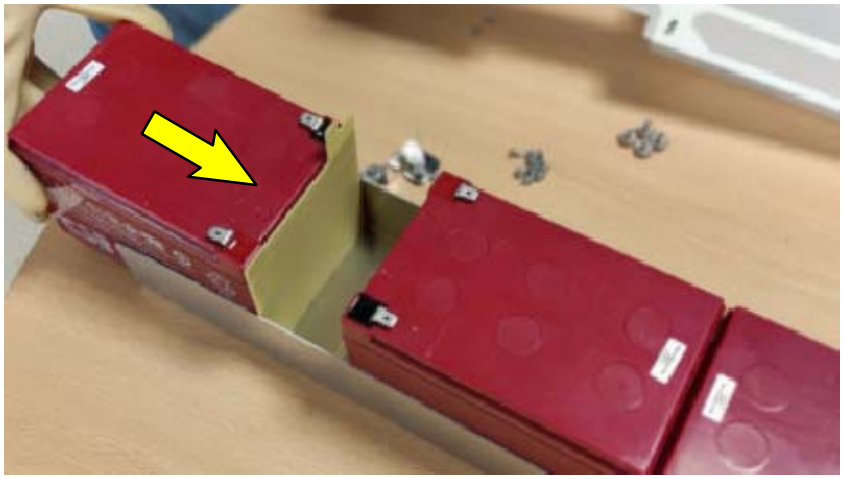
1. Mount the first battery and the baffle at the position shown on the illustration.

2. Mount the second battery at the position shown on the illustration.



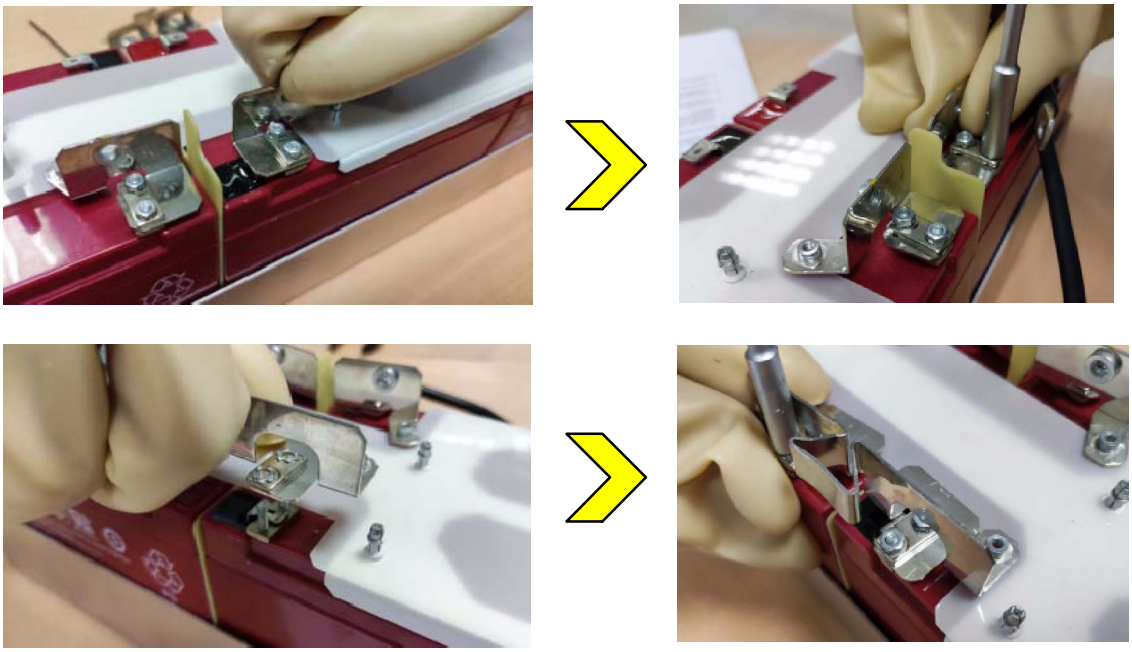
3. Mount the third battery at the position shown on the illustration.

4. Mount the baffle and the fourth battery at the position shown on the illustration.

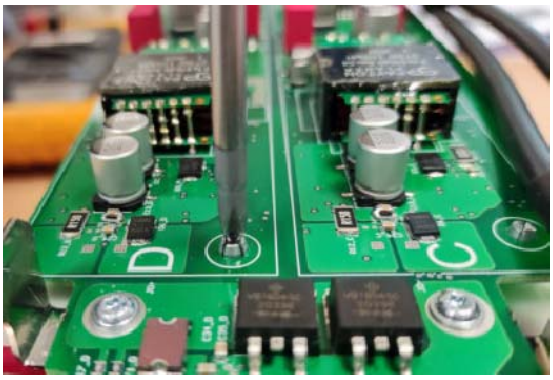


5. Mount the Charger Board Frame and fix it with the 4 nuts.

6. Mount the Connection Terminals on the Battery Terminals. Do not fully tighten the nuts in order to allow a slight movement when mounting the Battery Charger Board.



7. Mount the Battery Charger Board using as guide the pin shown on the illustration. Align the Battery Charger Board correctly in order to insert the remaining pins through the Battery Charger Board holes which are placed near the serigraphy “A”, “B”, “C” and “D”. Press the Battery Charger Board slightly down.

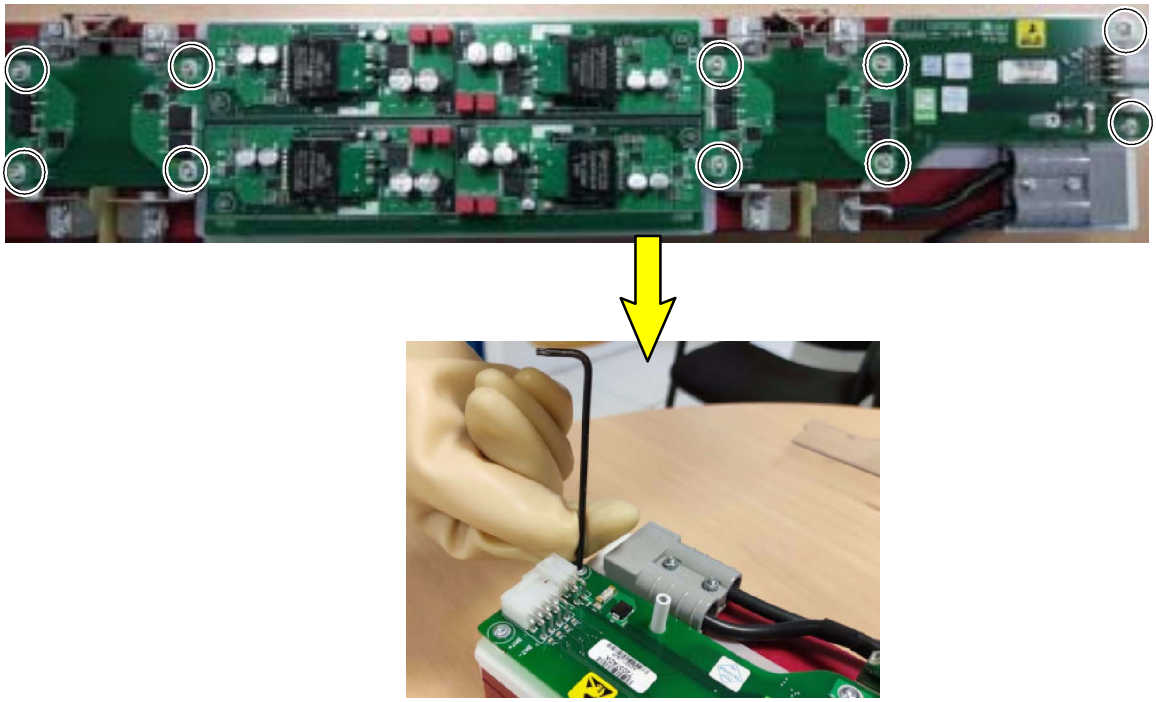


CAUTION

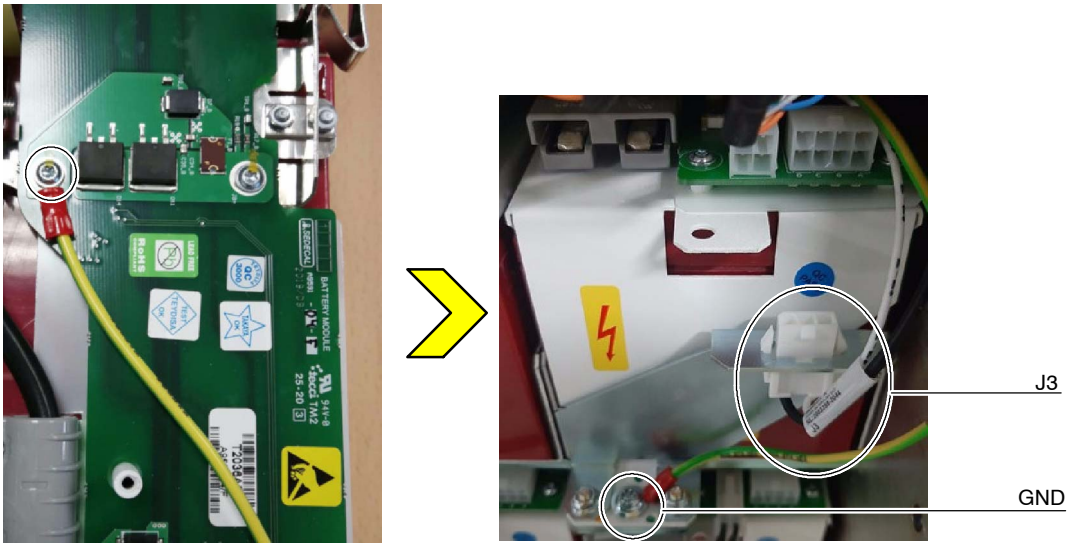
The Battery Charger Board has electronic components mounted at the back side of the Board.

Please, handle this Board with care in order to avoid any possible damage on these components.

8. Place the 10 screws which fix the Battery Charger Board to the Batteries. Once all the screws are placed, tighten it accordingly.

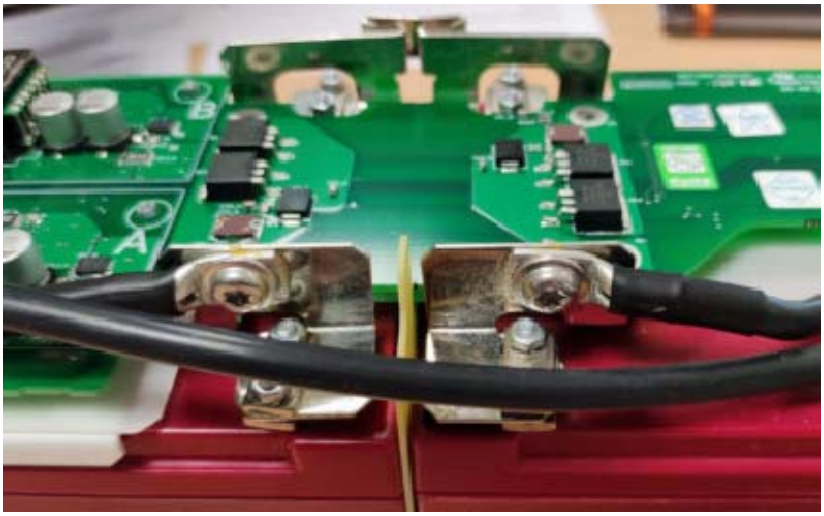


9. For the Battery Tray 4 only, connect the GND wire and J3 (Brake Release Button Connector) as shown on the illustration.

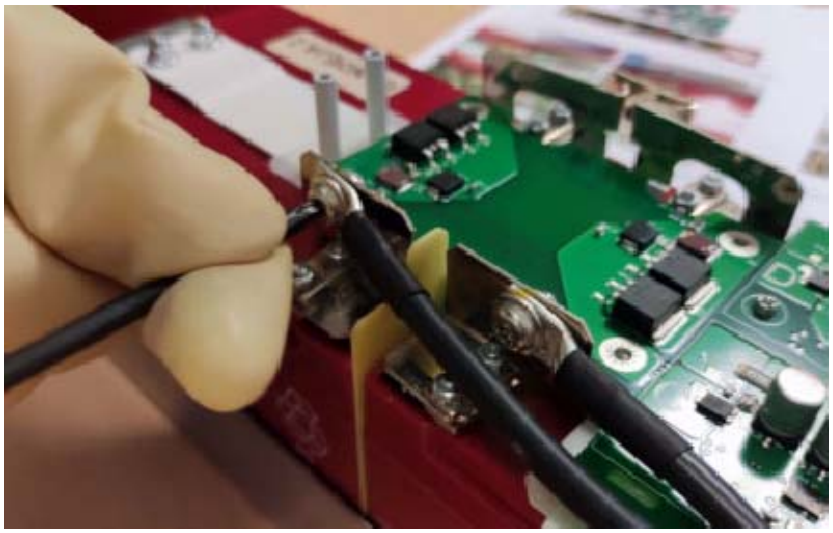


10. Tighten the nuts which fix the Connection Terminals to the Battery Terminals, previously mounted as indicated in step 6.

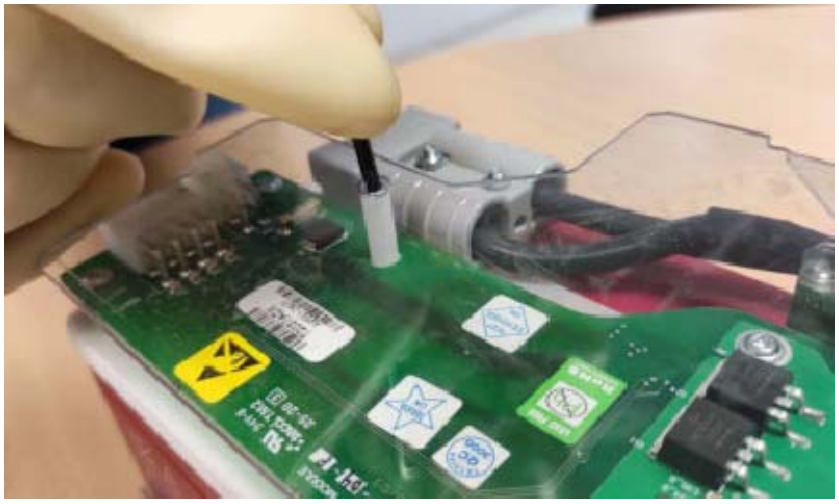
11. Connect the cable between the two batteries which are placed at the central positions. Watch out the voltages.



12. Connect the cables between the Anderson Connector and the batteries which are placed at the ends of the Battery Tray.



13. Install the plastic Protective Cover on the Battery Tray using the screws removed previously.



14. Slide the Battery Tray inside the Unit, and tighten the screw that holds the Battery Tray on the Chassis Frame of the Unit.

15. Connect the Anderson and Molex connectors to the Battery Tray.

16. Turn the Circuit Breaker ON.

17. Keep the Unit connected to the mains for at least 8 hours with the Generator OFF in order to ensure a complete charging cycle.

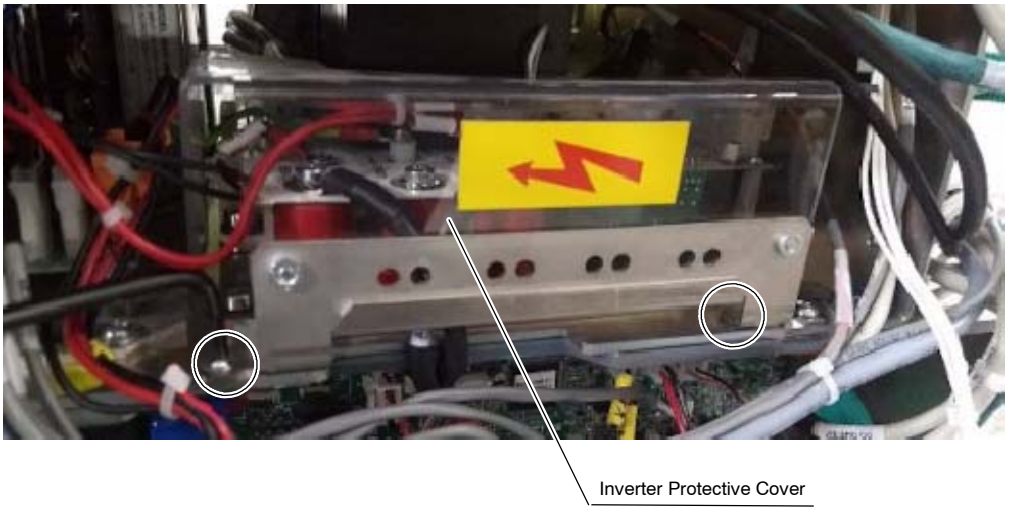
18. Turn ON the Unit, and perform a functional check.

19. Turn OFF the Unit, and install the Covers of the Unit.

2.7 INVERTER MODULE: IGBT AND HALF BRIDGE DRIVER BOARD REPLACEMENT

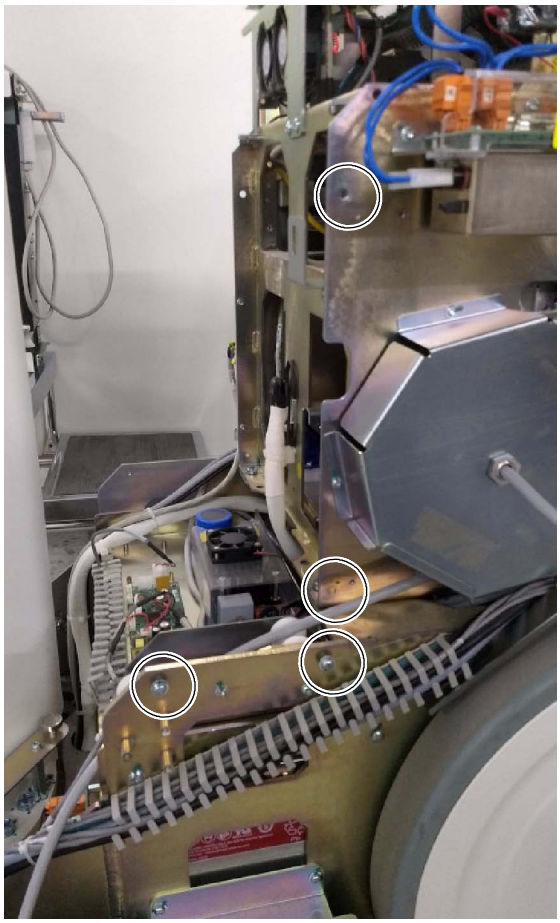
1. With the Unit OFF, dismount the Back Cover (A4) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

2. Remove the two (2) screws which fix the Inverter Protective Cover.



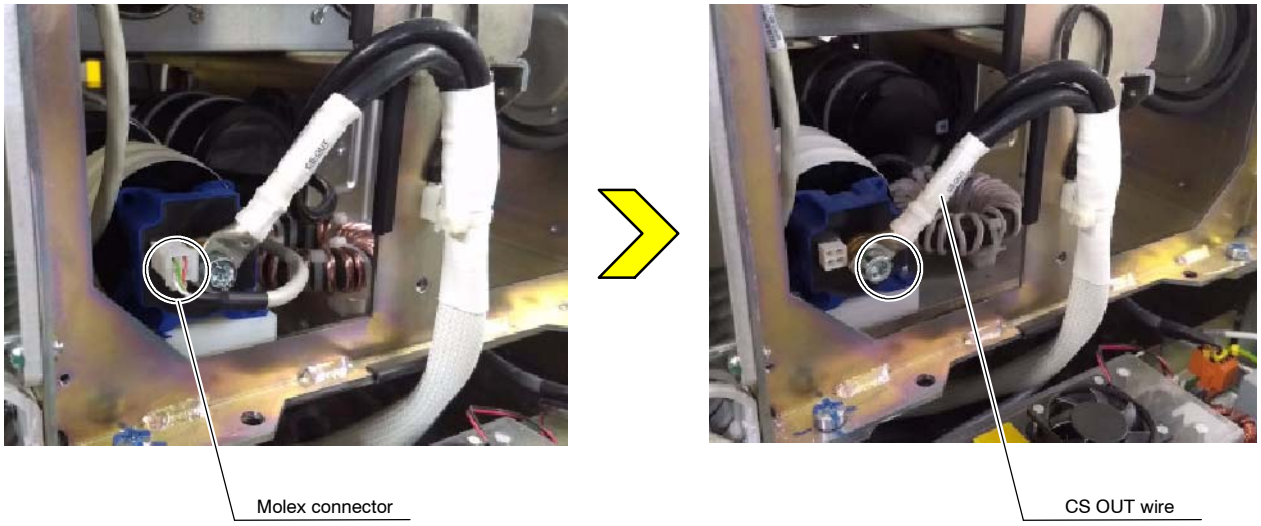
3. Check the DC Bus is totally discharged.

4. Remove the rear Detector Charge Box by unscrewing four (4) screws on the right-hand side and three (3) screws on the left-hand side.



5. Disconnect the connectors J3 and J5 from the Digital Detector Supply Board (A40036-XX).

6. Disconnect the Molex connector. Then, disconnect the CS-OUT wire by removing the screw.

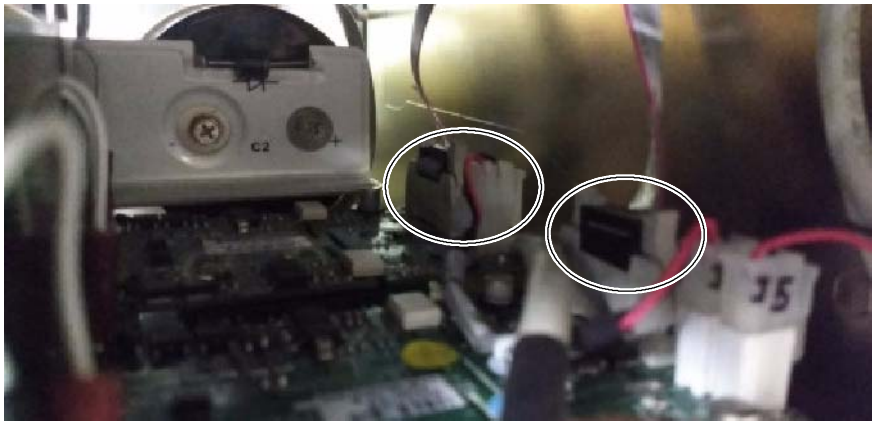


7. At the rear side, loosen partially the two (2) screws that fix the Inverter Plate.

8. At the front side, remove completely the two (2) screws which fix the Inverter Plate.

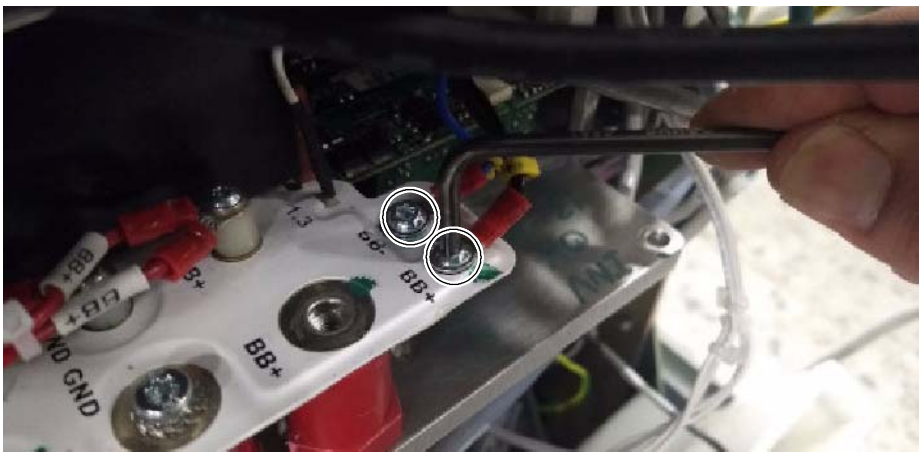
9. Disconnect J5 connector from Half Bridge Driver Board 1 (A3699-XX).

10. Disconnect J1 connectors from both Half Bridge Driver Boards (A3699-XX).



11. Pull the Inverter out slightly in order to get access to the Busbar screws. Then, remove the screws which fix the BB+ and BB– wires.

12. Remove the two (2) screws that fix the black and blue wires connected to BB+ and BB–.



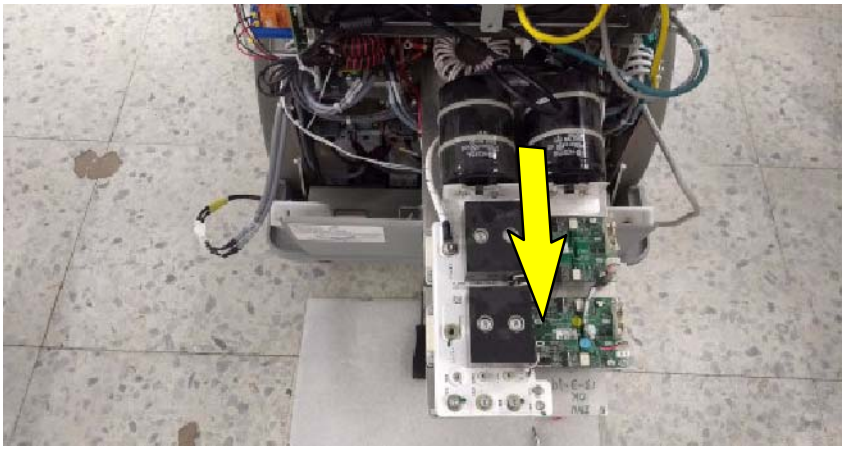
13. Pull the Inverter out further in order to get access to the next set of wires. Then, remove the screw which fixes the red wire labelled as BB+.

14. Remove the screw which fixes the GND wire.

15. Remove the screw that fixes the black wired labelled as BB–.

16. Disconnect the 1-E1C2 wire by removing the indicated screw in the illustration.

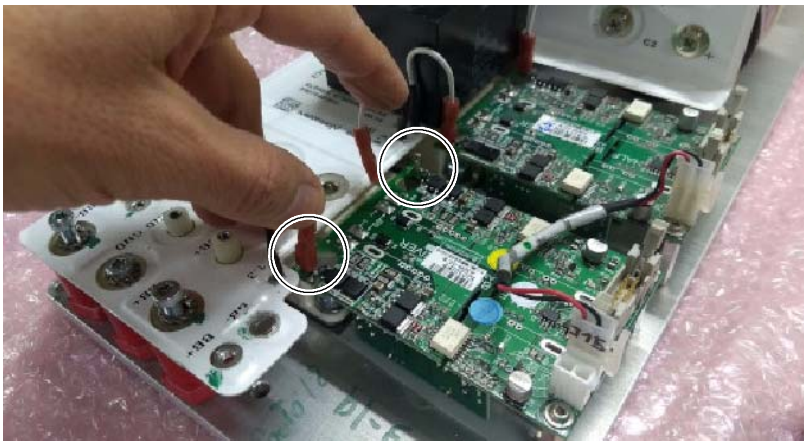
17. Remove completely the Inverter Assembly out of the Mobile Unit.



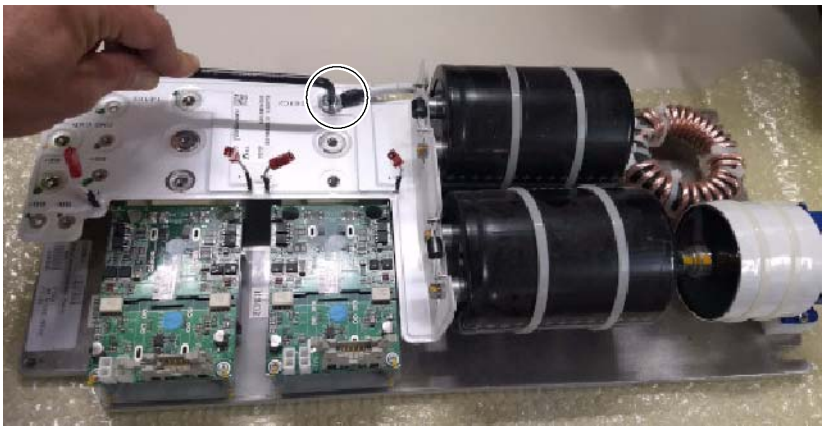
18. Place the Inverter Assembly on a workbench or similar.

19. Remove the screws that fix the Capacitors to the IGBT Modules. Then, remove both Capacitors from the Busbar.

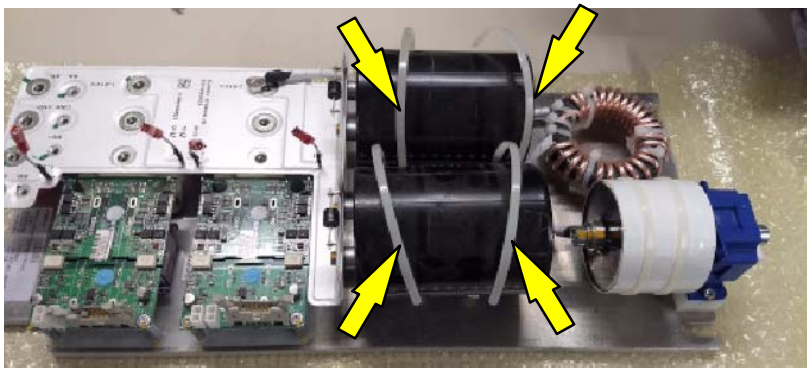
20. Disconnect the four (4) faston terminals, two (2) on each corner of Half Bridge Driver Board.



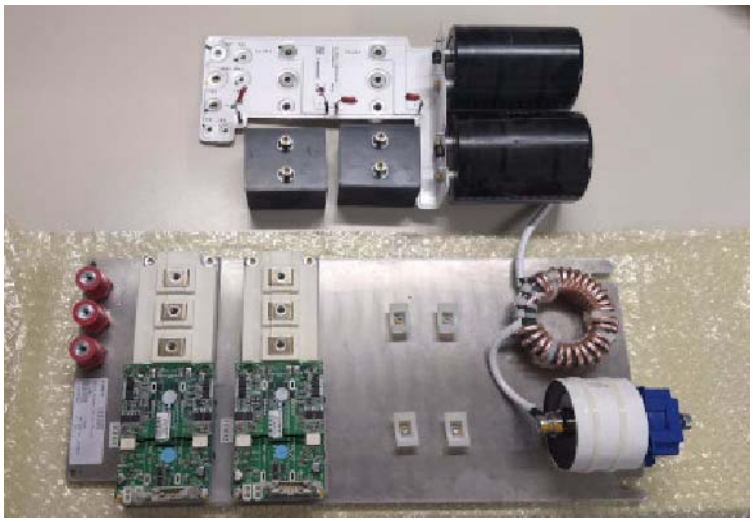
21. Disconnect the 2-E1C2 wire by removing the indicated screw in the illustration.



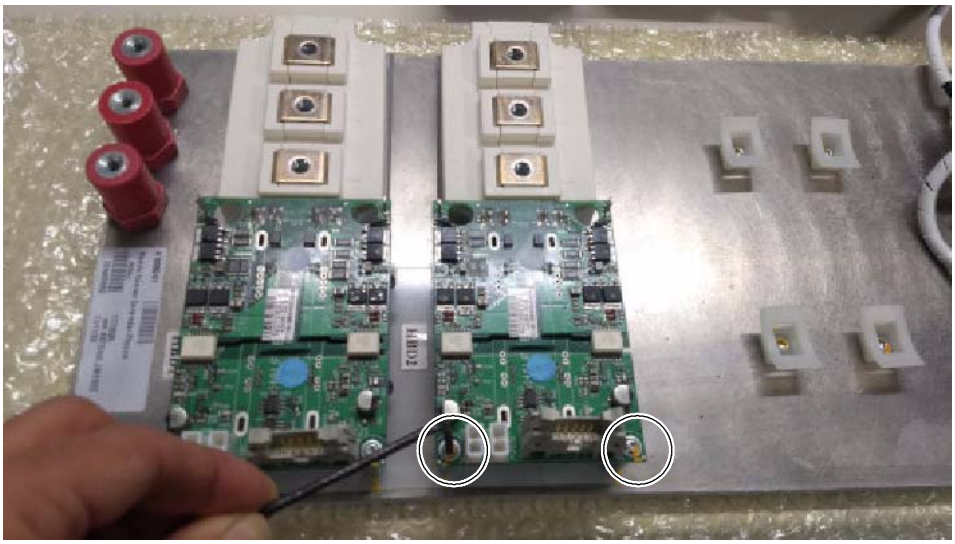
22. Cut off the four (4) tie wraps holding the Capacitors.



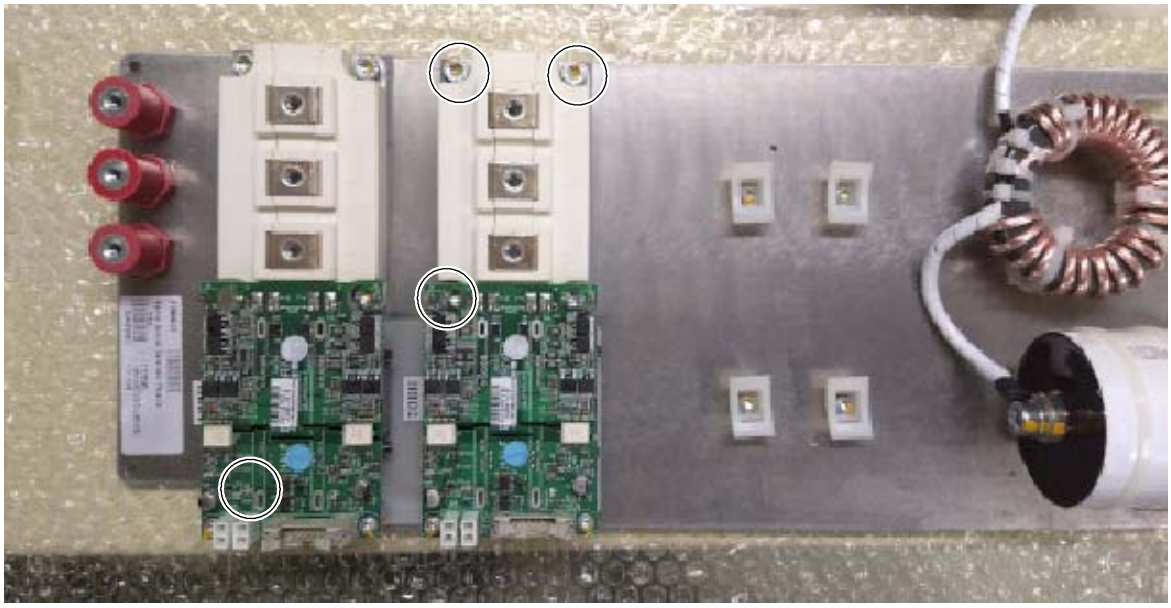
23. Remove the Busbar Assembly.



24. Remove the two (2) screws which fix the Half Bridge Driver Board to the hex spacers.



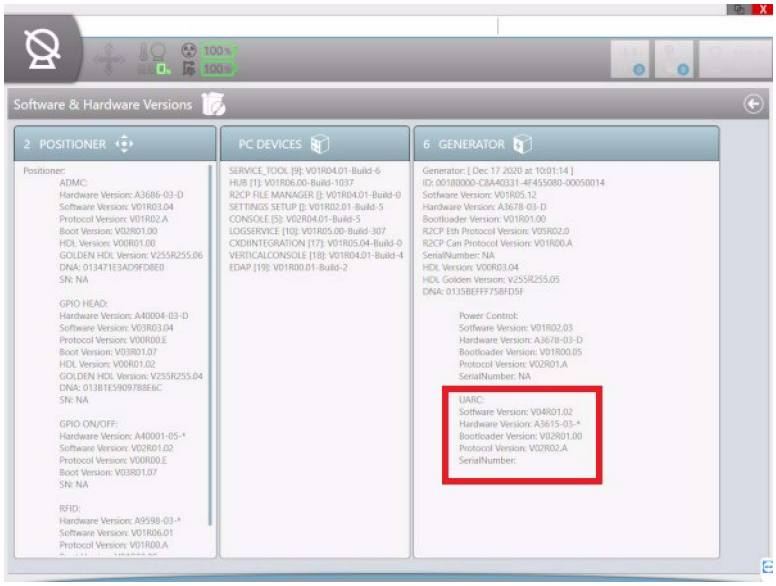
25. Remove the four (4) screws which fix the IGBT to the Inverter Plate.



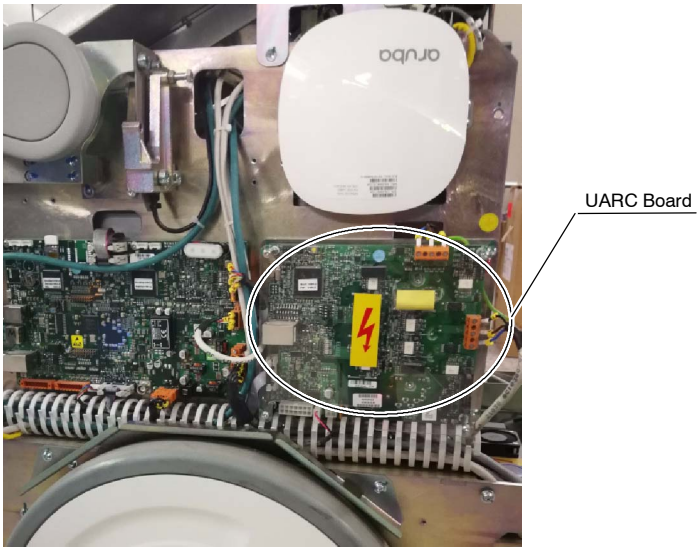
26. Replace the IGBT Module with the new one, and assemble all the components following the reverse process.

2.8 UNIVERSAL ADVANCED ROTOR CONTROL BOARD (UARC) REPLACEMENT

1. Before the replacement, write down the firmware version currently installed in the Universal Advanced Rotor Control Board (UARC) (A3615-XX) to be replaced. In order to do it, at the Service Tool, select “Maintenance” and then “Software and Hardware Versions”. At the “Generator Tab” appear the versions installed in the UARC.

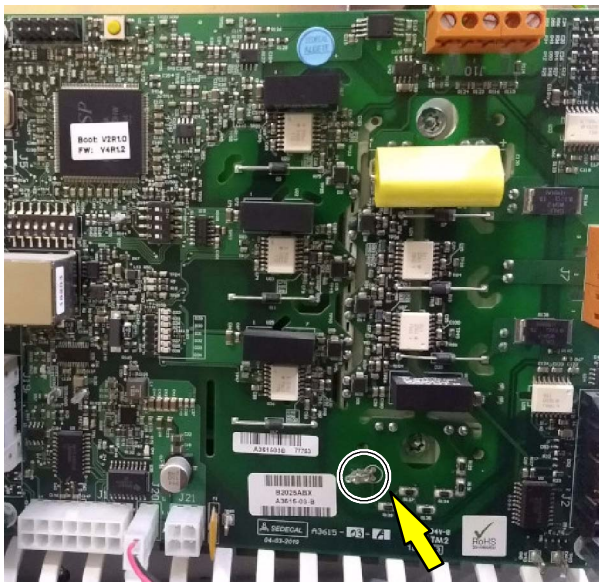


2. With the Unit OFF, in order to get access to the UARC Board, dismount the Right Lateral Cover (A7) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

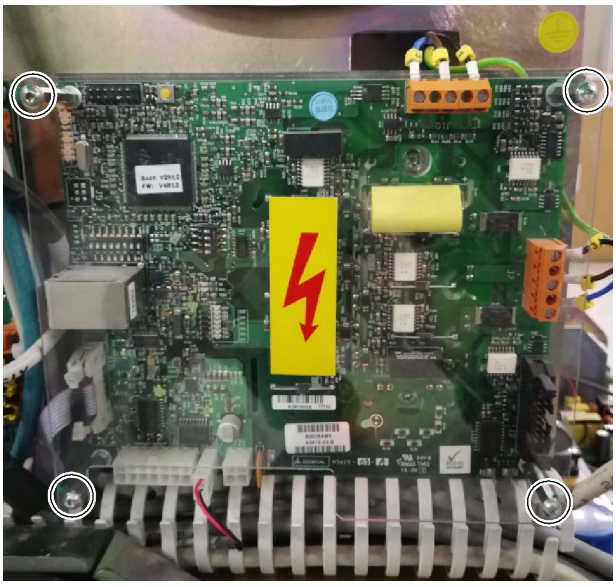


3. Switch OFF the breaker next to the GPIO Trolley Board (A40001-XX).

4. Check the “Hazardous Voltage” neon indicator is completely off and verify the voltage at the connector is 20 VDC or lower. The time required to reach this safety voltage, once the neon indicator is off, is 7 minutes 30 seconds approximately.



5. Dismount the protective cover of the UARC Board by removing the four (4) indicated screws.



6. Disconnect all the connectors and wires from the UARC Board. Ensure these connectors and wires are properly identified to avoid incorrect connections in the new Board.

7. Dismount the UARC Board to be replaced by unscrewing two (2) screws and four (4) turrets, as indicated in the illustration below.

8. Mount the new UARC Board and reconnect all the connectors and wires previously disconnected at step 6.

9. Mount the protective cover of the UARC Board.

10. Switch ON the breaker next to the GPIO Trolley Board.

11. Turn ON the Unit and verify the firmware versions installed in the new UARC Board.

12. In order to avoid compatibility issues, if necessary, upgrade or downgrade the firmware version to match with the version of the original UARC Board.

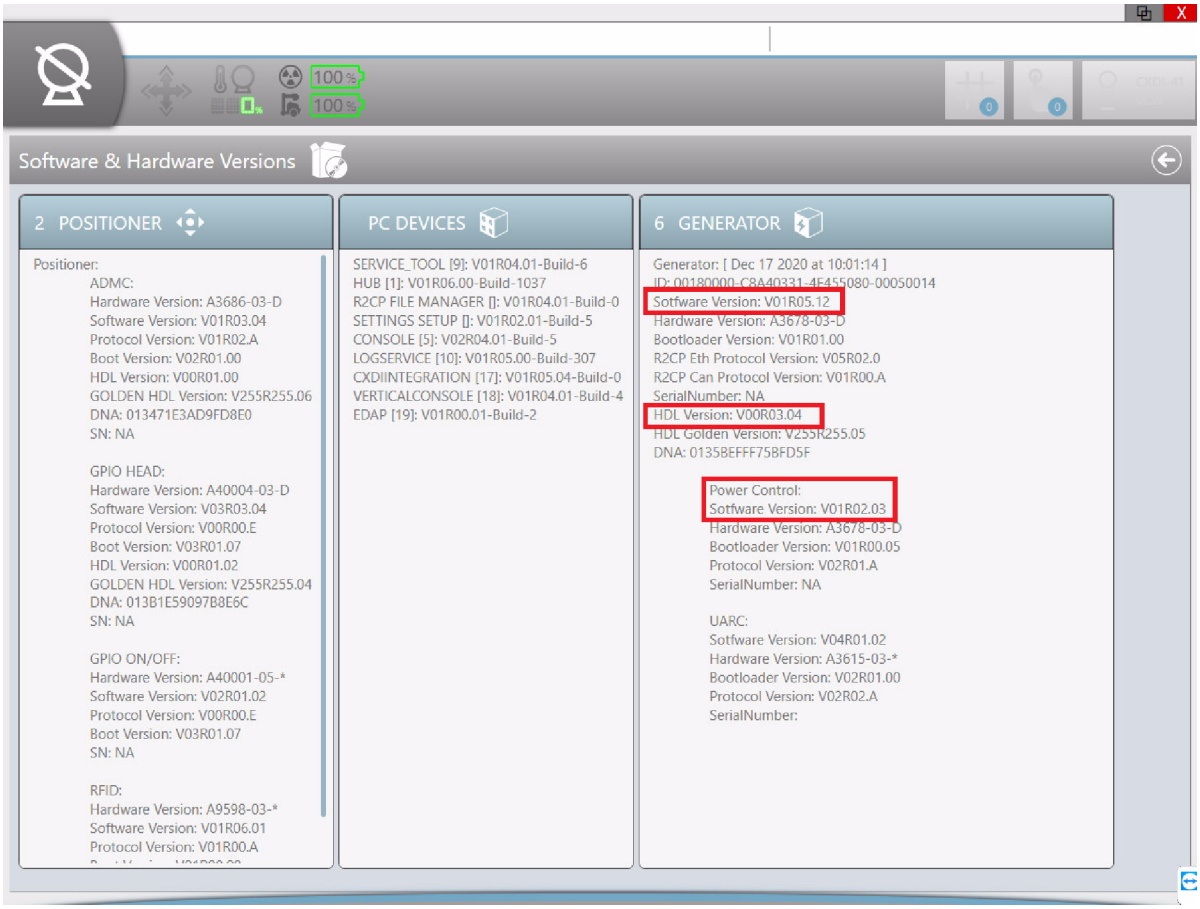
13. Perform a functional test by pressing the Handswitch button half-way (*"Prep"* position) in order to activate the "Prep" order.

2.9 ADVANCED CONTROL BOARD (ACB) REPLACEMENT

1. With the Unit OFF, in order to get access to the Advanced Control Board (ACB) (A3678-XX), dismount the Right Lateral Cover (A7) of the Main Module of the Unit. For detailed information, *refer to Section 1.2.*

2. Turn ON the Unit and start the Service Tool.

3. At the Service Tool, select “Maintenance” and then “Software and Hardware Versions”. In the “Generator” tab, write down the versions installed in the ACB to be replaced.



4. Verify the availability of a valid Backup in the Service Tool by selecting “System Installation”, then “Generator Setup”, then “Restore” and “Site”.

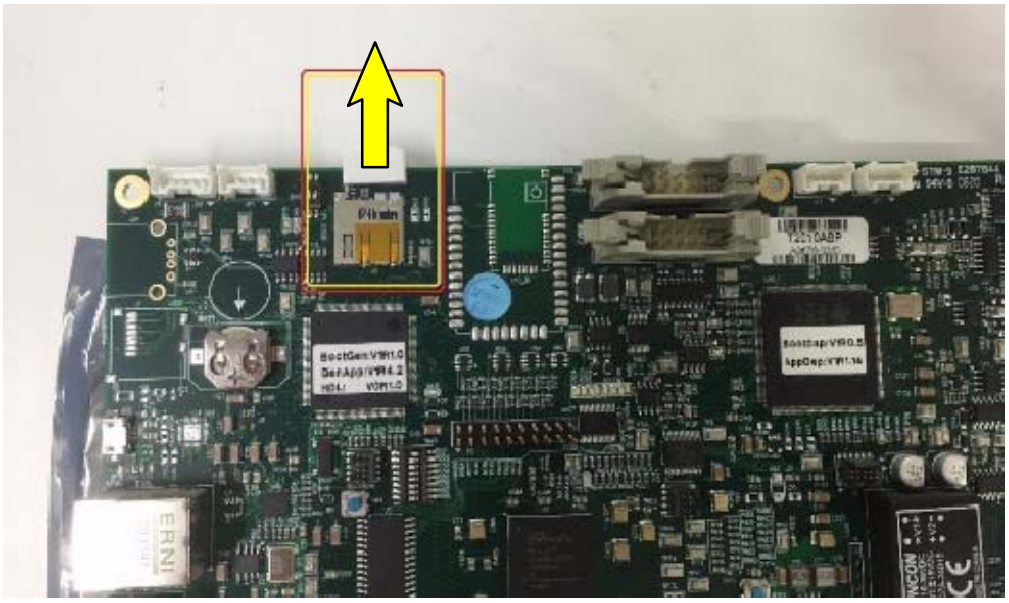
Note ☞ *Do not perform a “Restore”, only verify the presence of a usable backup available. The available backups appear listed with the name format: YYYY-MM-DD hh:mm:ss (Year-Month-Day, Hour-Minute-Second).*

5. Depending on the availability of a valid Backup:

   a. If the Backup is not present or it is unknown: Perform a Backup by selecting “Maintenance”, then “Backup” and “Site”. A new Backup (Service Tool, Positioner and Generator) will be generated with the name format of the current date and time.

   b. If the Backup is already present: Turn OFF the Unit , unplug all the connectors to the ACB, and remove the ACB from the Unit by unscrewing six (6) screws.

6. Remove the License from the original ACB and install it in the new Board.



7. Ensure the mAs jumper between TPS1 and TPS2 is installed in the new ACB. Copy the position of the microswitches from the original to the new Board.

8. Install the new ACB in the Unit and plug all the connectors disconnected in step 5.b.

9. Turn ON the Unit and verify the firmware versions installed in the new ACB as explained in the step 3. In order to avoid compatibility issues, install the same versions recorded in step 3. in case necessary.

10. Perform a Restore of the calibration data:

    - Go to “System Installation”, then “Generator Setup”, then “Restore” and “Site”.

    - Then, select the known Backup identified in the step 4. or the one performed in the step 5.a.

11. At this moment the new ACB contains the calibration data from the board just replaced. The Service Engineer can verify the generator output in terms of kV and mA, or alternatively perform a new calibration:

    a. For verifying the kV and mA with the data from the backup, follow the procedure in the Maintenance chapter of the Service Manual (*refer to section 2.6 Radiographic Parameters*).

    b. For recalibrating the Unit, start the Service Tool and select “System Installation”, then “Generator Setup”, then “Begin Wizard”. *For detailed information, refer to Configuration and Calibration chapter of the Service Manual*.

Note ☞ *Depending on the software package installed in the Unit, the manual calibration of other functionalities may be required. If the message “Collimator apertures have not been calibrated” appears after the replacement of the ACB, proceed with the calibration of the corresponding functionality. For detailed information, refer to Configuration and Calibration chapter of the Service Manual.*

12. Perform a Backup as explained in the step 5.a.

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SECTION 3 ARM PROCEDURES

3.1 TELESCOPIC ARM REPLACEMENT

3.1.1 TELESCOPIC ARM REPLACEMENT WITH 3-SECTION ARM

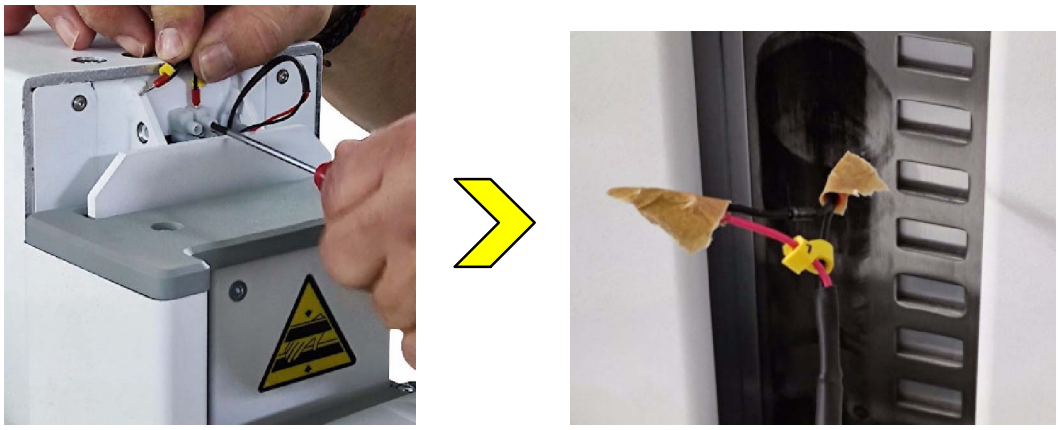
3.1.1.1 TELESCOPIC ARM DISASSEMBLY

Note ☞ *It is recommended to dismount the Telescopic Arm of the Unit with a workforce of two people.*

1. Remove the Curved-Top Cover (A5) and the following Monoblock covers: Lateral Covers (B1), Upper Cover (B2) and Lower Back Cover (B4). For more information, *refer to Section 1.2.*

2. Turn ON the Unit for raising the Telescopic Arm up to the top of the Column Carriage. Then, the Service Engineer can reach easily the Cable Cover Arm Mobile in order to dismount this cover by removing the two (2) screws.

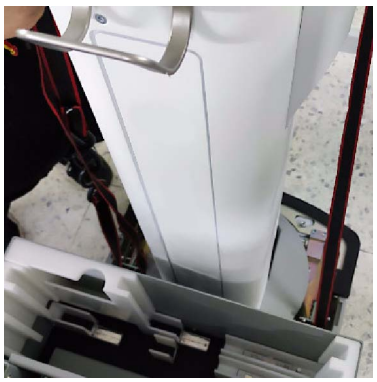
3. Disconnect the two (2) wires from the connector of the Telescopic Arm Brake. Tape the wires ends as a safety measure.



4. Rotate the Head-Assembly 180º (Collimator pointing upwards) and lower carefully the Telescopic Arm halfway down until the Head-Assembly is supported on the workbench (the movement section of the Column must always be retracted).

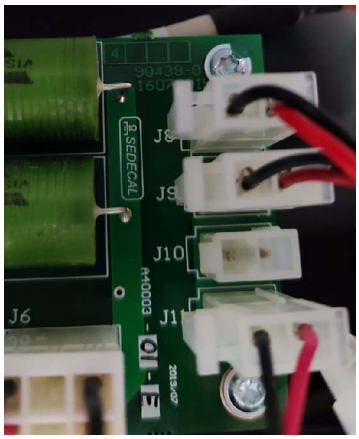
5. Turn OFF the Unit.

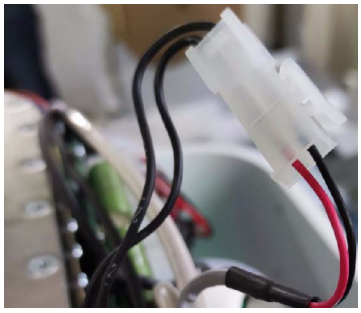
6. Fix a strap around the Column to secure it when the spring comes into action. A protective element is placed on the top cover of the Column to protect it from scratches or impacts, and the strap is placed on top. Then, pass the strap under the base of the chassis (it is not necessary to remove the base cover, as it is inserted inside the cover).

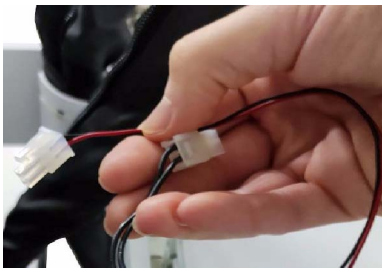


7. Remove the screws to dismount the Press-Cable Kit Mobile and keep the Cable Conduit hanging next to the cable of the two Telescopic Arm Brake connections (this cable is routed under the Press-Cable Kit Mobile and enters the Cable Conduit through a metal eyelet).

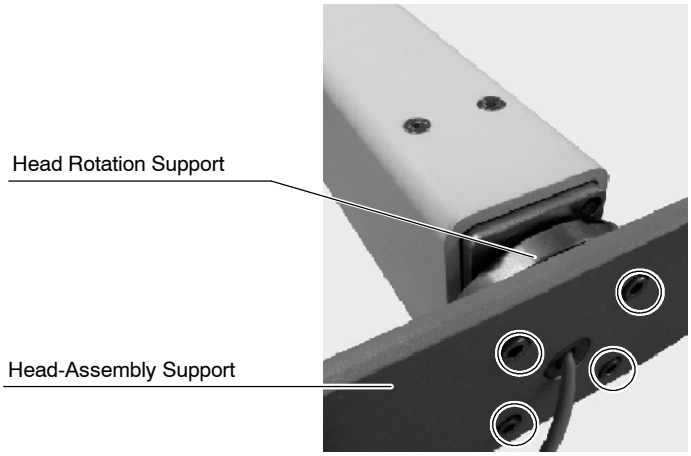
8. Disconnect the two (2) wires leading from the Head Rotation Support area to the connector J10 on the Monoblock Buffer Board (A40003-XX) and to the Telescopic Brake connector (J31) on the GPIO Head Board (A40004-XX).







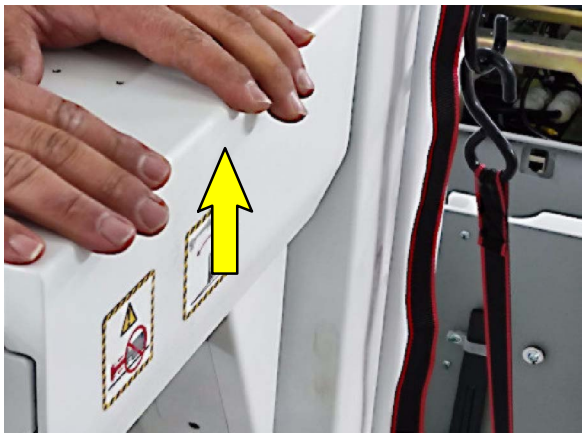
9. Remove the four (4) screws placed around the Head Rotation Support (these screws fix the Telescopic Arm with the Head-Assembly Support).



10. After removing the screws, carefully remove the Head-Assembly from the Telescopic Arm in order to avoid any friction against the Head Rotation Support wires.

WARNING

HOLD THE TELESCOPIC ARM AND LET IT GRADUALLY RISE TO ITS HIGHEST POINT WITHOUT RELEASING IT.

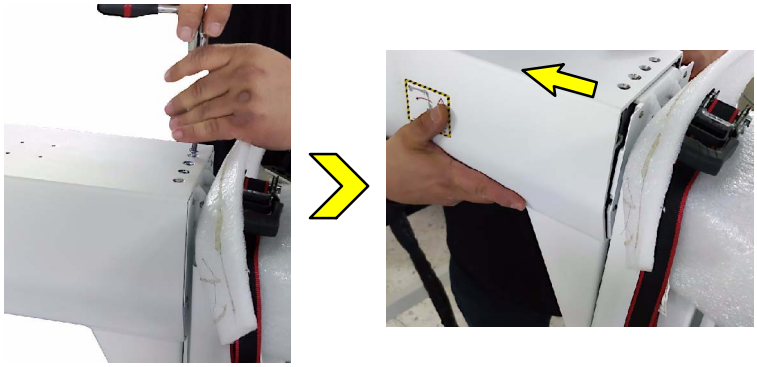


Note ☞ *Two people are required at this step, one Technician removes the Head-Assembly and the other one holds the Telescopic Arm.*

11. Remove the two (2) screws which fix the lower cap placed at the wedge of the Telescopic Arm next to the Column.

12. Once the lower cap is removed, the Service Engineer will remove the three (3) screws which are placed inside the hollow (two (2) screws on the left and one (1) on the right). These screws fix the Telescopic Arm to the Column Carriage.

13. Remove the four (4) screws placed at the upper area of the Telescopic Arm, and remove the Arm.



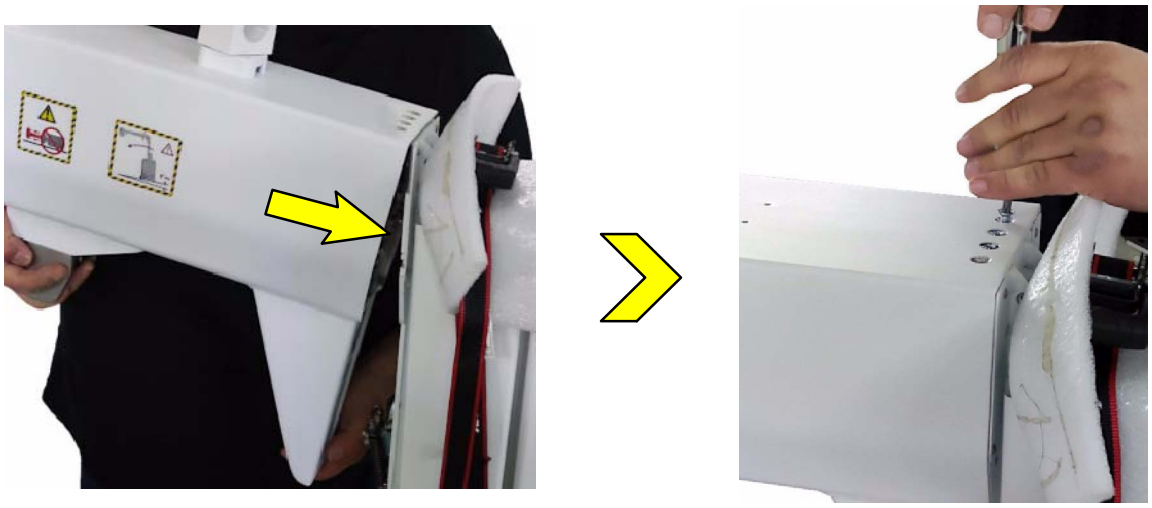
3.1.1.2 TELESCOPIC ARM ASSEMBLY

Note ☞ *Impregnate the thread of all the screws with glue Loctite 243 (or similar) in order to ensure the fixation of all the bolted joints.*

1. Continue with this procedure after Telescopic Arm Disassembly.

2. Place the new Telescopic Arm on the Column Carriage, and tighten slightly the four (4) screws placed at the upper area of the Telescopic Arm.

Note ☞ *At this step, it is important to highlight that the screws are not tightened completely.*



3. Remove the two (2) screws which fix the lower cap placed at the wedge of the Telescopic Arm.

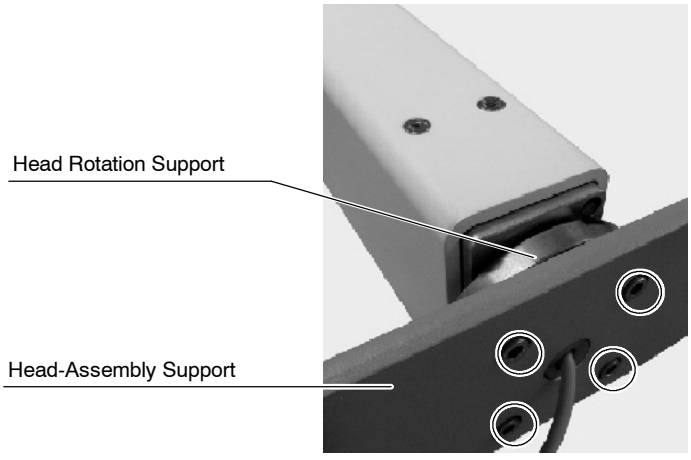
4. Once the lower cap is removed, gain access inside the hollow in order to install the three (3) screws (two (2) screws on the left and one (1) screw on the right). These screws fix the Telescopic Arm to the Column Carriage.

5. Mount the lower cap and fix it with the two (2) screws.

6. Tighten fully the four (4) screws placed at the upper area of the Telescopic Arm.

7. Push the Telescopic Arm down until reaching the same level that the Head-Assembly placed on the workbench.

8. Assemble the end of the Telescopic Arm into the Head-Assembly Support. Then, fix the assembly with the four (4) screws.



Note ☞ *It is recommended a workforce of two people to perform the steps 8 and 9 in order to ensure the coupling.*

9. Screw the lower part of the Press-Cable Kit Mobile, which holds the Cable Conduit, into the upper area of the Telescopic Arm.

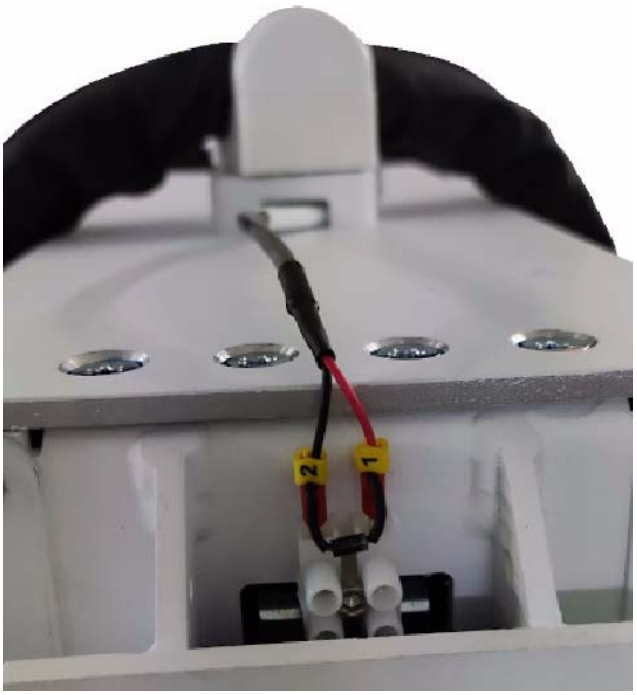
10. Place the Cable Conduit on the lower part of the Press-Cable Kit Mobile. Then, screw the upper part of the Press-Cable Kit Mobile into the lower part in order to hold the Cable Conduit.

Note ☞ *The metal eyelet located at the Cable Conduit should be practically in contact with the Press-Cable Kit Mobile.*

11. Connect the two (2) wires leading from the Head Rotation Support area to the connector J10 on the Monoblock Buffer Board (A40003-XX) and to the Telescopic Brake connector (J31) on the GPIO Head Board (A40004-XX).

12. Switch on the Unit, release the strap, and raise manually the Telescopic Arm up to the top of the Column Carriage.

13. Connect the two (2) wires, which pass through the metal eyelet of the Cable Conduit, to the connector of the Telescopic Arm Brake.



14. Mount the Cable Cover Arm Mobile and fix it with the screws (below this cover are the wires connected in the previous step).

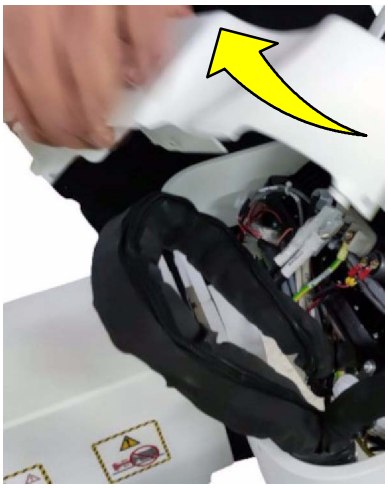
15. Finally, mount the Curved-Top Cover and the following Monoblock covers: Lateral Covers, Upper Cover and Lower Back Cover.

3.1.2 TELESCOPIC ARM REPLACEMENT WITH 4-SECTION ARM

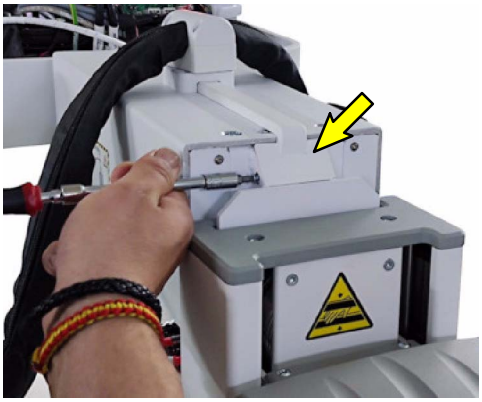
3.1.2.1 TELESCOPIC ARM DISASSEMBLY

Note ☞ *It is recommended to dismount the Telescopic Arm of the Unit with a workforce of two people.*

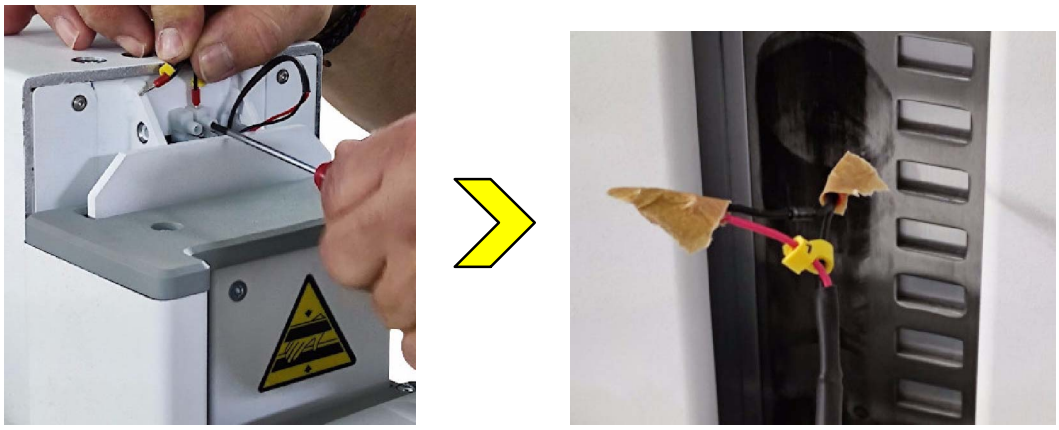
1. Remove the Curved-Top Cover (A5) and the following Monoblock covers: Lateral Covers (B1), Upper Cover (B2) and Lower Back Cover (B4). For more information, *refer to Section 1.2.*



2. Turn ON the Unit for raising the Telescopic Arm up to the top of the Column Carriage. Then, the Service Engineer can reach easily the Cable Cover Arm Mobile in order to dismount this cover by removing the two (2) screws.



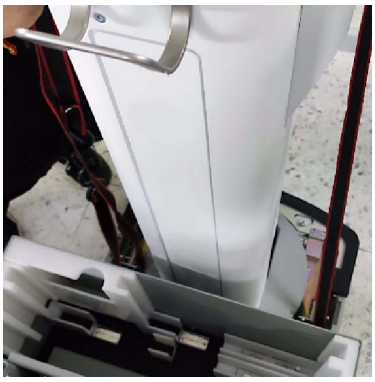
3. Disconnect the two (2) wires from the connector of the Telescopic Arm Brake. Tape the wires ends as a safety measure.



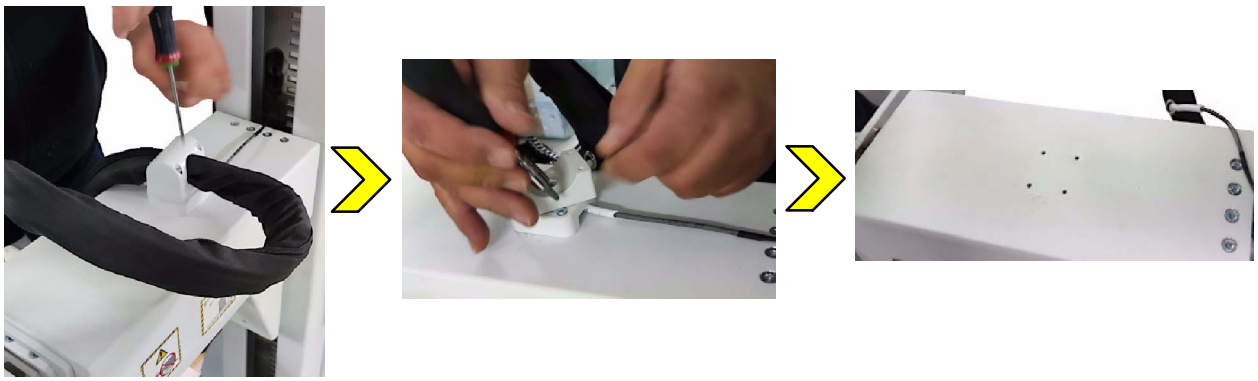
4. Rotate the Head-Assembly 180º (Collimator pointing upwards) and lower carefully the Telescopic Arm halfway down until the Head-Assembly is supported on the workbench (the movement section of the Column must always be retracted).

5. Turn OFF the Unit.

6. Fix a strap around the Column to secure it when the spring comes into action. A protective element is placed on the top cover of the Column to protect it from scratches or impacts, and the strap is placed on top. Then, pass the strap under the base of the chassis (it is not necessary to remove the base cover, as it is inserted inside the cover).

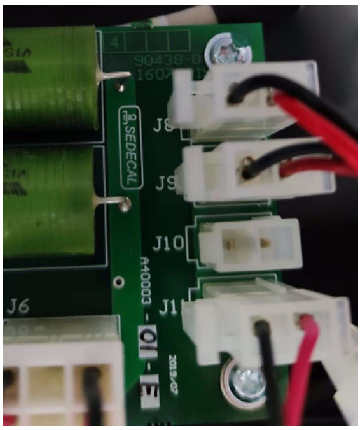


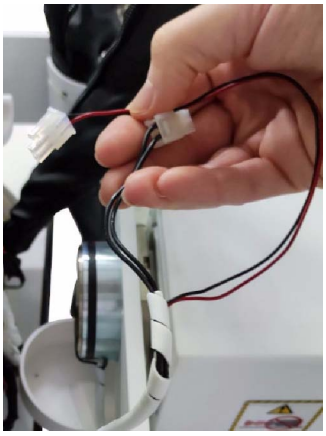
7. Remove the screws to dismount the Press-Cable Kit Mobile and keep the Cable Conduit hanging next to the cable of the two Telescopic Arm Brake connections (this cable is routed under the Press-Cable Kit Mobile and enters the Cable Conduit through a metal eyelet).



8. Remove the four (4) screws which fix the Head Rotation Support Cover of the Head-Assembly. This cover can be kept hanging from the cable at a distance that allows work to continue.

9. Disconnect the two (2) wires leading from the Head Rotation Support area to the connector J10 on the Monoblock Buffer Board (A40003-XX) and to the Telescopic Brake connector (J31) on the GPIO Head Board (A40004-XX).



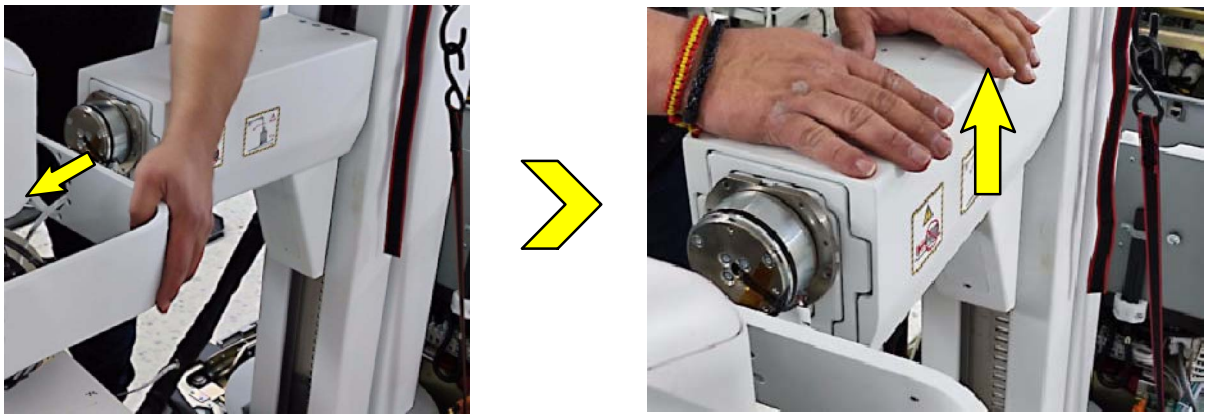


10. Once the Head Rotation Support Cover is dismounted, remove the eight (8) screws placed around the Head Rotation Support (these screws fix the Telescopic Arm with the Head-Assembly).

11. After removing the screws, carefully remove the Head-Assembly from the Telescopic Arm in order to avoid any friction against the Head Rotation Support wires.

WARNING

HOLD THE TELESCOPIC ARM AND LET IT GRADUALLY RISE TO ITS HIGHEST POINT WITHOUT RELEASING IT.

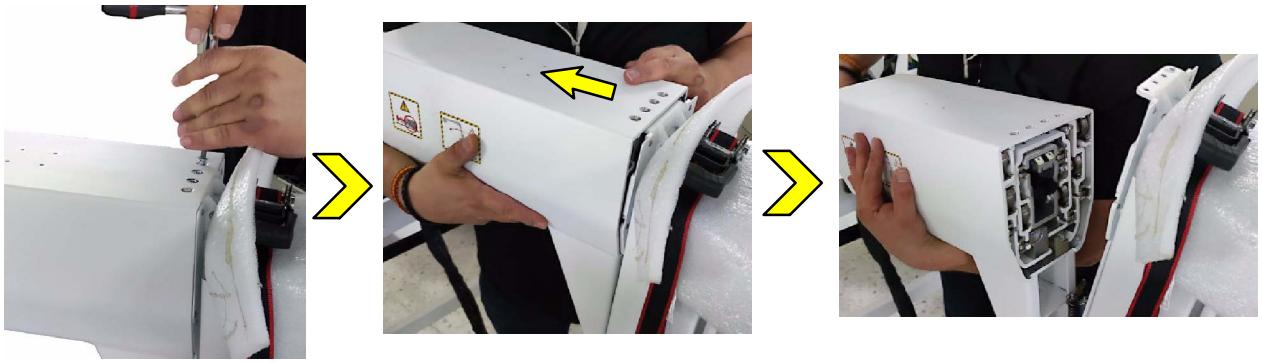


Note ☞ *Two people are required at this step, one Technician removes the Head-Assembly and the other one holds the Telescopic Arm.*

12. Remove the two (2) screws which fix the lower cap placed at the wedge of the Telescopic Arm next to the Column.

13. Once the lower cap is removed, the Service Engineer will remove the three (3) screws which are placed inside the hollow (two (2) screws on the left and one (1) on the right). These screws fix the Telescopic Arm to the Column Carriage.

14. Remove the four (4) screws placed at the upper area of the Telescopic Arm, and remove the Arm.



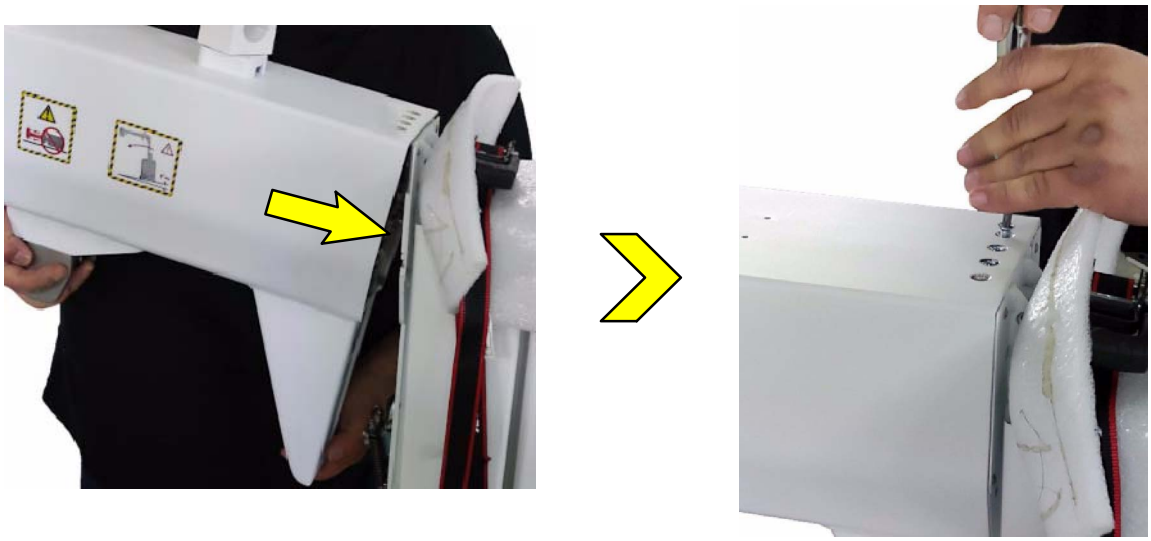
3.1.2.2 TELESCOPIC ARM ASSEMBLY

Note ☞ *Impregnate the thread of all the screws with glue Loctite 243 (or similar) in order to ensure the fixation of all the bolted joints.*

1. Continue with this procedure after Telescopic Arm Disassembly.

2. Place the new Telescopic Arm on the Column Carriage, and tighten slightly the four (4) screws placed at the upper area of the Telescopic Arm.

Note ☞ *At this step, it is important to highlight that the screws are not tightened completely.*



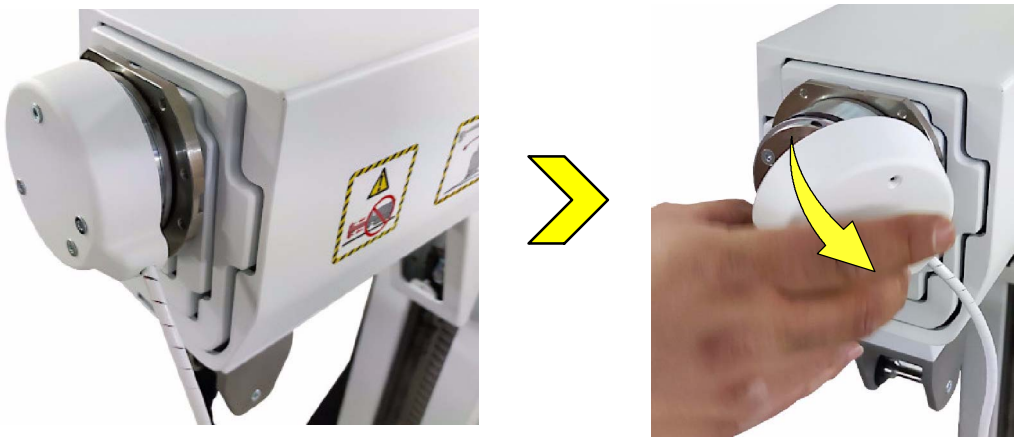
3. Remove the two (2) screws which fix the lower cap placed at the wedge of the Telescopic Arm.

4. Once the lower cap is removed, gain access inside the hollow in order to install the three (3) screws (two (2) screws on the left and one (1) screw on the right). These screws fix the Telescopic Arm to the Column Carriage.

5. Mount the lower cap and fix it with the two (2) screws.

6. Tighten fully the four (4) screws placed at the upper area of the Telescopic Arm.

7. Remove the four (4) screws which fix the Head Rotation Support Cover of the Head-Assembly. This cover can be kept hanging from the cable at a distance that allows work to continue.



8. Push the Telescopic Arm down until reaching the same level that the Head-Assembly placed on the workbench.

9. Assemble the end of the Telescopic Arm (once the Head Rotation Support Cover has been removed) into the Head-Assembly Support. Then, fix the assembly with the eight (8) screws.

Note ☞ *It is recommended a workforce of two people to perform the steps 8 and 9 in order to ensure the coupling.*

10. Screw the lower part of the Press-Cable Kit Mobile, which holds the Cable Conduit, into the upper area of the Telescopic Arm.

11. Place the Cable Conduit on the lower part of the Press-Cable Kit Mobile. Then, screw the upper part of the Press-Cable Kit Mobile into the lower part in order to hold the Cable Conduit.

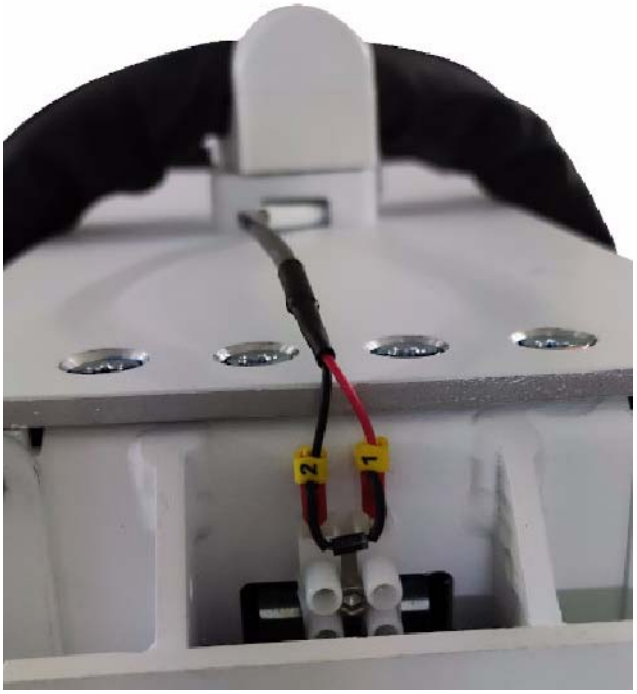
Note ☞ *The metal eyelet located at the Cable Conduit should be practically in contact with the Press-Cable Kit Mobile.*

12. Mount the Head Rotation Support Cover and fix it with the four (4) screws.

13. Connect the two (2) wires leading from the Head Rotation Support area to the connector J10 on the Monoblock Buffer Board (A40003-XX) and to the Telescopic Brake connector (J31) on the GPIO Head Board (A40004-XX).

14. Switch on the Unit, release the strap, and raise manually the Telescopic Arm up to the top of the Column Carriage.

15. Connect the two (2) wires, which pass through the metal eyelet of the Cable Conduit, to the connector of the Telescopic Arm Brake.



16. Mount the Cable Cover Arm Mobile and fix it with the screws (below this cover are the wires connected in the previous step).

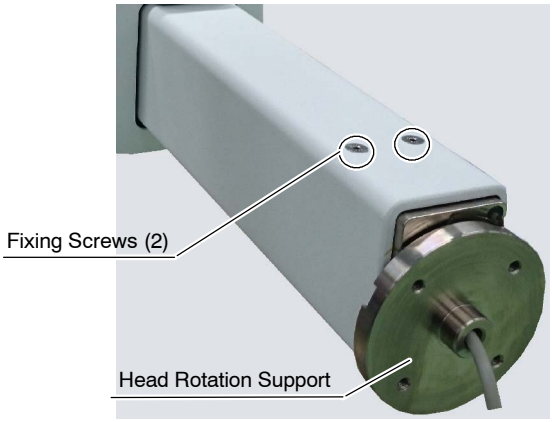
17. Finally, mount the Curved-Top Cover and the following Monoblock covers: Lateral Covers, Upper Cover and Lower Back Cover.

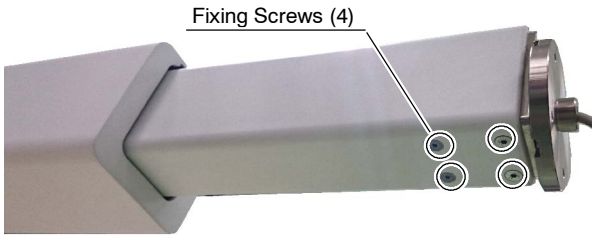
3.2 HEAD ROTATION SUPPORT REPLACEMENT

3.2.1 HEAD ROTATION SUPPORT REPLACEMENT WITH 3-SECTION ARM

1. Follow steps 1. to 10. from *Section 3.1.1.1 Telescopic Arm Disassembly* to remove the Monoblock Covers and dismount the Head-Assembly.

2. Extend the inner section of the Telescopic Arm, in order to remove the six (6) screws (two (2) screws on the upper surface and four (4) screws on the lower surface), as indicated in the illustration below.





3. Extract the Head Rotation Support, passing the wires through it, and replace this Support with the new one.

4. Assemble the new Head Rotation Support following the reverse process.

5. Finally, mount the Monoblock Covers.

3.2.2 HEAD ROTATION SUPPORT REPLACEMENT WITH 4-SECTION ARM

1. Follow steps 1. to 11. from *Section 3.1.2.1 Telescopic Arm Disassembly* to remove the Monoblock Covers and dismount the Head-Assembly.

2. Extend the inner section of the Telescopic Arm, in order to remove the six (6) screws (four (4) screws on the upper surface and two (2) screws on the lower surface), as indicated in the illustration below.

3. Extract the Head Rotation Support and replace it with the new one.

4. Assemble the new Head Rotation Support following the reverse process.

5. Finally, mount the Monoblock Covers.

SECTION 4 HEAD-ASSEMBLY PROCEDURES

4.1 COLLIMATOR REPLACEMENT

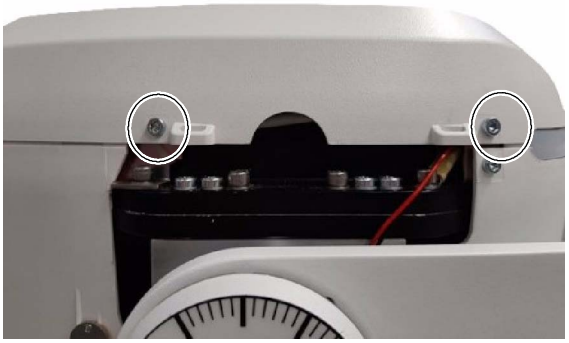
1. Switch OFF the Unit.

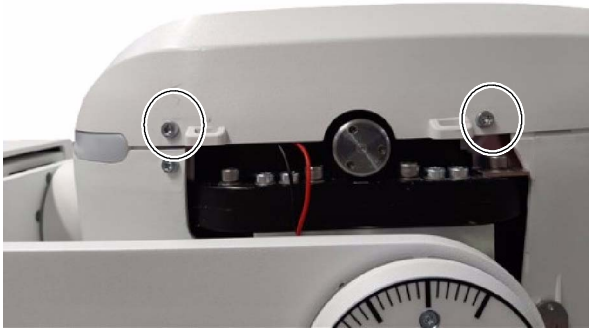
2. Extend the Telescopic Arm and place the Head-Assembly to be able to remove the Monoblock Covers.

Note ☞ *For detailed information about Covers Removal, refer to Section 1.2.*

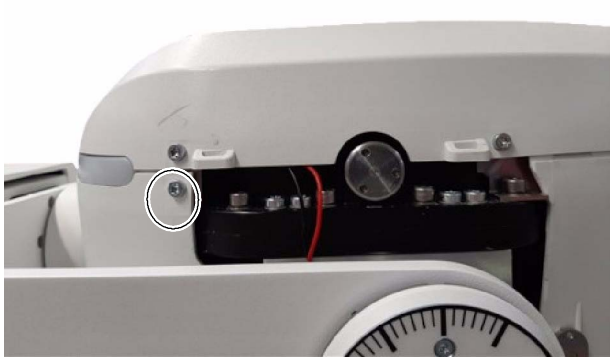
3. Remove the Monoblock Lateral Covers (B1).

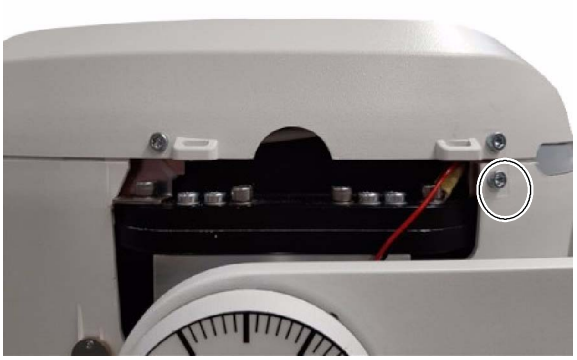
4. Remove the Monoblock Upper Cover (B2).

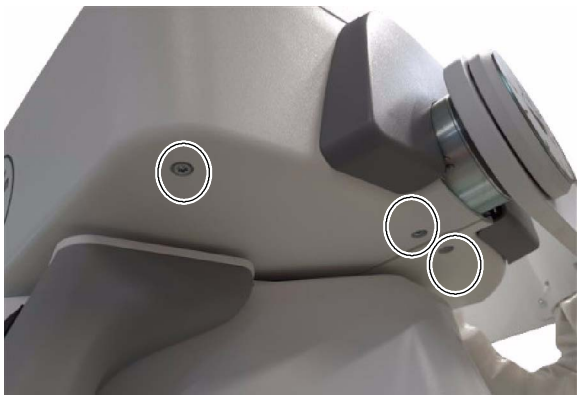




5. Remove the Monoblock Lower Front Cover (B3) and the Monoblock Lower Back Cover (B4).







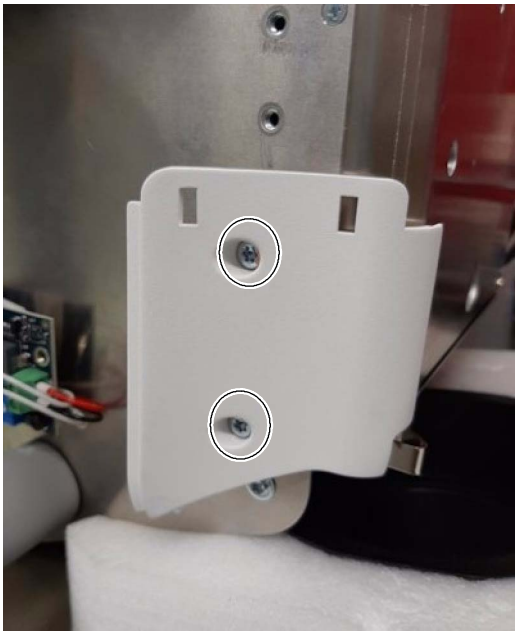
6. Rotate the Head-Assembly 180º (Collimator pointing upwards) and lower carefully the Telescopic Arm until the Head-Assembly is supported on the workbench.

7. Hold the Telescopic Arm by passing a strap under the frame of the Unit and above the Telescopic Arm.

8. Remove the Collimator Covers. For detailed information about the process, *refer to Section 1.2 Covers Removal*.

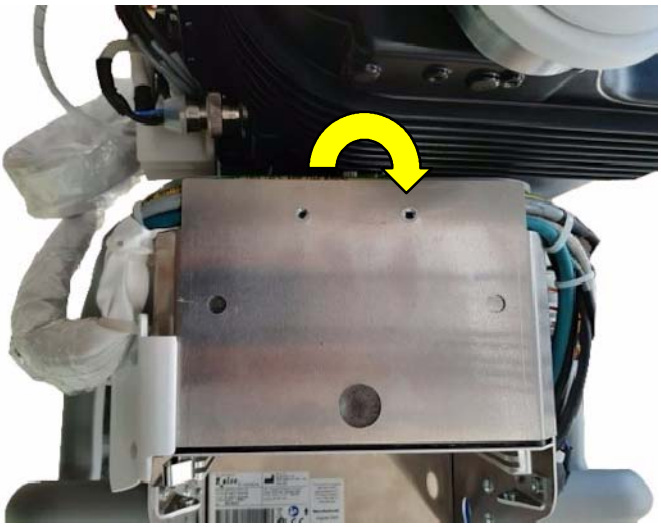
9. Cut the plastic tie wraps which fix the cables.

10. Remove the Cable Outlet Cover by removing the two (2) fixing screws.

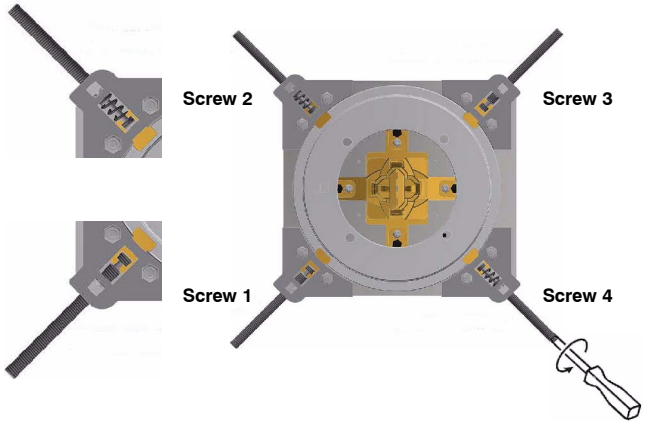


11. Unplug the connectors J1, J3, J9, J31, J12, J5, J6, J8, J20, J15 and GND on the GPIO Head Board (A40004-XX).

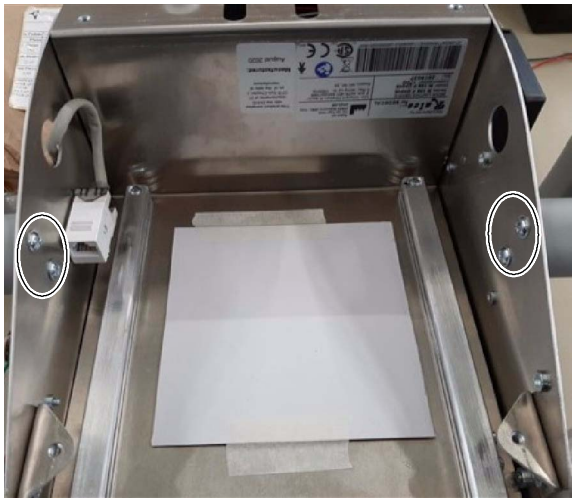
12. Pull the wires out of the Collimator through the slot, one at a time, and leave them hanging from the Monoblock.

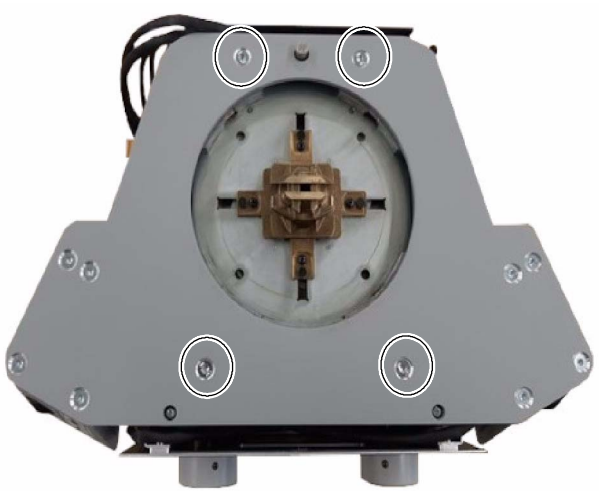


13. Remove the Collimator by loosening the four (4) fixing screws, and place it on a workbench.

COLLIMATOR MOUNTING BRACKET TYPE B	
Collimator Mounting Bracket Type B (with 2 Fixing Screws with spring and 2 Fixing Screws without spring)	

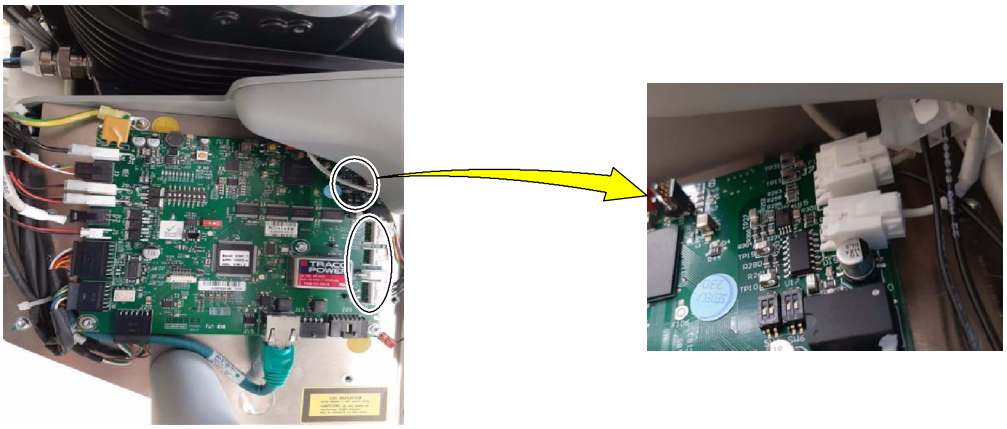
14. Remove the four (4) side screws and the four (4) top screws.





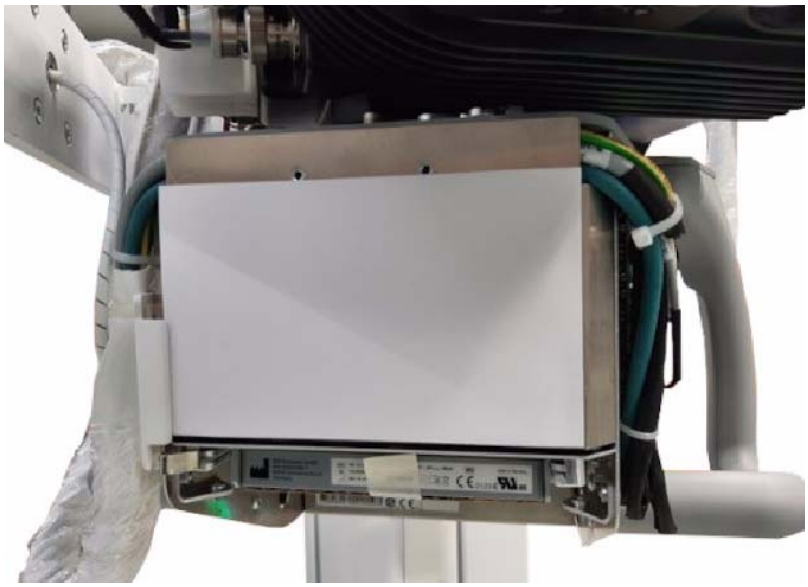
15. Slide the Handles Fixing Plate towards the front of the Collimator by lifting it slightly to release the Collimator Rotation Stop.

16. Remove the GPIO Head Board by unplugging connectors J7, J4, J10 and J16, and removing the three (3) fixing screws.



17. Remove the Handles Fixing Plate from the Collimator.

18. Fix the overlay on the rear side of the new Collimator.



19. Replace the Collimator by reversing the whole process described above, considering the tightening of the screws detailed below.

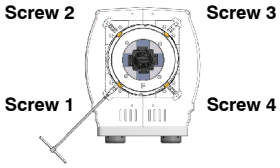
INSTALLATION

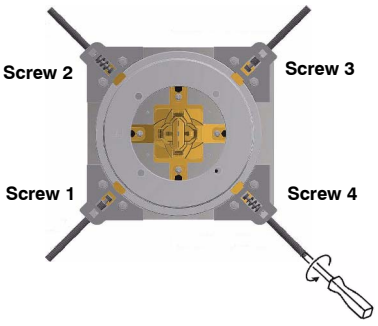
The installation of the Collimator with the Mounting Bracket type B and Flange type B1 with Metal Stopping Plate needs to be made as follows:

- Install the Collimator on the Flange: while one person holds the weight of the Collimator, the other tightens the Fixing Screws (x4) located at the four corners that fix the Collimator to the Flange.

- With the Tabs (Fixing Screws) fully retracted, tight the four Screws:
  - Screws 1 and 3 up to the end stroke (at least 7 turns on each one) applying a Torque of 0.45 Nm.
  - Screws 2 and 4 (with integrated adjustable spring), 5 $^{1}/_{2}$ turns exactly.
    (If Screws 2 and 4 are tightened more than 5$^{1}/_{2}$ - 6 turns, the Collimator will not rotate).

- Check the installation of the Collimator.





Screws 1, 3 = 7 turns
Screws 2, 4 = 5 $^{1}/_{2}$ turns

20. Switch ON the Unit.

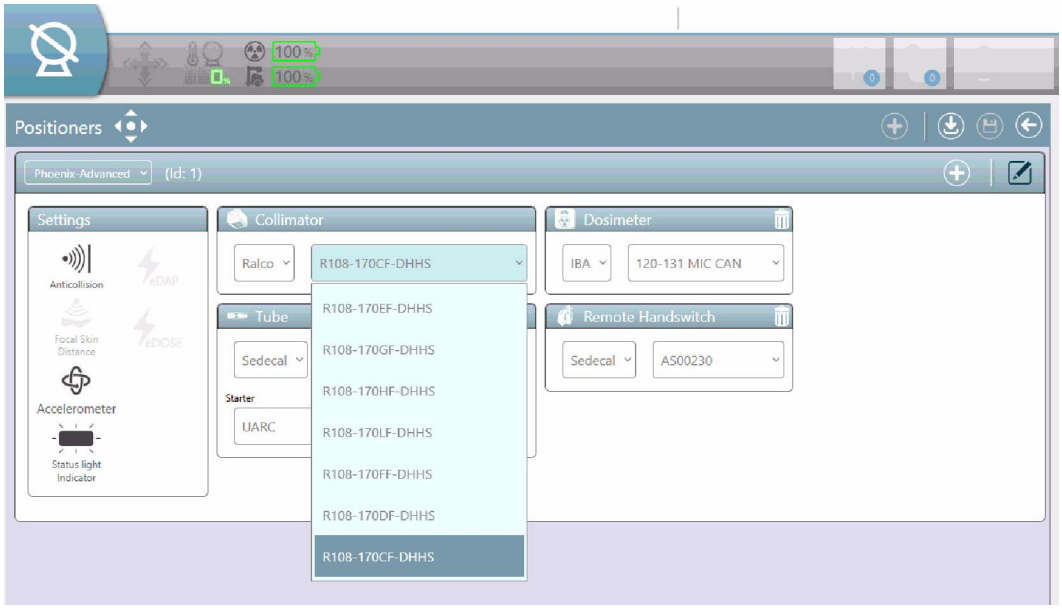
21. Exit from the Acquisition software in order to access to the operating system desktop.

22. Launch the Service Tool software and perform the following steps:

    a. Access to “System Configuration” and select “Positioners”.

    b. From the drop-down list of the “Collimator” tab, select the model of the new Collimator installed.

    c. Save the change.



Note ☞ *For further information on using the Service Tool application, refer to the Configuration & Calibration Chapter of the Service Manual.*

23. Exit from the Service Tool application.

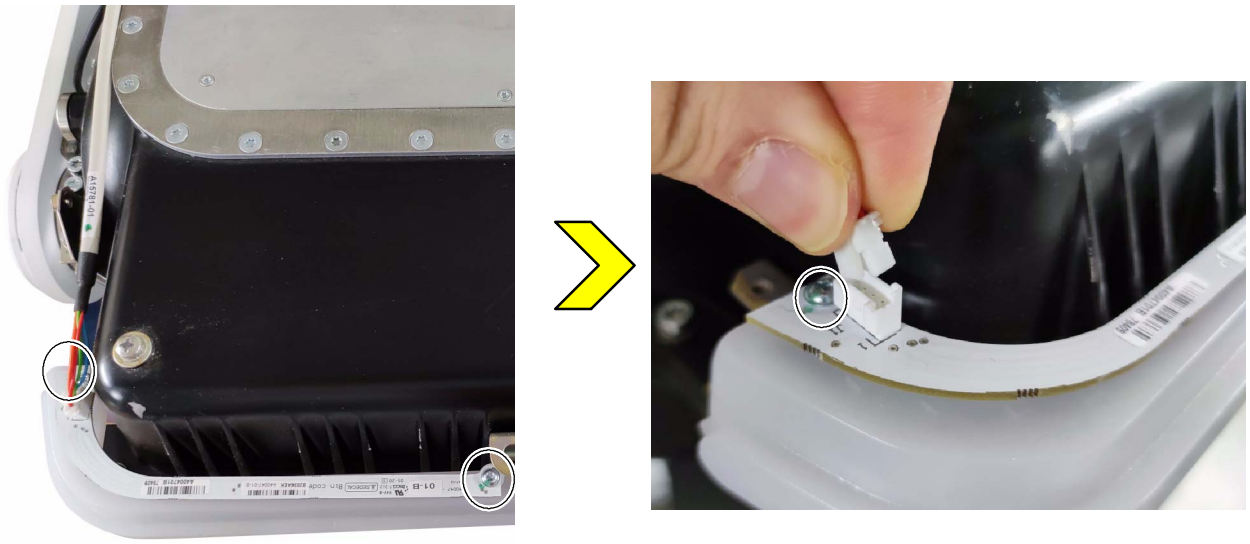
24. Switch OFF the Unit.

25. Finally, mount the Collimator Covers and the Monoblock Covers.

4.2 HEAD-ASSEMBLY LEDS REPLACEMENT

1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

2. For replacing the Front Left LED Stripe (A40047-01), disconnect the connector J1 and remove the two (2) screws indicated in the illustration below.



3. For replacing the Front Right LED Stripe (A40047-02), disconnect the connector J1 and remove the two (2) screws indicated in the illustration below.

4. For replacing the Back Left LED Stripe (A40048-XX), disconnect the connectors J1, J2 and J3, and remove the two (2) screws indicated in the illustration below.

5. For replacing the Back Right LED Stripe (A40048-XX), disconnect the connectors J1, J2 and J3, and remove the two (2) screws indicated in the illustration below.

Note ☞ *For replacing the LED Stripe Cover (A526501-XX), it is necessary to remove before the corresponding LED Stripe.*

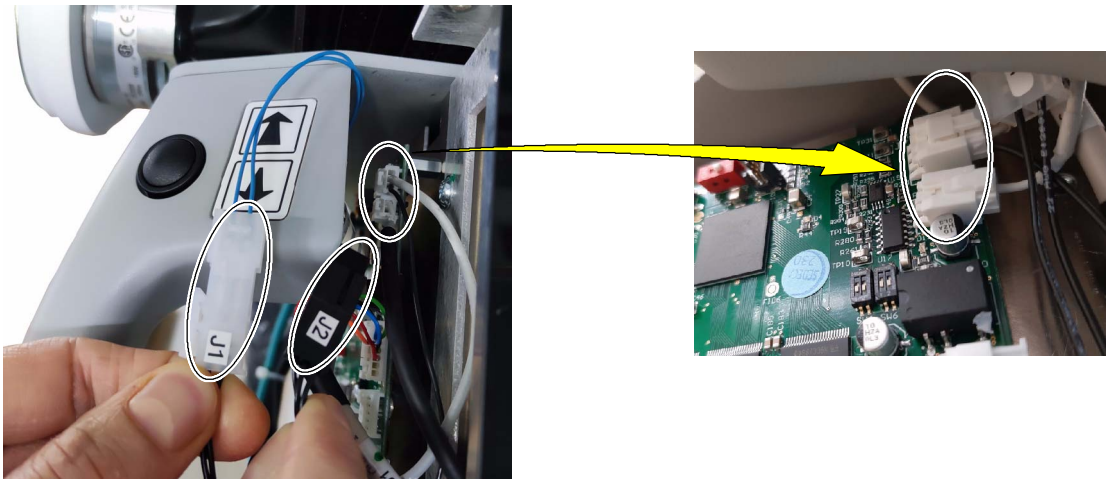
6. Finally, once the corresponding LED Stripe or LED Stripe Cover has been replaced by a new one following the reverse process, mount the Monoblock Covers.

4.3 HEAD-ASSEMBLY HANDGRIPS REPLACEMENT

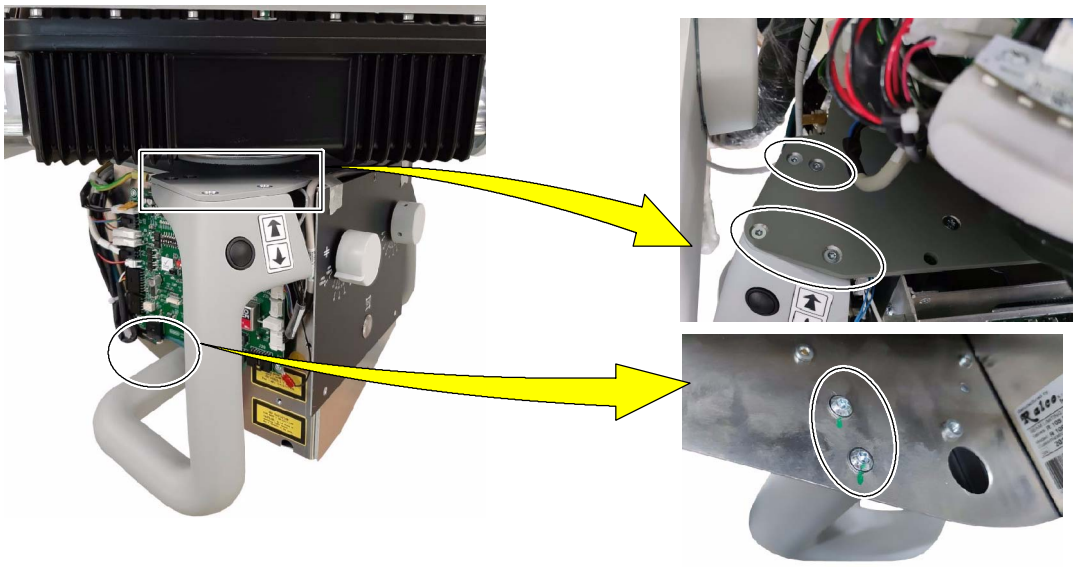
1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

2. Remove the Collimator Covers. For detailed information about the process, *refer to Section 1.2 Covers Removal*.

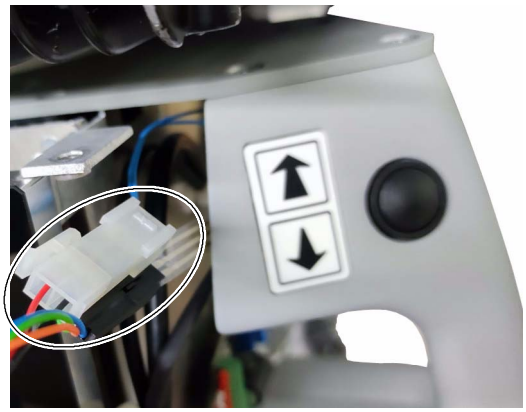
3. For replacing the left handgrip (frontal collimator view), disconnect the connectors J1 and J2, and the connectors J4 and J7 on the GPIO Head Board (A40004-XX).



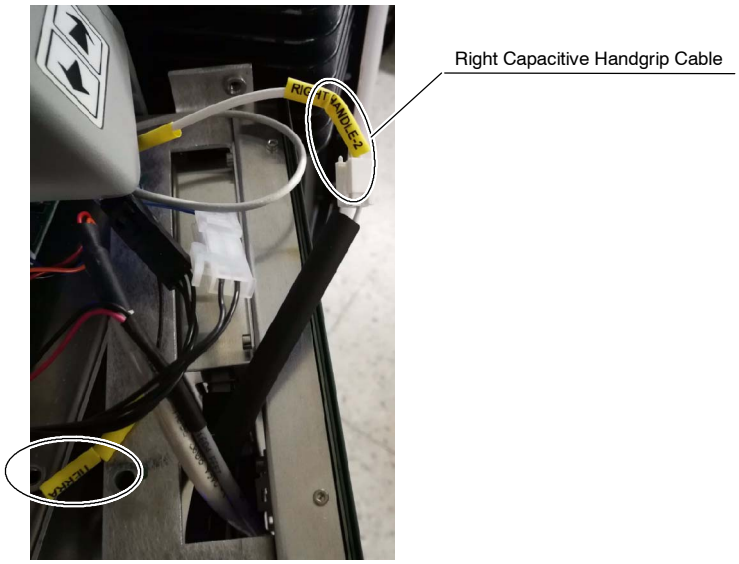
4. Once the previous connectors have been disconnected, remove six (6) screws (four (4) screws on the upper part and two (2) screws on the lower part) for dismounting the left handgrip, as indicated in the illustration below.



5. For replacing the right handgrip (frontal collimator view), disconnect the connectors J3 and J4, and the connector J4 on the GPIO Head Board. Then, remove the six (6) screws as done in the previous step.



Note ☞ *For 4-Section Arm only: In order to disconnect the cable which gives the capacitive function to the right handgrip (connector J4 on the GPIO Head Board), it is recommended to remove the two indicated screws on the Head-Assembly screen frame for a better access.*



6. Assemble the new handgrips following the reverse process.

7. Finally, mount the Collimator Covers and the Monoblock Covers.

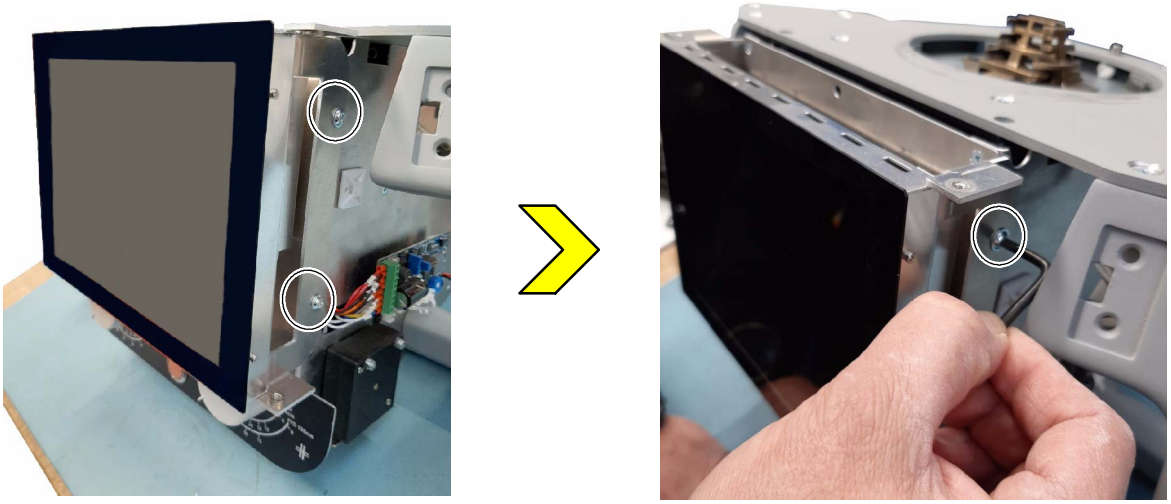
4.4 HEAD-ASSEMBLY SCREEN REPLACEMENT

4-SECTION ARM ONLY

1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

2. Remove the Collimator Covers. For detailed information about the process, *refer to Section 1.2 Covers Removal*.

3. Remove the four (4) fixing screws (two (2) on each side), as indicated in the illustration below.



4. Disconnect the following connectors: 12V DC, HDMI, INTERF T.

5. Remove the four (4) fixing screws as indicated in the illustration below, in order to remove the screen.

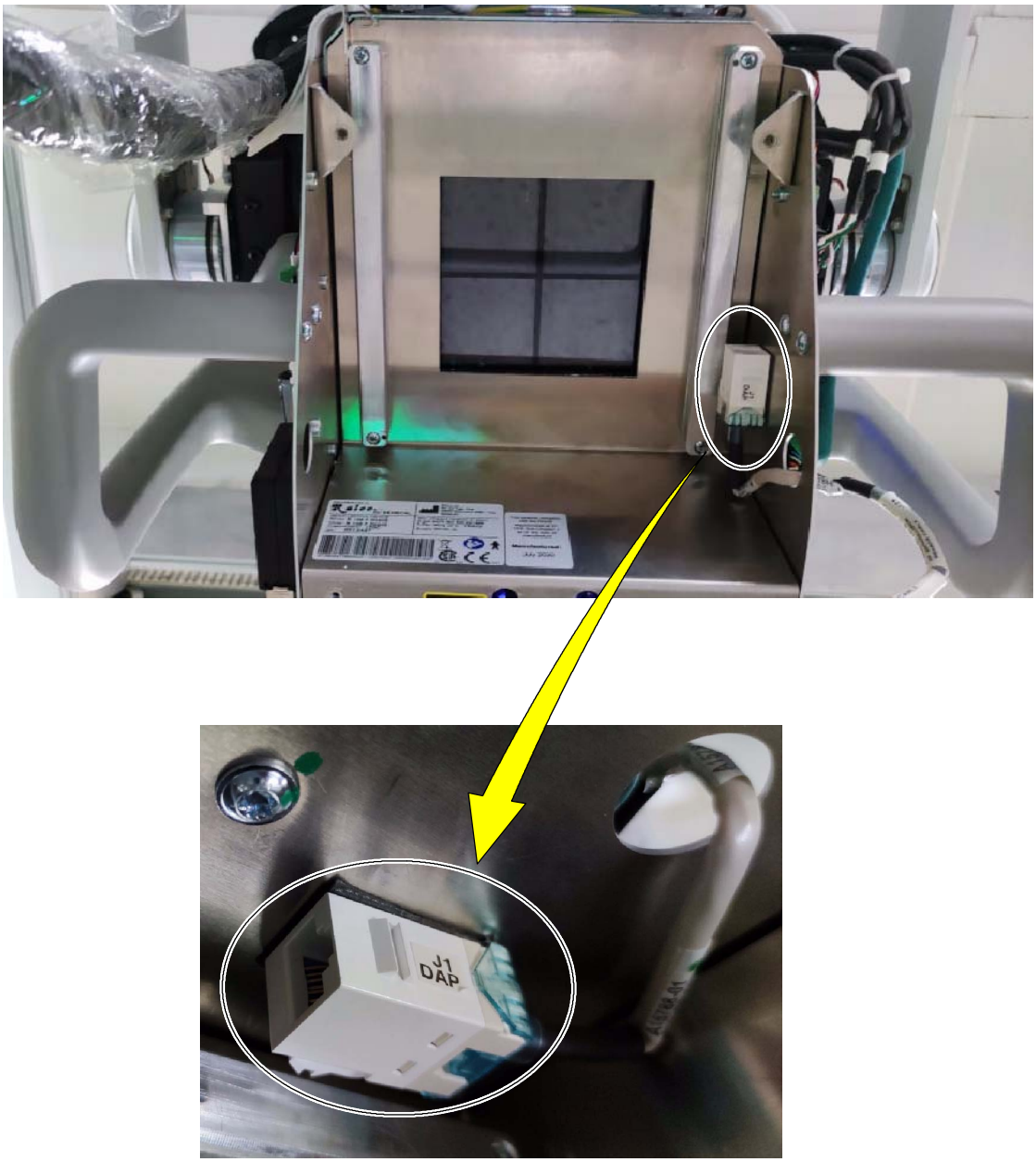
6. Replace the screen and assemble the new one following the reverse process.

7. Finally, mount the Collimator Covers and the Monoblock Covers.

4.5 DAP REPLACEMENT

1. Remove the Collimator Covers. For detailed information about the process, *refer to Section 1.2 Covers Removal*.

2. Replace the DAP by disconnecting the connector J1 DAP.



3. Finally, once the DAP has been replaced by a new one following the reverse process and mount the Collimator Covers.

4.6 MONOBLOCK SUPPORT REPLACEMENT

4-SECTION ARM ONLY

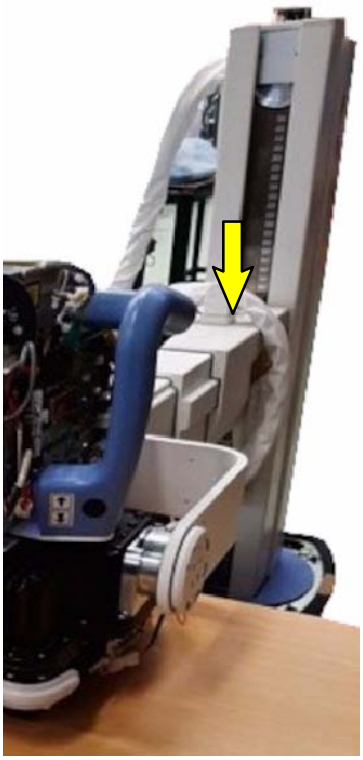
1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

2. Remove the tie wrap that fix the cable in the Monoblock.

3. Disconnect the corresponding connector, depending on which Support is needed to replace:

   - Disconnect the connector J8, located at the PBA Monoblock Buffer (A40003-XX), for replacing the Monoblock Right Support.
   - Disconnect the connector J9, located at the PBA Monoblock Buffer (A40003-XX), for replacing the Monoblock Left Support.

4. Rotate the Head-Assembly 180º (Collimator pointing upwards) and lower carefully the Telescopic Arm until the Head-Assembly is supported on the workbench.

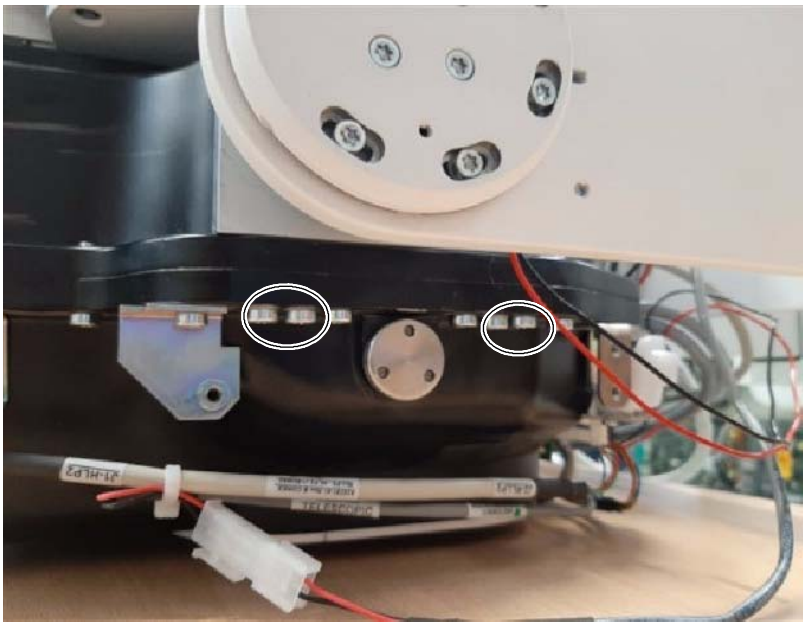


5. Hold the Telescopic Arm by passing a strap under the frame of the Unit and above the Telescopic Arm.

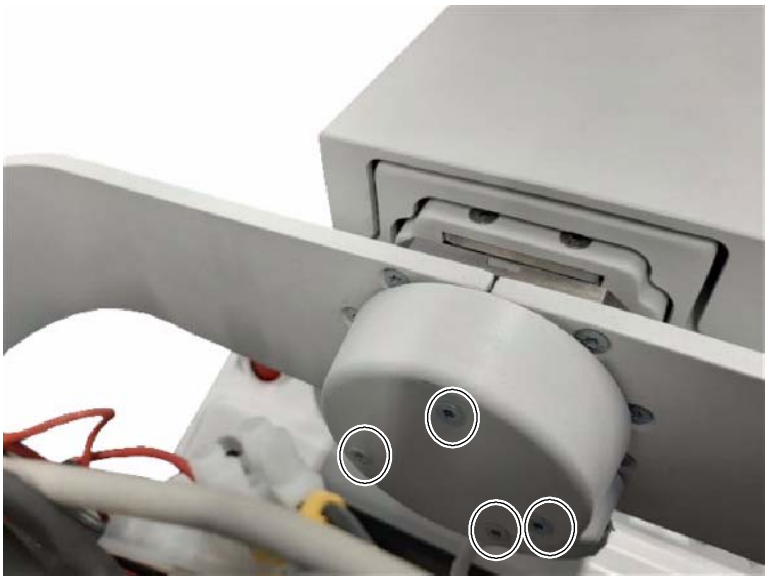
Note ☞ *If the Monoblock Right Support needs to be replaced, remove the Cable Holder by removing the two (2) fixing screws.*

6. Remove the Angle Indicator from the Monoblock Support by removing the two (2) fixing screws.

7. Remove the four (4) fixing screws of the Monoblock Rotation Support.

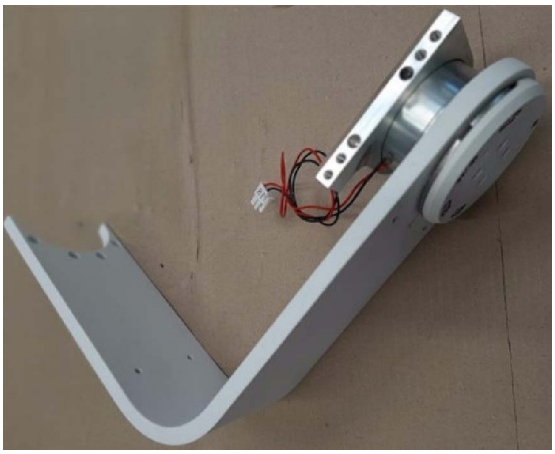


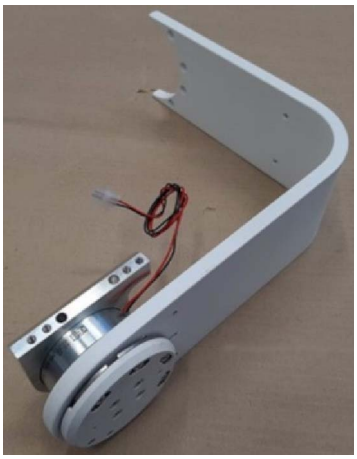
8. Remove the four (4) fixing screws of the Tube Head Rotating Cover.



9. Remove the four (4) fixing screws of the Monoblock Support of the Tube Head Rotating Assembly (in case both Supports are replaced, it is necessary to remove eight (8) screws).

10. Replace the corresponding Monoblock Support and follow the reverse process to reinstall the parts removed in the previous steps.



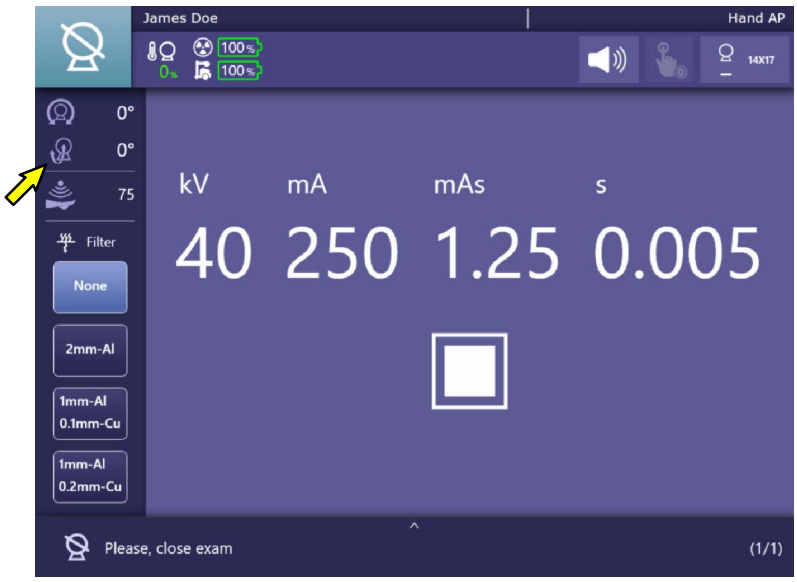


11. Remove the tie wrap that fix the cable in the Monoblock.

12. Loose the adjusting screws of the rotation to level the Monoblock/Collimator Assembly.

13. Turn ON the Unit.

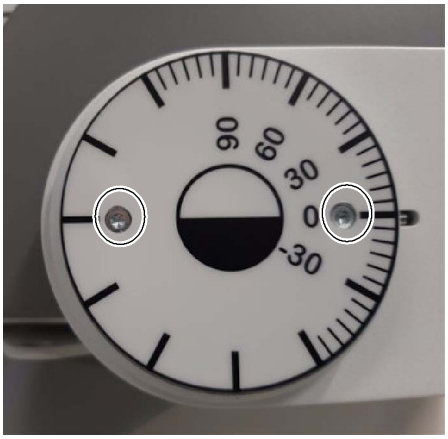
14. Check the Pitch Rotation Indicator in the Head-Assembly Control Console. Rotate the Assembly until the 0º angle is reached and tight the previous loosened screws.



Head Assembly Control Console

15. Turn OFF the Unit.

16. Reinstall the Angle Indicator from the Monoblock Support by fixing the two (2) screws.



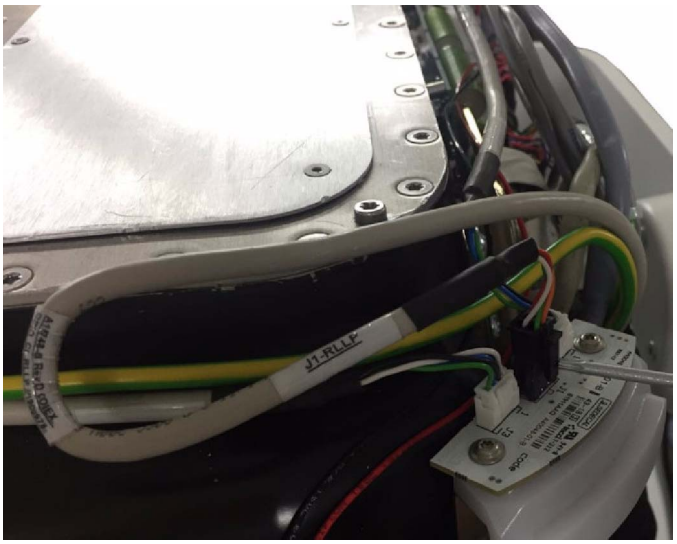
17. Finally, mount the Monoblock Covers.

4.7 MONOBLOCK REPLACEMENT

4.7.1 MONOBLOCK DISASSEMBLY

1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

2. Disconnect all the connectors on each LED Stripe.

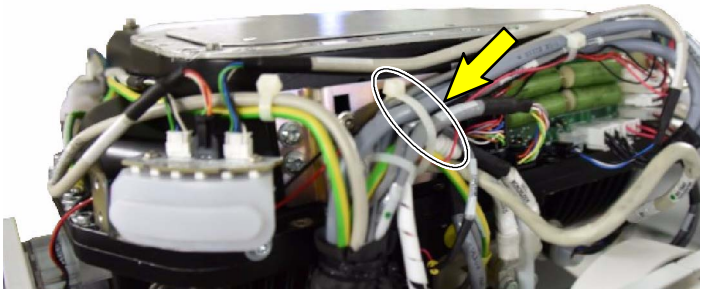


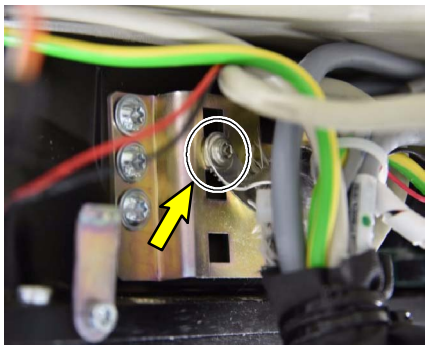
3. Remove the screws on each LED Stripe.

4. Dismount the Front LED Stripes (A40047-XX), the Back LED Stripes (A40048-XX) and the LED Stripe Covers (A526501-XX).

Note ☞ *For detailed information in order to remove the LED Stripes and the LED Stripe Covers, refer to Section 4.2.*

5. Cut the tie wraps that hold the harness to the Monoblock, and remove the screw that holds the ground clamp around the cable.



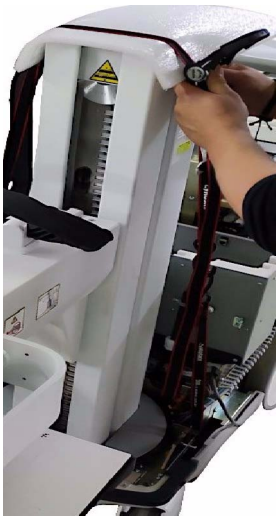


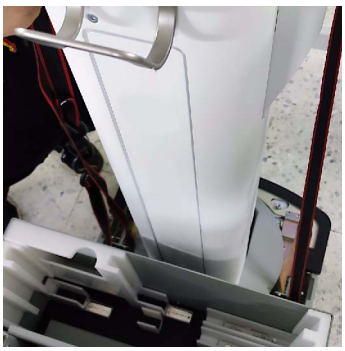
6. Turn ON the Unit.

7. Rotate the Head-Assembly 180º (Collimator pointing upwards) and lower carefully the Telescopic Arm halfway down until the Head-Assembly is supported on the workbench.

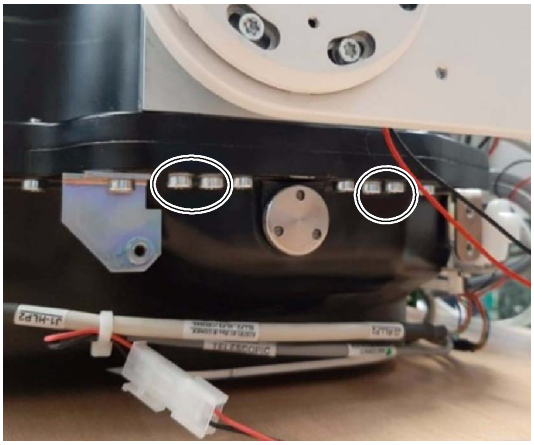
8. Turn OFF the Unit.

9. Fix a strap around the Column to secure it when the spring comes into action. A protective element is placed on the top cover of the Column to protect it from scratches or impacts, and the strap is placed on top. Then, pass the strap under the base of the chassis (it is not necessary to remove the base cover, as it is inserted inside the cover).

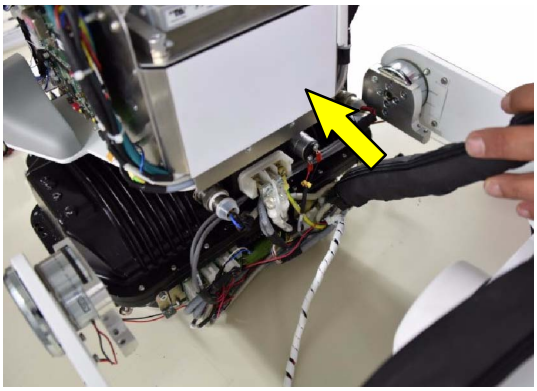




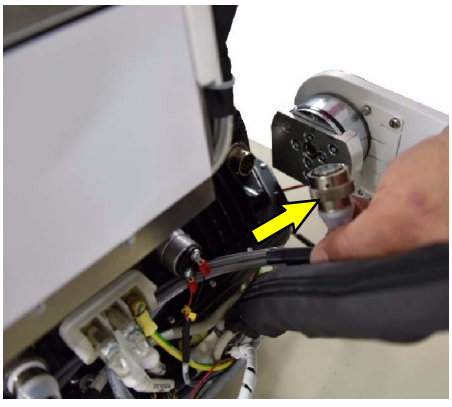
10. Remove the eight (8) screws, four (4) on each side, that fix the Monoblock to the Rotating Support.



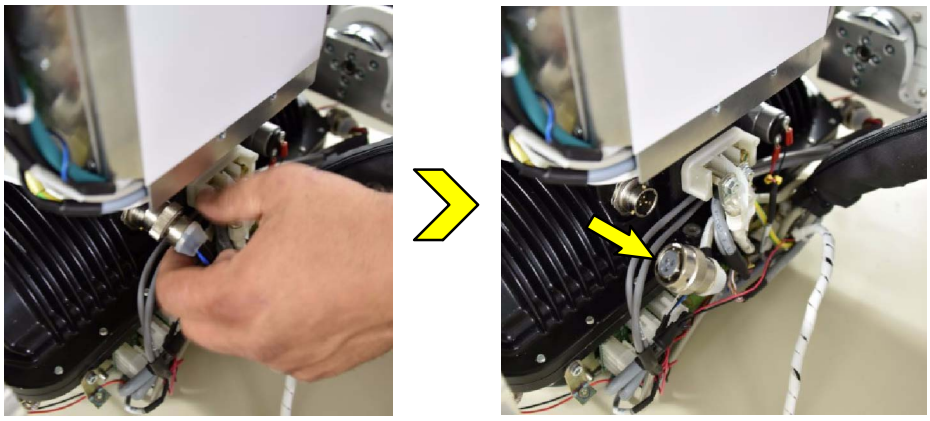
11. Slide the Monoblock in order to have more room for cabling disconnection (prevent the Rotation Brake Cables from being strained when sliding the Monoblock).



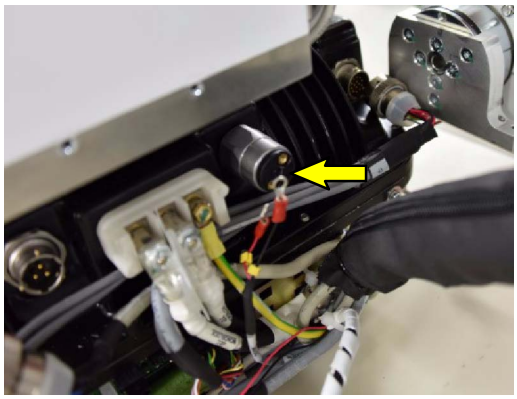
12. Disconnect J1 connector from Monoblock.



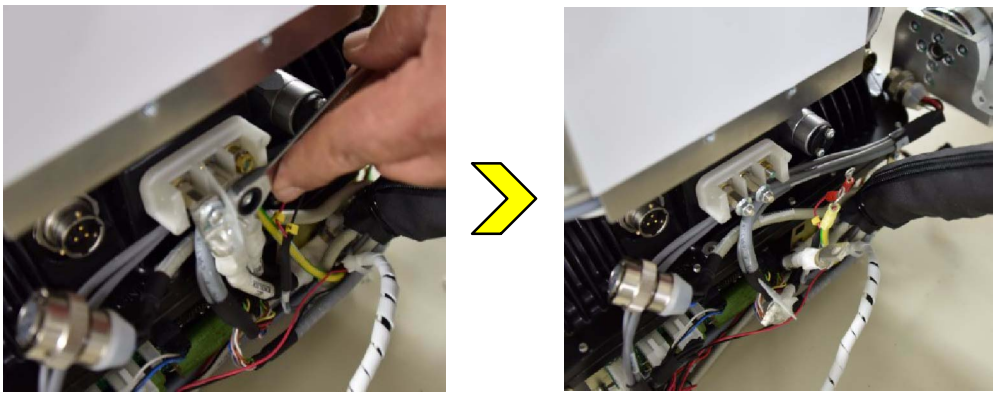
13. Disconnect J2 connector from Monoblock.



14. Disconnect Thermal Switch from Monoblock.

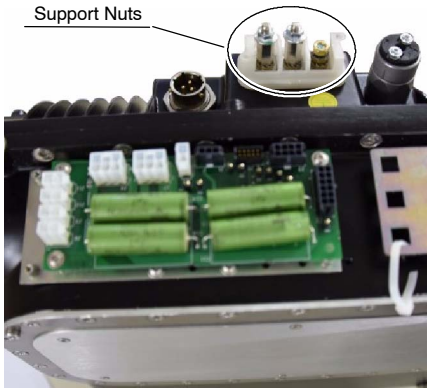


15. Disconnect the Power Cables and the Ground Cable from Monoblock.

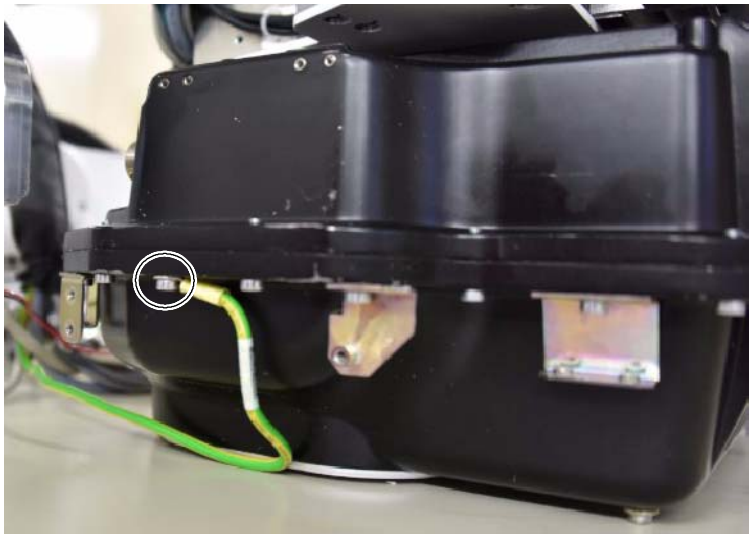


WARNING

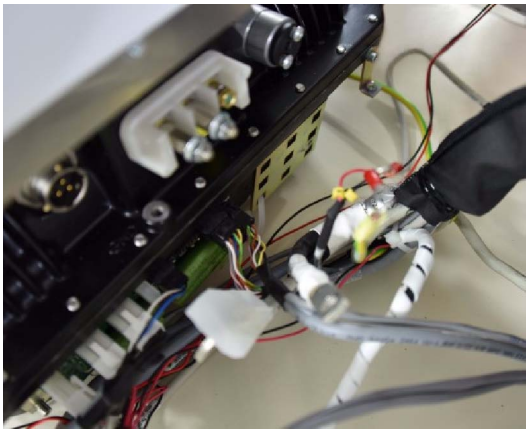
DO NOT LOOSEN THE SUPPORT NUTS DURING THE DISCONNECTION OF THE POWER CABLES AND THE GROUND CABLE, OTHERWISE, LOSS OF TIGHTNESS AND OIL LEAKAGE CAN OCCUR IN THE MONOBLOCK.

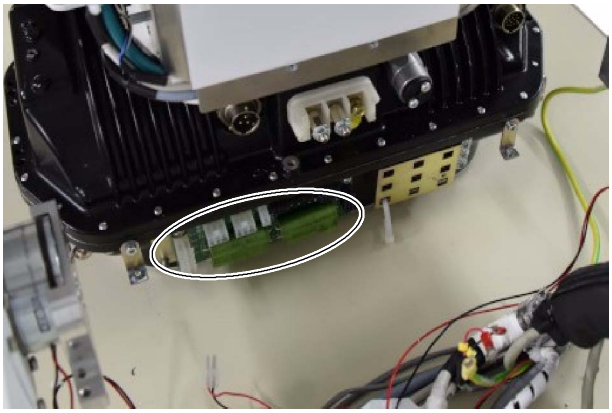


16. Disconnect the Side Ground Cable from the Monoblock.

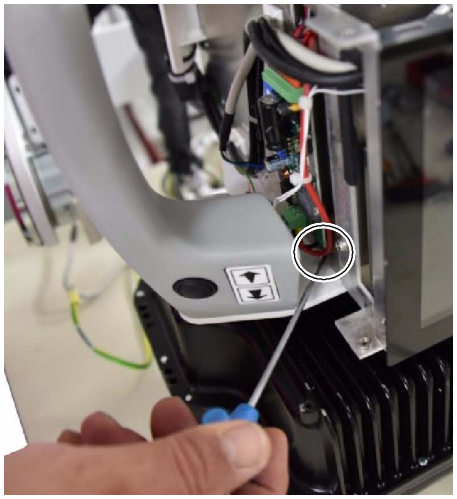


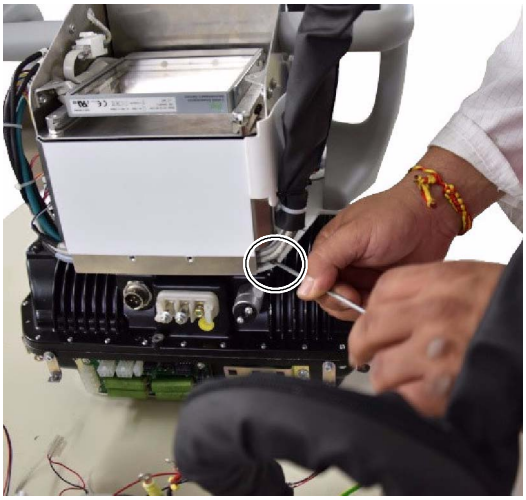
17. Disconnect all the connectors from the Monoblock Buffer Board (A40003-XX).

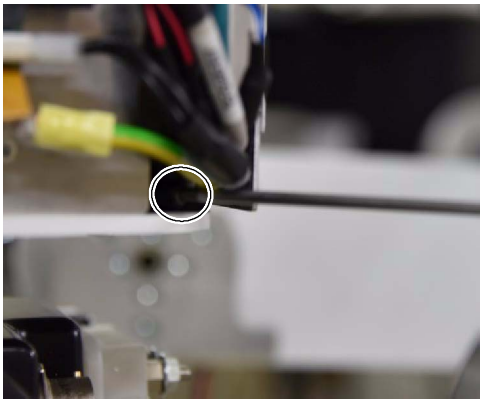




18. Fully loosen the four (4) screws that fix the Collimator to the Monoblock.



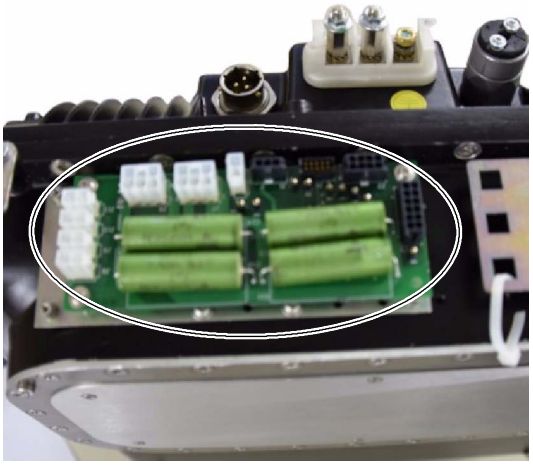




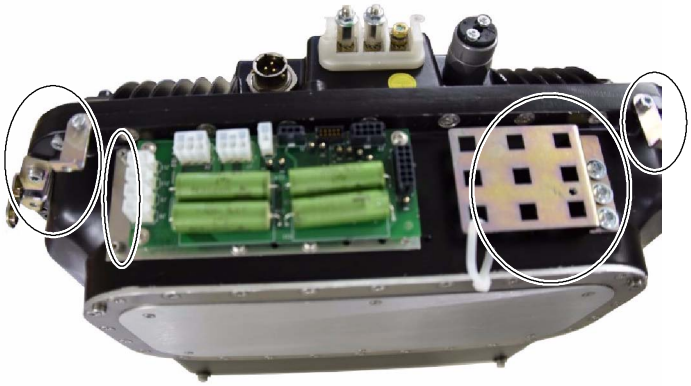
19. Remove the Collimator and place it aside.

20. Dismount Collimator Flange and Spacers to be installed on the new Monoblock.

21. Dismount the Monoblock Buffer Board to be installed on the new Monoblock.



22. Dismount mounting brackets for Monoblock Buffer Board, LEDs, etc, if they are not present in the new Monoblock to be installed.



WARNING

FOR THOSE BRACKETS ASSEMBLED ON THE MONOBLOCK USING CLOSING SCREWS, DISMOUNT AND MOUNT THE BRACKETS ONE BY ONE.
THE CLOSING SCREWS SEAL THE TWO SHELLS THAT MAKE UP THE HOUSING OF THE MONOBLOCK, AVOIDING AN OIL LEAKAGE.

4.7.2 MONOBLOCK ASSEMBLY

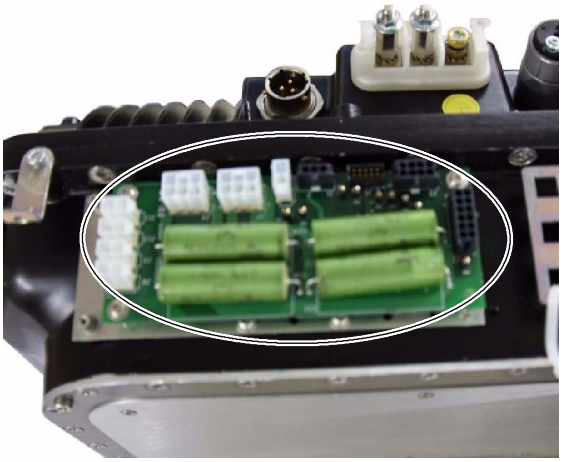
1. Continue with this procedure after Monoblock Disassembly.

2. Install all the mounting brackets if not provided in the new Monoblock.

WARNING

FOR THOSE BRACKETS ASSEMBLED ON THE MONOBLOCK USING CLOSING SCREWS, DISMOUNT AND MOUNT THE BRACKETS ONE BY ONE, IN ORDER TO AVOID AN OIL LEAKAGE.

3. Install the previously dismounted Monoblock Buffer Board (A40003-XX) on the new Monoblock.



4. Mount Collimator Flange and Spacers.

5. Place the Collimator on mounting Flange.

6. Tighten the mounting screws which fix the Collimator as described below.

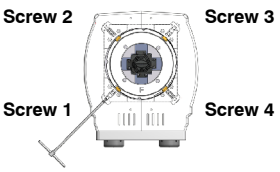
INSTALLATION

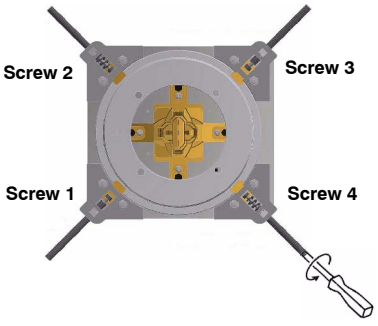
The installation of the Collimator with the Mounting Bracket type B and Flange type B1 with Metal Stopping Plate needs to be made as follows:

- Install the Collimator on the Flange: while one person holds the weight of the Collimator, the other tightens the Fixing Screws (x4) located at the four corners that fix the Collimator to the Flange.

- With the Tabs (Fixing Screws) fully retracted, tight the four Screws:
  - Screws 1 and 3 up to the end stroke (at least 7 turns on each one) applying a Torque of 0.45 Nm.
  - Screws 2 and 4 (with integrated adjustable spring), 5 $^1/_2$ turns exactly.
    (If Screws 2 and 4 are tightened more than 5$^1/_2$ - 6 turns, the Collimator will not rotate).

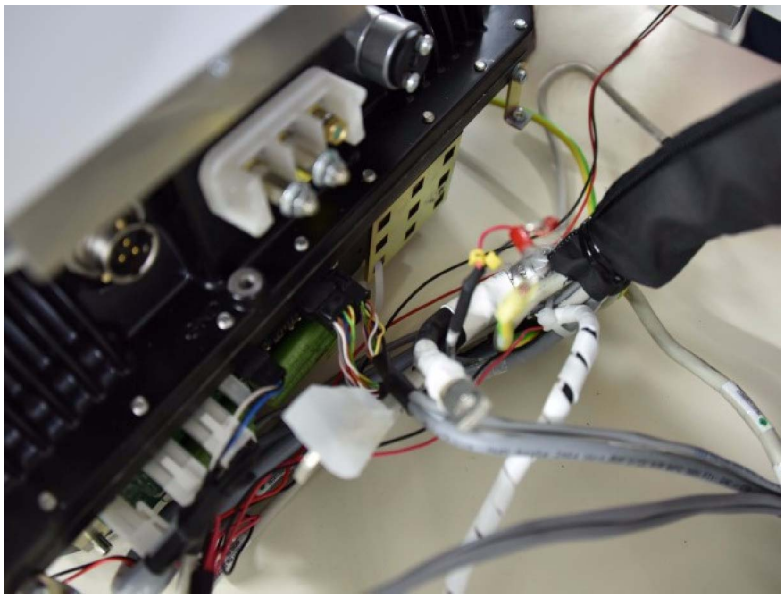
- Check the installation of the Collimator.





Screws 1, 3 = 7 turns
Screws 2, 4 = 5 $^1/_2$ turns

7. Connect all the connectors to the Monoblock Buffer Board.



8. Connect all the cables and connectors previously disconnected from the Monoblock: Ground Cable, Power Cables, Side Ground Cable, J1 and J2 Connectors, and Thermal Switch.

9. Install the eight (8) screws, four (4) on each side, that fix the Monoblock to the Rotating Support.

10. Release the strap around the Column.

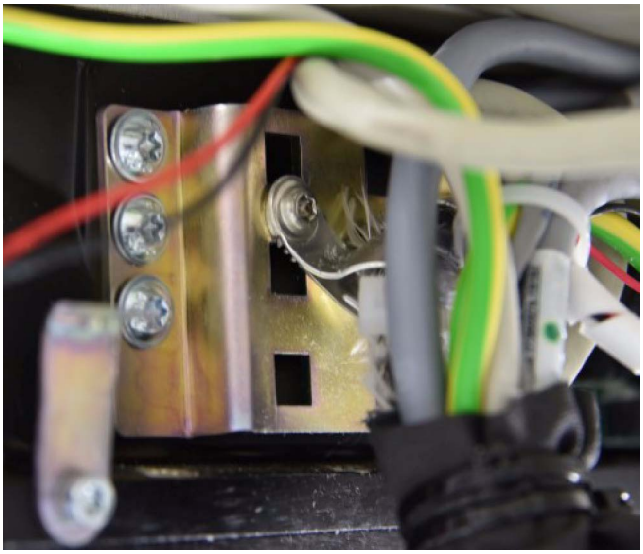
11. Turn ON the Unit.

12. Raise carefully the Telescopic Arm up to a height comfortable for the Service Engineer.

13. Rotate the Head–Assembly 180^{o} (Collimator pointing downwards).

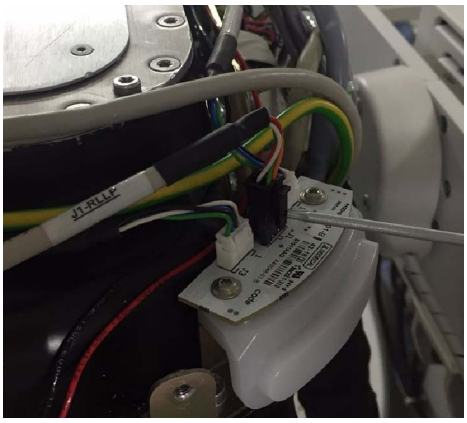
14. Turn OFF the Unit.

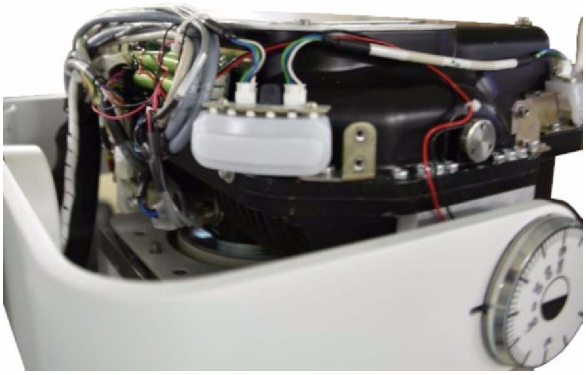
15. Reinstall the ground clamp around the cable, and use tie wraps to secure the harness to the Monoblock.



16. Reassemble the Front LED Stripes (A40047-XX), the Back LED Stripes (A40048-XX) and the LED Stripe Covers (A526501-XX).

17. Reconnect all the connectors on the LED Stripes.





18. Mount the Monoblock Covers: Monoblock Lateral Covers (B1), Monoblock Upper Cover (B2), Monoblock Lower Front Cover (B3) and Monoblock Lower Back Cover (B4).

19. Replace the label “X-Ray Tube Assembly” with the new one at the Monoblock Lower Back Cover. This new label is associated with the new Monoblock.

20. Access the Service Mode and perform the Parameters Calibration:

    a. At Service Mode enter in *System Installation -> Generator Setup -> Parameters Calibration*.

    b. Perform “kVp Gain” adjustment.

    For detailed information, refer to the Configuration and Calibration chapter of the Service Manual.

21. Perform the Auto Calibration:

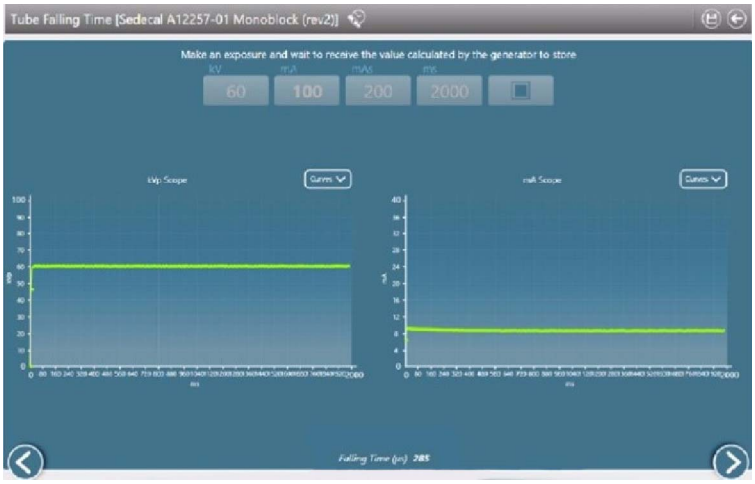
    a. At Service Mode enter in *System Installation -> Generator Setup -> Auto Calibration*.

    b. Perform “Auto Calibration” for both filaments.

    For detailed information, refer to the Configuration and Calibration chapter of the Service Manual.

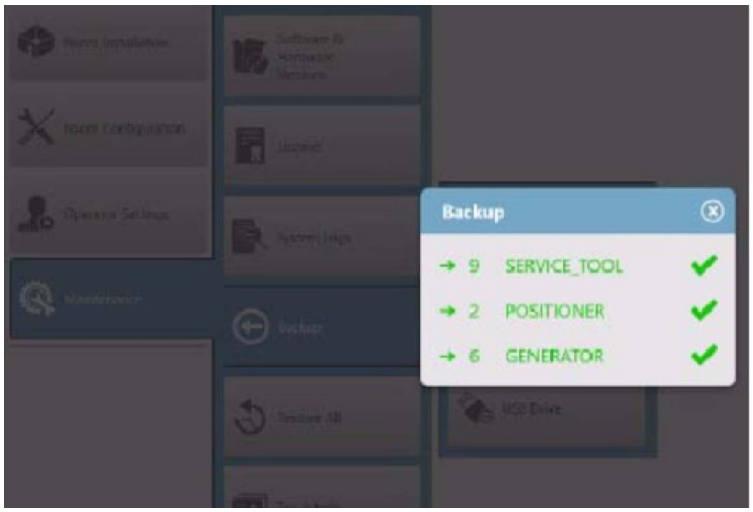
22. Perform the Tube Falling Time. At Service Mode enter in *System Installation -> Generator Setup -> Parameters Calibration -> Tube Falling Time*.

    For detailed information, refer to the Configuration and Calibration chapter of the Service Manual.



23. Finally, it is recommended to perform a Backup of the new calibration data. At Service Mode enter in *Maintenance -> Backup*.

    For detailed information, refer to the Configuration and Calibration chapter of the Service Manual.

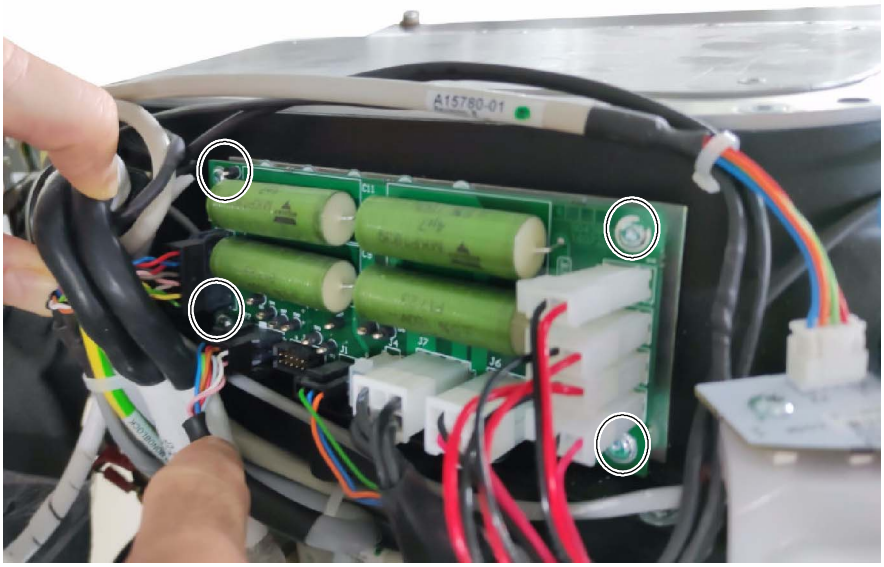


4.8 HEAD-ASSEMBLY BOARDS REPLACEMENT

4.8.1 MONOBLOCK BUFFER BOARD REPLACEMENT

1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

2. Disconnect the following connectors from the Monoblock Buffer Board (A40003-XX): J3, J2, J1, J4, J7, J6, J8, J9, J10 and J11. Then, remove the four (4) screws in order to extract the Monoblock Buffer Board.



3. Assemble the new Monoblock Buffer Board following the reverse process.

4. Check kV values after replacement (*follow the procedure described in the "Test for kV Loop" Section in the Maintenance Chapter of this Service Manual*).

5. Check mA values randomly on both focus after replacement (*follow the procedure described in the "Test for Digital mA Loops" Section in the Maintenance Chapter of this Service Manual*).

Note ☞ *After checking the kV and mA values, if necessary, perform the corresponding calibration (refer to "Manual Calibration" Section in the Configuration & Calibration Chapter of this Service Manual*).

6. Finally, mount the Monoblock Covers.

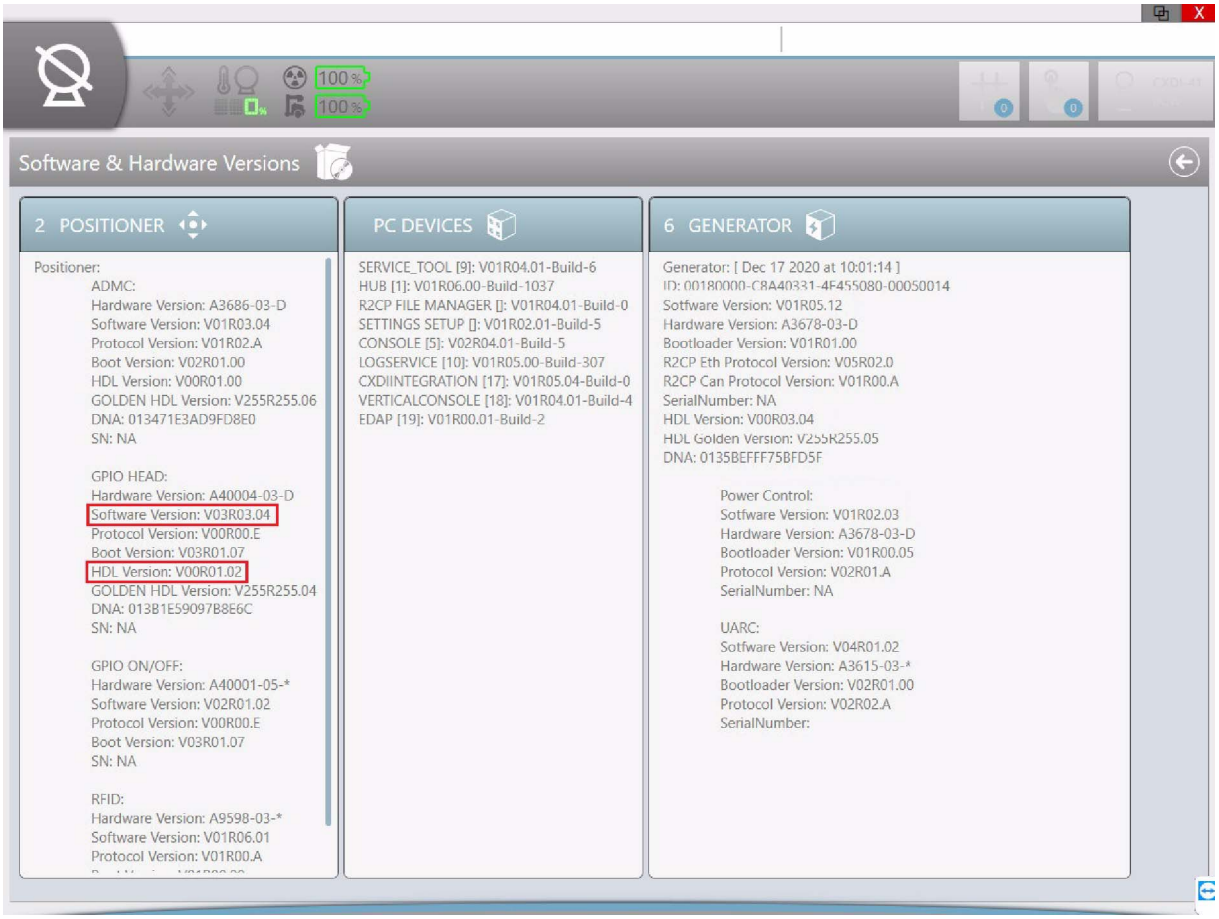
4.8.2 GPIO HEAD BOARD REPLACEMENT

1. Follow steps 1. to 5. from *Section 4.1 Collimator Replacement* to remove the Monoblock Covers.

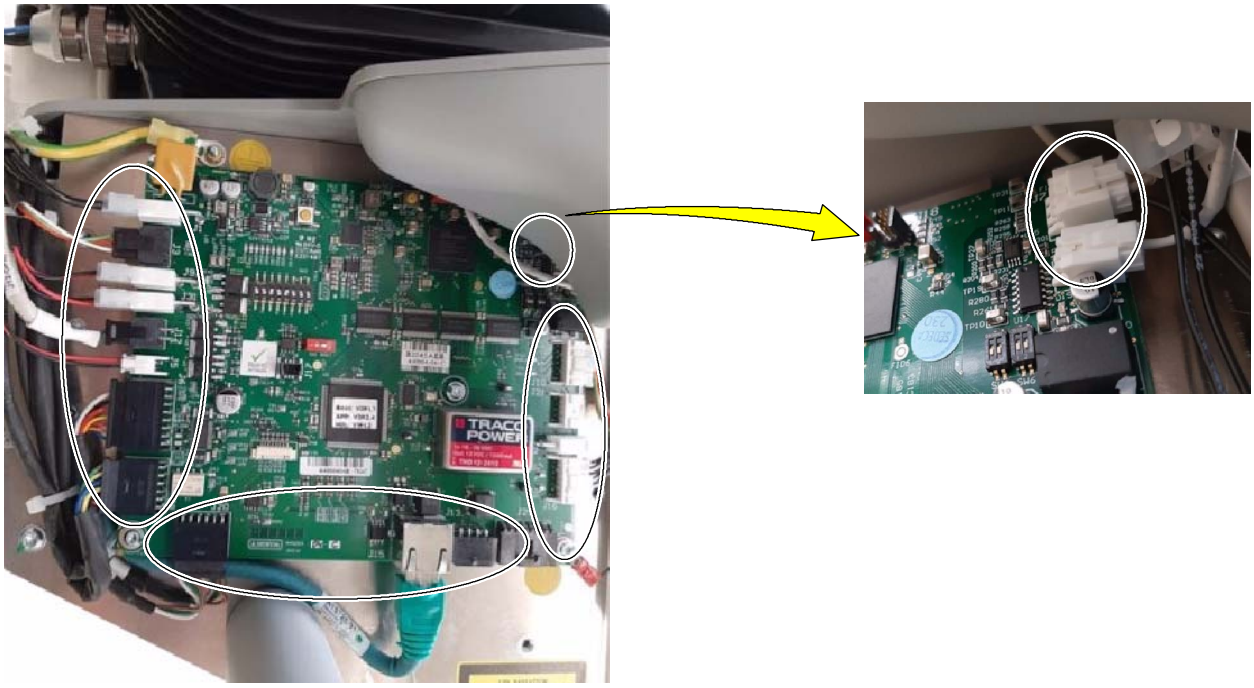
2. Remove the Collimator Covers. For detailed information about the process, *refer to Section 1.2 Covers Removal*.

3. Turn ON the Unit and start the Service Tool.

4. At the Service Tool, select “Maintenance” and then “Software and Hardware Versions”. In the “Positioner” tab, verify the versions installed in the GPIO Head Board (A40004-XX) and write it down to check the versions of the new Board match with the versions of the original Board.



5. Unplug the connectors J1, J3, J9, J31, J12, J5, J6, J8, J20, J15, J13, J29, J7, J4, J10, J2 and J16 on the GPIO Head Board.



6. Remove the four (4) fixing screws in order to extract the GPIO Head Board, as indicated in the illustration below.

7. Check the switches SW4 (1&2) and SW6 (1&2) in the GPIO Head Board are at OFF position. This is the default setting for Collimator Handles Sensitivity.

Table 4-1
Collimator Handles Sensitivity Adjustment

GPIO HEAD BOARD (A40004-XX)				COLLIMATOR HANDLES SENSITIVITY
SW6		SW4		
SW6-2	SW6-1	SW4-2	SW4-1	
ON	ON	OFF	OFF	-- Less sensitivity
OFF	ON	OFF	OFF	- Less sensitivity
OFF	OFF	OFF	OFF	Default setting
OFF	OFF	ON	OFF	+ More sensitivity
OFF	OFF	OFF	ON	+ More sensitivity
OFF	OFF	ON	ON	++ More sensitivity

8. Assemble the new GPIO Head Board following the reverse process.

Note ☞ *The Replacement Kit includes Adapter Cables for connecting the Capacitive Sensor from the Handles at J7 and J4 of GPIO Head Board. These Adapter Cables are necessary if the original Board is A40004-03 and it is replaced with a A40004-04. If the original Board is A40004-04, the Service Engineer should not use these Adapter Cables.*

9. Turn ON the Unit and start the Service Tool for verifying the versions installed in the new GPIO Head Board match with the versions of the original Board. If the versions do not match, proceed to update it.

10. 4-Section Arm only: Verify the correct operation of the “Rotation and Angulation Angles of the X-ray Tube” indicators on the Head-Assembly Console. Perform the Accelerometer Calibration in case necessary. *For detailed information, refer to Configuration and Calibration chapter of the Service Manual.*

11. The replacement of GPIO Head Board requires the recalibration of the Collimator Blades due to the new hardware installed. *For detailed information, refer to Configuration and Calibration chapter of the Service Manual.*

12. Verify the Sensitivity of the Head-Assembly Handgrips. In order to do so, hold the Handgrips to activate the Brake Control to move the Column and Arm.

Note ☞ *If the Sensitivity is still high after testing the Sensitivity, refer to Table 4-1 in order to adjust the setting of the switches.*

13. Turn OFF the Unit.

14. Mount the Collimator Covers and the Monoblock Covers.

15. Turn ON the Unit and perform a functional test.

SECTION 5 SYSTEM MESSAGES

5.1 SYSTEM MESSAGES DISPLAY

The System Messages are displayed on the Message Bar, located at the bottom area of the X-ray Generator Console (embedded in *Primo S*) in the Main Screen and in the Head-Assembly Console (if installed).

Illustration 5-1
System Messages: Main Control Console – X-ray Generator Console

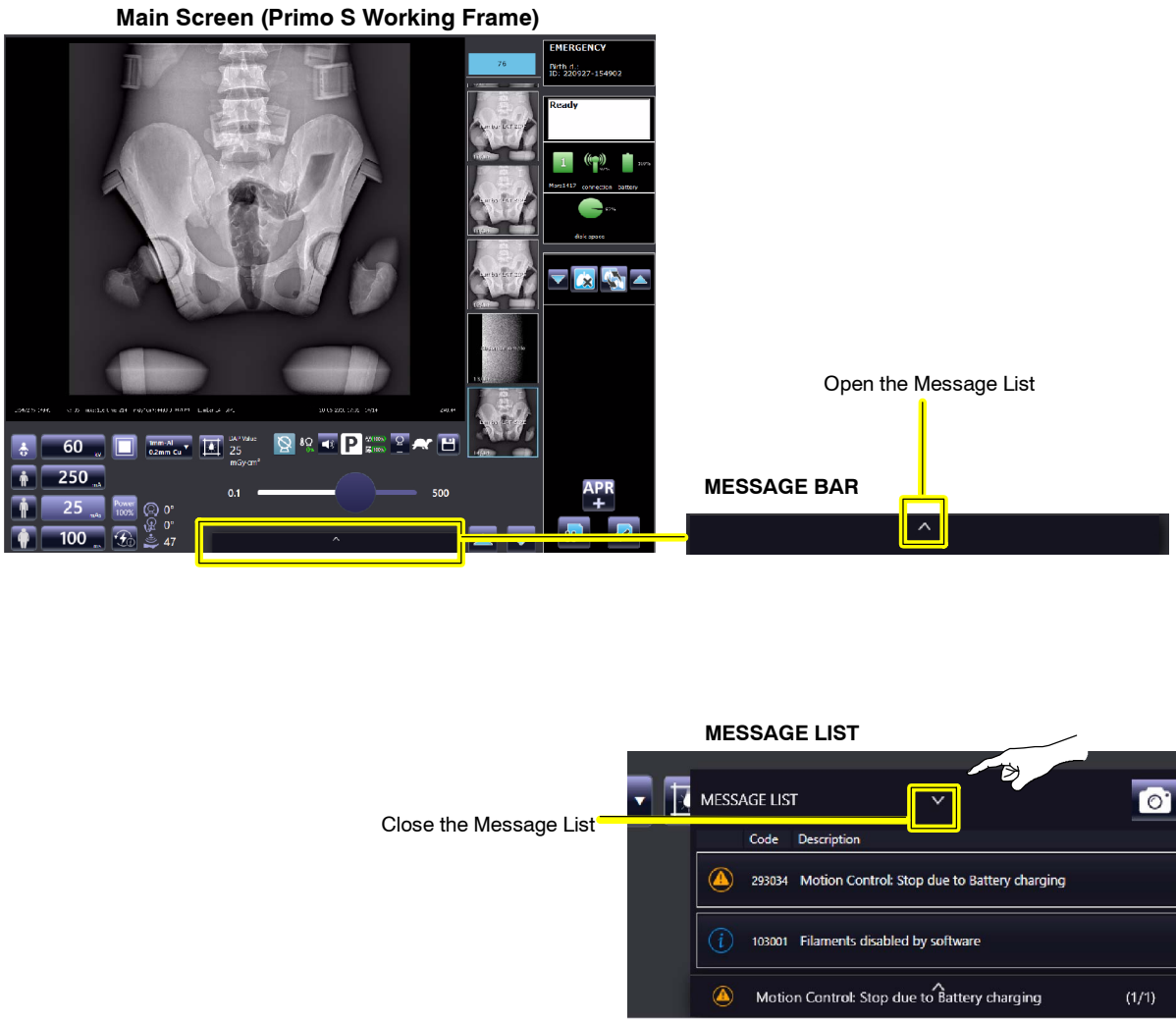
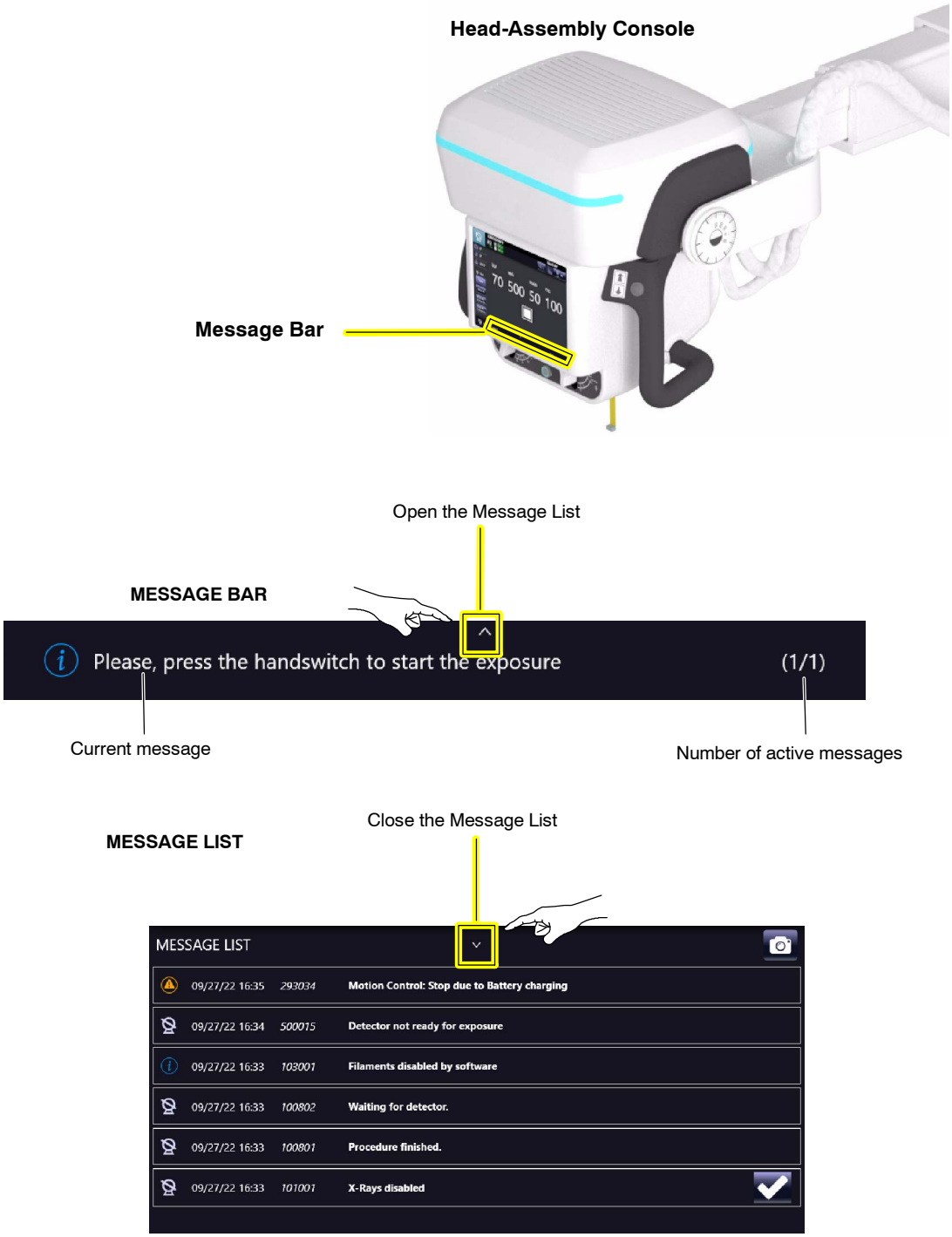


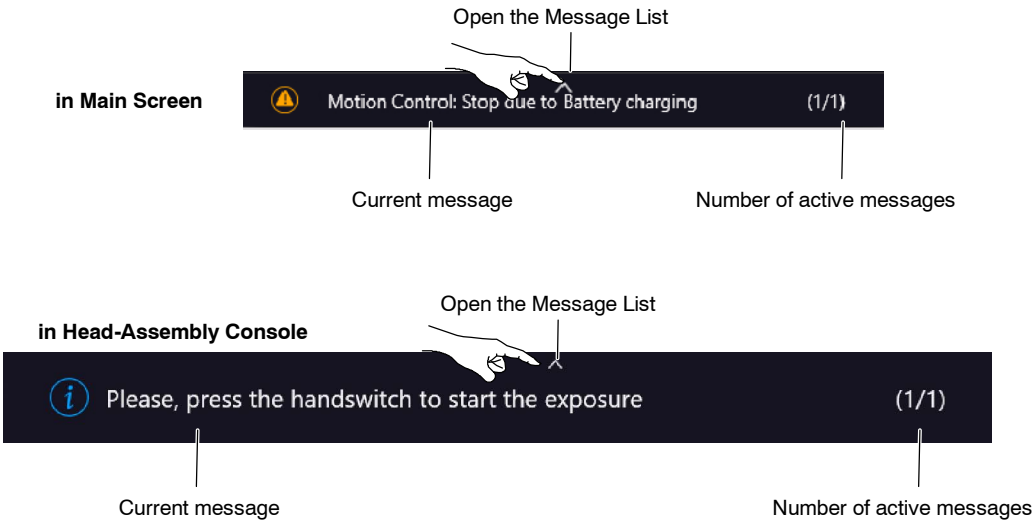
Illustration 5-2
System Messages: Head-Assembly Console (option).



The Message Bar displays the System Messages (Errors, Warnings, Information, inhibit conditions, etc.).

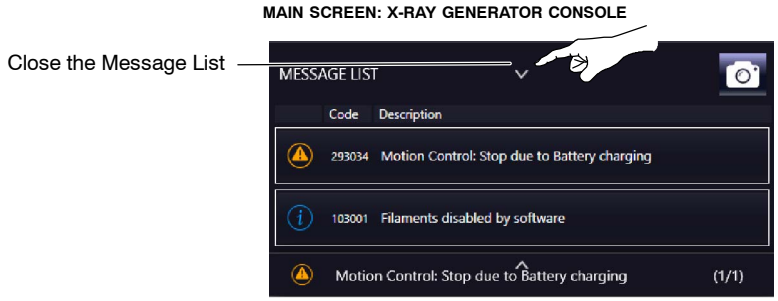
To open the Message List, tap on the Message bar arrow icon; a pop-up window will be displayed.

Illustration 5-3
Message Bar



Tap on the upper arrow icon of the Message List to close the List and to return to the previous screen.

Illustration 5-4
Message List



5.2 SYSTEM MESSAGES LIST

The system message tables included below comprise the following fields:

- **ID**: Identification code of the System Message.
- **DESC**: Brief description of the System Message.
- **LOG_DESC**: Log description, displayed in the Logs list.
  The Logs list is the file that records the events occurred in the system.
- **HELP TEXT:** User actions.
- **SERVICE ACTION:** Further information and actions for the Service support.
- **CATEGORY:** Type of the System Message.

The System Messages are classified in different types:

- **ERROR.**
  Error messages indicate the potential cause of a system failure that can abort or inhibit the exposure or procedure.

- **WARNING.**
  Warning messages alert about conditions that do not disable or abort exposures (e.g., maximum kV value reached while modifying the exposure parameters). The warning message blinks on the screen for a few seconds notifying this event.

- **INHIBIT.**
  Inhibit messages indicate that exposures, movements or both are inhibited.

- **INFORMATION.**
  Informative messages provide information about the system and disappear automatically from the screen after a few seconds.

- **USER ACTION.**
  User Action messages indicate that exposures are inhibited until the user performs the required action.

- **EMERGENCY.**
  Emergency messages indicate that the emergency button is pressed. Therefore, movements and exposures are not allowed.

Note ☞ *Remember that only the active messages of the selected Workstation will be displayed in the Message History.*

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
100002	One or more workstations are not properly configured; a default value has been assigned	Error	E002 WRONG WS CONFIGURATION ERROR One or more workstations are not properly configured; a default value has been assigned.	• TBD
100005	The Exposure order input signal is active during the Startup sequence	Error	E005 EXP ORDER ERROR The Exposure order input signal is active during the Startup sequence.	• TBD
100006	The Preparation order input signal is active during the Startup sequence	Error	E006 PREP ORDER ERROR The Preparation order input signal is active during the Startup sequence.	• TBD
100023	Error while writing in the E2PROM	Error	E023 E2PROM ERROR Error while writing in the E2PROM.	• TBD
100024	The timeout for the acknowledge for X-rays from the Bucky or FPD has been exceeded	Error	E024 BUCKY/DIGITAL PANEL ERROR The timeout for the acknowledge for X-rays from the Bucky or FPD has been exceeded.	• TBD
100029	Generator heat capacity exceeded	Error	E029 GENERATOR OVERHEAT ERROR Generator heat capacity exceeded.	• TBD
100031	The time stamp checksum is wrong	Error	E031 TIME STAMP CHECK ERROR The time stamp checksum is wrong.	• TBD
100032	I2C bus error while trying to access the Real Time Clock (RTC)	Error	E032 RTC-I2C ERROR I2C bus error while trying to access the Real Time Clock (RTC).	• TBD
100035	The acknowledge for X-rays from the Bucky or FPD has been lost before the end of the exposure	Error	E035 BUCKY MOTION (X-RAY ACK) ERROR The acknowledge for X-rays from the Bucky or FPD has been lost before the end of the exposure.	• TBD
100037	Tube ratings exceeded or not enough Heat Units to perform the selected exposure	Error	E037 TUBE OVERLOAD ERROR Tube ratings exceeded or not enough Heat Units to perform the selected exposure.	• TBD
100038	+5 V power supply failure	Error	E038 +5 V POWER SUPPLY FAILURE. +5 V Power Supply is out of range	• TBD

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
100039	+15 V power supply failure	Error	E039 +15 V POWER SUPPLY FAILURE. +15 V Power Supply is out of range	• TBD
100040	Imbalanced kVp, there is not the same voltage in Anode and Cathode branches	Error	E040 IMBALANCED kVp ERROR Imbalanced kVp, there is not the same voltage in Anode and Cathode branches.	• TBD
100041	Imbalanced mA, there is not the same current in Anode and Cathode branches	Error	E041 IMBALANCED mA ERROR Imbalanced mA, there is not the same current in Anode and Cathode branches.	• TBD
100042	The counters checksum is wrong	Error	E042 CORRUPT COUNTERS ERROR The counters checksum is wrong.	• TBD
100047	I2C bus error while trying to access the Licence	Error	E047 LICENCE -- I2C ERROR I2C bus error while trying to access the Licence.	• TBD
100049	The generator has lost the communications with the remote console	Error	E049 COMMUNICATIONS ERROR (COMMS LOST AT THE GENERATOR) The generator has lost the communications with the remote console.	• TBD
100050	The user has released the exposure device before the end of the exposure	Error	E050 ABORTED EXPOSURE ERROR The user has released the exposure device before the end of the exposure.	• TBD
100051	The selected exposure time cannot be achieved	Error	E051 WRONG EXPOSURE TIME ERROR The selected exposure time cannot be achieved.	• TBD
100054	The timeout for receiving the Digital/DSI synchronism pulse has elapsed	Error	E054 DIGITAL SYNC ERROR The timeout for receiving the Digital/DSI synchronism pulse has elapsed.	• TBD
100060	The number of exposures to autocalibrate a mA station has run out	Error	E060 AUTOCAL ERROR The number of exposures to autocalibrate a mA station has run out.	• TBD

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
100061	There has been an error while trying to access the Licence data. Default options have been selected	Information	E061 LICENCE ERROR There has been an error while trying to access the Licence data. Default options have been selected.	• TBD
100063	The Ready from the starter has been lost before the end of the exposure	Error	E063 ROTOR READY ERROR The Ready from the starter has been lost before the end of the exposure.	• TBD
100065	+24 V Delayed power supply failure	Error	E065 +24 V DELAYED POWER SUPPLY FAILURE +24 V delayed power is out of range	• TBD
100066	+24 V (UNR) power supply failure	Error	E066 +24 V (UNR) POWER SUPPLY FAILURE +24 V (unregulated) Power Supply is out of range.	• TBD
100067	-15 V power supply failure	Error	E067 -15 V POWER SUPPLY FAILURE. -15 V Power Supply is out of range.	• TBD
100068	+3.3 V power supply failure	Error	E068 +3.3 V POWER SUPPLY FAILURE +3.3 V Power Supply is out of range.	• TBD
100069	+24 V (UNR) permanent power supply failure	Error	E069 +24 V (UNR) PERMANENT POWER SUPPLY FAILURE +24 V (unregulated) Power Supply out of range.	• TBD
100071	Interlock error: Exposure aborted because an interlock has been deactivated during the exposure	Error	E071 INTERLOCK ERROR Exposure aborted because an interlock has been deactivated during the exposure.	• TBD
100072	Exposure aborted by deactivation of Positioner-OK signal	Inhibit Exposure	E072 POSITIONER OK ERROR Exposure aborted by deactivation of Positioner-OK signal	• TBD
100074	COP Generator Reset Error	Inhibit Exposure	The generator has been reset because of the COP module.	• TBD
100075	CLK Generator Reset Error	Inhibit Exposure	The generator has been reset because of the CLK module.	• TBD

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
100076	TRAP Generator Reset Error	Inhibit Exposure	The generator has been reset because of an illegal operation code.	• TBD
100077	Software Interrupt Generator Reset Error	ErrInhibit Exposureor	The generator has been reset because of a software interrupt.	• TBD
100078	Memory Interrupt Generator Reset Error	Inhibit Exposure	The generator has been reset because of a memory overflow interrupt.	• TBD
100079	Required mA Stations Calibration Error	Inhibit Exposure	The required mA stations have not been calibrated. At least one required mA station has not been properly calibrated, and it/they has/have the default value/s.	• TBD
100250	Communication lost with UARC Device.	Error	Communication lost with UARC Device.	• Check the Status LEDs of the UARC Board (A3615). ▪ If the Status LEDs are correct, check the CAN Cables: cable condition and connections, replacing if necessary. ▪ If the Status LEDs are not correct, replace the UARC Board (A3615).
100251	Communication lost with Power Control Device.	Error	Communication lost with Power Control Device.	• Replace the ADVANCED CONTROL Board (A3678).
100252	Timeout for receiving the Ready State from Power Control has elapsed.	Error	Timeout for receiving the Ready State from Power Control has elapsed.	• Replace the ADVANCED CONTROL Board (A3678).
100253	Timeout for receiving the Synch State from Power Control has elapsed.	Error	Timeout for receiving the Synch State from Power Control has elapsed.	• Replace the ADVANCED CONTROL Board (A3678).
100254	Power Control Protocol Version mismatch.	Error	Power Control Protocol Version mismatch.	• If the error occurs after performing a System update, check the SW versions compatibility with the ADVANCED CONTROL Board (A3678).
100255	UARC Protocol Version mismatch.	Error	UARC Control Protocol Version mismatch.	• If the error occurs after performing a System update, check the SW versions compatibility with the UARC Board (A3615).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
100256	Starter is not supported by License.	Error	Starter is not supported by License.	• If the error occurs after the SW License reinstallation, check the License options.
100257	High Speed is not supported by License.	Error	High Speed is not supported by License.	• If the error occurs after the SW License reinstallation, check the License options and configurations.
100258	FPGA running with Golden Firmware.	Error	FPGA running with Golden Firmware.	• Rewrite the FPGA. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
100259	Calibration Station cannot be performed	Error	Calibration Station cannot be performed.	• TBD
100801	Procedure finished	Inhibit Exposure	Procedure finished.	• No Service action is required.
100802	Waiting for detector	Inhibit Exposure	Waiting for detector.	• No Service action is required.
100803	Activated Procedure is not allowed.	Inhibit Exposure	Activated Procedure is not allowed.	• Change the exposure values or wait for the X-ray Tube to cool.
100910	Error in exposure_switches.xml file	Error	Error in exposure_switches.xml file.	• -
100920	workstations.xml has not been downloaded	Error	workstations.xml has not been downloaded.	• -
100921	image_receptors.xml has not been downloaded	Error	image_receptors.xml has not been downloaded.	• -
100922	exposure_switches.xml has not been downloaded	Error	exposure_switches.xml has not been downloaded.	• -
100923	generator.xml has not been downloaded	Error	generator.xml has not been downloaded.	• -

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
100924	Tube_1.xml has not been downloaded	Error	Tube_1.xml has not been downloaded.	• -
100926	uarc_workstations.xml has not been downloaded	Error	uarc_workstations.xml has not been downloaded.	• -
100930	Tube file wrong format.	Error	Tube file wrong format.	• If the error occurs after performing a system update, reload the Initial Settings, the Tube Settings, or perform a System Backup.
100941	Current Image Receptor Synchronization Type is not supported. Please, select other workstation.	Error	Current Image Receptor Synchronization Type is not supported. Please, select other workstation.	• Check the Workstation Configuration and the Image receptor Configuration.
100942	Preheating Filament.	Information	Preheating Filament.	• No Service action required.
100944	Maximum Preparation Time Reached.	Information	Maximum Preparation Time Reached.	• Remove preparation and exposure order.
101001	X-rays disabled.	Inhibit Exposure	X-rays disabled.	• No Service action required.
101002	Tube overload.	Warning	Tube overload.	• No Service action required.
101003	Tube thermostat.	Warning	Housing is too hot.	• No Service action required.
101004	Generator model overload.	Warning	Generator model overload.	• No Service action required.
101007	INTERLOCK_1	Inhibit Exposure	Configurable Interlock on field during the Configuration Procedure.	• No Service action required.
101008	INTERLOCK_2	Inhibit Exposure	Configurable Interlock on field during the Configuration Procedure.	• No Service action required.
101015	Generator has not been calibrated yet.	Information	Generator has not been calibrated yet.	• No Service action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
101016	mA Station selected has not been calibrated.	User Action	mA Station selected has not been calibrated.	• No Service action required.
101017	Configurated Tube is different to Calibrated Tube.	Information	Configurated Tube is different to Calibrated Tube.	• Check the configured Tube. • If the X-ray Tube is correct and the error persists, configure and calibrate the X-ray Tube again.
101018	Exposure does not allowed in this Desktop.	Inhibit Exposure	Exposure does not allowed in this Desktop.	• No Service action required.
101019	The system has to be rebooted for being upgraded.	Information	The system has to be rebooted for being upgraded.	• No Service action required.
101021	Inhibit Xray due to system communication lost.	Inhibit Exposure	Inhibit Xray due to system communication lost.	• No Service action required.
101022	Generator inactivity state, preheating filament.	Information	Generator inactivity state, preheating filament.	• No Service action required.
101023	Upgrade is ongoing, xray disabled during this process.	Information	Upgrade is ongoing, xray disabled during this process.	• No Service action required.
101025	The exposure selected exceeds the current battery capacity power. Exposures are not allowed in this state.	Inhibit Exposure	The exposure selected exceeds the current battery capacity power. Exposures are not allowed in this state.	• Check the Batteries voltage and status, replacing as necessary. • Check the Battery Chargers, replacing as necessary. • If the problem persists, replace the GPIO TROLLEY Board (A40001).
101026	Upgrading is performing, when the process finishes click on accept to apply the changes.	Information	Upgrading is performing, when the process finishes click on accept to apply the changes.	• System upgrade in progress, when the process finishes click on Accept to apply the changes.
101031	System will be reset due to license upgrade.	Information	System will be reset due to license upgrade.	• No Service Action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
101032	Filaments disabled by inactivity.	Information	Filaments disabled by inactivity.	• No Service Action required.
101035	System is connected to mains.	Inhibit Exposure	System is connected to mains.	• No Service Action required.
102001	Value requested exceeds generator power.	Information	Generator max power.	• No Service Action required.
102002	Value requested exceeds tube maximum rating.	Information	Tube maximum rating.	• No Service Action required.
102003	Technique requested not allowed due to tube space charge.	Information	Space charge.	• No Service Action required.
102004	kVp requested out of range.	Information	kVp range.	• No Service Action required.
102005	mAs requested out of range.	Information	mAs range.	• No Service Action required.
102006	mA requested out of range.	Information	mA range.	• No Service Action required.
102007	ms requested out of range.	Information	ms range.	• No Service Action required.
102008	Focal spot change not allowed due to mA-mAs selection.	Information	Focal spot warning.	• No Service Action required.
102009	APR warning.	Information	APR warning.	• No Service Action required.
102010	Generator thermal limit.	Information	Generator thermal limit.	• No Service Action required.
102019	Low speed configured. However, high speed option enabled by license.	Information	Low speed configured. However, high speed option enabled by license.	• No Service Action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
102023	Number of exposure reached. Exposure finished.	Information	Number of exposure reached. Exposure finished.	• No Service Action required.
102024	Exposure finished due to limit mAs reached.	Information	Exposure finished due to limit mAs reached.	• No Service Action required.
102025	Exposure finished due to limit energy for serial radiographic exposures.	Information	Exposure finished due to limit energy for serial radiographic exposures.	• No Service Action required.
103001	Filaments disabled by software.	Information	Filaments disabled by software.	• Enable Filaments by software.
103002	Filaments disabled by hardware.	Information	Filaments disabled by hardware.	• Enable Filaments by Hardware (Switch 7 on the ADVANCED CONTROL Board (A3678)).
103003	Time Stamp has not been updated from SNTP Server.	Information	Time Stamp has not been updated from SNTP Server.	• Configure OS Windows.
103008	File has not been uploaded. File Manager Service has not found.	Information	File has not been uploaded. File Manager Service has not found.	• Configure OS Windows.
103009	Demo Mode Enabled by License.	Information	Demo Mode Enabled.	• Replace the System License.
103011	Demo Mode enabled by Dip Switch.	Information	Demo Mode enabled by Dip Switch.	• Enable Filaments by Hardware (Switch 8 on the ADVANCED CONTROL Board (A3678)).
140301	Generator DSP Control. Register configuration.	Error	Generator DSP Control. Internal Register configuration error.	• No Service action required. *(Not included in the current SW version).*
140302	Xray generator internal error.	Error	Generator DSP Control. +24 Vdc Voltage is out of range.	• Check the power supply to ADVANCED CONTROL Board (A3678), it should be + 24 Vdc (in J3 and TP47). • If the voltage is not correct, replace the ADVANCED CONTROL Board (A3678).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140305	Xray generator internal error.	Error	Generator DSP Control. Main CPU Vref is out of range (2.97 - 3.63) Vdc.	• Incorrect Main CPU (U12) Vref +24Vdc (admissible voltage: 2.97 - 3.63 Vdc). • Check the power supply to ADVANCED CONTROL Board (A3678), it should be + 24 Vdc (in J3 and TP47). • If the voltage is not correct, replace the ADVANCED CONTROL Board (A3678).
140307	Generator DSP Control. Internal temperature.	Error	Generator DSP Control. Power Control internal temperature > 80 ºC.	• Internal temperature monitoring of DSP (U90). • Check the ventilation circuit. • If the problem persists, replace the ADVANCED CONTROL Board (A3678).
140308	Xray generator internal error.	Error	Generator DSP Control. Time in ready state exceeded.	• Replace the ADVANCED CONTROL Board (A3678).
140309	Generator DSP Control. Exposition Safety Timer.	Error	Generator DSP Control. Exposition finished by safety power control timer.	• Replace the ADVANCED CONTROL Board (A3678).
140310	Generator DSP Control. kV converter Overcurrent.	Error	Generator DSP Control. Overcurrent on the kV converter, primary of the transformer. Exposition has been aborted.	• Overcurrent in Main Inverter. • Check the Power Inverter: current, power cables to the HV Transformer (Monoblock), primary to the HV Transformer. • Perform the manual calibration (80 kV, 80 mA) to check the graphs. Check the waveforms (current TP) of resonance frequencies.
140311	Generator DSP Control. kV Overvoltage.	Error	Generator DSP Control. Overvoltage on the kV control measure, secondary of the transformer. Exposition has been aborted.	• Overcurrent in kV. • Check kV gain. Check the kV measurement chain (TP27). • Check the HV Transformer (Monoblock). • Check the measurements in the kV buffer (TP1 and TP2). • Perform the manual calibration.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140316	Generator DSP Control. IGBT bridge fault branch.	Error	Generator DSP Control. IGBT bridge fault branch Q1Q2, HBD1.	• Check Driver HBBD1, the Ribbon Cable connected to J10 and TP14 of the ADVANCED CONTROL Board (A3678). • If the problem persists, replace the Ribbon Cable or the ADVANCED CONTROL Board (A3678) as necessary.
140317	Generator DSP Control. IGBT bridge fault branch.	Error	Generator DSP Control. IGBT bridge fault branch Q3Q4, HBD2.	• Check Driver HBBD1, the Ribbon Cable connected to J15 and TP15 of the ADVANCED CONTROL Board (A3678). • If the problem persists, replace the Ribbon Cable or the ADVANCED CONTROL Board (A3678) as necessary.
140318	Generator DSP Control. kV out of range.	Error	Generator DSP Control. kV out of range. Exposition has been aborted.	• First, discard a power problem in the Batteries (plug the system and make some exposures in manual calibration, at a low power (80 kV, 80 mA). • If it is correct, check the power in the Batteries. • If kV cannot be read, check the kV measurement chain (power supply, MONOBLOCK BUFFER Board (A40003), control cables, and Monoblock control connector (A and B = 30 kohm, C and D = 30 kohm, A and D = 60 khm, B and C = continuity ...). • If kV can be read, but kV shown are out of control (does not follow the trapezoidal demand), check the system resonance point (current in TP22; kV in TP27).
140319	Generator DSP Control. mA Overcurrent.	Error	Generator DSP Control. Overcurrent on the mA control. Exposition has been aborted.	• Check mA gain and filament calibration. • Make a low current exposure in manual calibration, and check the mA graph. • Check the Filament current calibration (TP46) on the ADVANCED CONTROL Board (A3678).
140320	Generator DSP Control. Undercurrent in small filament during exposure.	Error	Generator DSP Control. Undercurrent in small filament during exposure.	• Check the mA measurement. • Check Small Focus and Small Focus Power Inverter (TP80) on the ADVANCED CONTROL Board (A3678).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140322	Generator DSP Control. Overcurrent in small filament.	Error	Generator DSP Control. Overcurrent in small filament.	• Check cables and filaments. • If there is a serial Capacitor in the MONOBLOCK BUFFER Board (A40003), replace this Board. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140324	Generator DSP Control. Small Filament Current out of range.	Error	Generator DSP Control. Measure of the small filament control loop is not following demand.	• Check filaments, cables and connections, kV in the MONOBLOCK BUFFER Board (A40003). • Check Inverter error in ADVANCED CONTROL Board (A3678).
140325	Generator DSP Control. Fault on small filament inverter.	Error	Generator DSP Control. Fault on small filament inverter.	• If the error occurs during the preheating or preparation, replace the ADVANCED CONTROL Board (A3678). • If the error appears during the exposure, it may be due to a the High Voltage short-circuit.
140326	Generator DSP Control. Thermal fault on small filament inverter.	Error	Generator DSP Control. Thermal fault on small filament inverter.	• Check the ventilation circuit of the System. • Restart the System, If the error persists, replace the ADVANCED CONTROL Board (A3678).
140330	Generator DSP Control. Undercurrent in large filament during exposure.	Error	Generator DSP Control. Undercurrent in large filament during exposure.	• Check the mA measurement. • Check Small Focus and Large Focus Power Inverter (TP63) on ADVANCED CONTROL Board (A3678).
140332	Generator DSP Control. Overcurrent in large filament.	Error	Generator DSP Control. Overcurrent in large filament.	• Check cables and filaments. • If there is a serial Capacitor in the MONOBLOCK BUFFER Board (A40003), replace this Board. • If the error persists, replace the ADVANCED CONTROL Board (A3678).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140334	Generator DSP Control. Large Filament Current out of range.	Error	Generator DSP Control. Measure of the large filament control loop is not following demand.	• Check filaments, cables and connections, kV in the MONOBLOCK BUFFER Board (A40003). • Check Inverter error in ADVANCED CONTROL Board (A3678).
140335	Generator DSP Control. Fault on large filament inverter.	Error	Generator DSP Control. Fault on large filament inverter.	• If the error occurs during the preheating or preparation, replace the ADVANCED CONTROL Board (A3678). • If the error appears during the exposure, it may be due to a the High Voltage short-circuit.
140336	Generator DSP Control. Thermal fault on large filament inverter.	Error	Generator DSP Control. Thermal fault on large filament inverter.	• Check the ventilation circuit of the System. • Restart the System, If the error persists, replace the ADVANCED CONTROL Board (A3678).
140350	Generator DSP Control. Master Heartbeat error.	Error	Generator DSP Control. Master Heartbeat error.	• Check communications, check SW versions. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140351	Generator DSP Control. Emergency signal activated by master.	Error	Generator DSP Control. Emergency signal activated by master.	• Check communications, check SW versions. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140352	Generator DSP Control. Synchronism signal (exposure order) has been received before preparation signal.	Error	Generator DSP Control. Synchronism signal (exposure order) has been received before preparation signal.	• Check communications, check SW versions. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140353	Generator DSP Control. Filament current demand is out of range.	Error	Generator DSP Control. Calibration value given for this filaments exceeds filament maximum current.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance). • Recalibrate the Focus.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140354	Generator DSP Control. Frequency out of range.	Error	Generator DSP Control. The main converter is oscillating out of its range.	• Check the Power Inverter and System resonance components (Inductance, Capacitor, Monoblock). • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140356	Generator DSP Control. End exposure not detected.	Error	Generator DSP Control. Control Board internal warning: end of exposure not detected by kv controller.	• Check SW versions. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140357	Generator DSP Control. Internal Status Fail.	Error	Generator DSP Control. Control Board internal warning: internal status not correct.	• Check SW versions. • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140358	Generator DSP Control. Monoblock connector error.	Error	Generator DSP Control. Control Board internal warning: J14 connector error.	• Check the circular Control Connector of the HV Transformer (Monoblock) is properly connected (it sounds a click when it is inserted and rotated at 90º). • Check the Connector Pins in the HV Transformer (Monoblock). • Check Head-Assembly wiring to MONOBLOCK BUFFER Board (A40003) and ADVANCED CONTROL Board (A3678) (J14, pins 9 and 10).
140359	Generator DSP Control. mA out of range.	Error	Generator DSP Control. mA out of range. Abort exposure.	• Restart the system. If error persists, calibrate filaments.
140360	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 boosting time small data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140361	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 boosting time large data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140362	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 boosting rec time data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140363	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 setting time small data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140364	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 setting time large data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140365	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 setting time fluoro data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140366	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 preheat ADC small data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140367	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 pheat ADC large data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140368	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 current limit small data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140369	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 current limit large data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140370	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration Tube 1 rise time data error.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140390	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration data error.	• No Service action required. *(Not included in the current SW version).*
140394	Generator DSP Control. Power Control Calibration data error.	Error	Generator DSP Control. Power Control Calibration data error.	• No Service action required. *(Not included in the current SW version).*

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140403	Generator DSP Control. Feedback KV error.	Error	Generator DSP Control. No feedback detected in the first 1/4 ramp.	• Check power supply and wiring of the Monoblock Buffer Board (A40003-XX), as well as the rest of the Monoblock wiring. • Check the TP27 signal on the Advanced Control Board (A3678-XX). • If everything is correct, replace the Monoblock Buffer Board.
140408	Generator DSP Control. Overcurrent in the main inverter.	Error	Generator DSP Control (SHFM). Overcurrent maintain during 500us.	• No Service action required.
140419	Generator DSP Control. Monoblock temperature limit	Error	Generator DSP Control (SHFM). The Monoblock temperature limit exceeds the limit.	• Wait for temperature to drop. • If the temperature is maintained, check wiring and NTC of the Monoblock. • If after the check, the problem persists, check the Advanced Control Board (ACB - A3678-XX).
140420	Generator DSP Control. ROTOR_UDC undervoltage.	Error	Generator DSP Control. ROTOR_UDC voltage is under its lowest allowed limit.	• Check the UDC (neon) on the UARC Board (A3615). • Check the flat ribbon cable connected between the ADVANCED CONTROL Board (A3678) and the UARC Board (A3615): cable condition and connections, replacing if necessary. • Check on ADVANCED CONTROL Board (A3678), TP3 (1.48 V = 423 Vdc). ▪ If voltage in TP3 is correct, replace the ADVANCED CONTROL Board (A3678). ▪ If the error persists, replace the UARC Board (A3615).
140427	Generator DSP Control. Monoblock temperature error.	Error	Generator DSP Control. Monoblock temperature error.	• No Service action required.
140428	Generator DSP Control. 24V Large Focus Fuse error.	Error	Generator DSP Control. 24V Large Focus Fuse error.	• No Service action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140429	Generator DSP Control. 24V Small Focus Fuse error.	Error	Generator DSP Control. 24V Small Focus Fuse error.	• No Service action required.
140430	Generator DSP Control. Large Focus Inductors Temperature error.	Error	Generator DSP Control. Large Focus Inductors Temperature error.	• No Service action required.
140431	Generator DSP Control. Small Focus Inductors Temperature error.	Error	Generator DSP Control. Small Focus Inductors Temperature error.	• No Service action required.
140460	Generator DSP Control. Main inverter minimum voltage warning.	Error	Generator DSP Control. mA Main inverter minimum voltage warning.	• No Service action required.
140461	Generator DSP Control. mA Following error warning.	Error	Generator DSP Control. mA Following error warning.	• No Service action required.
140462	Generator DSP Control. kV Following error warning.	Error	Generator DSP Control. kV Following error warning.	• No Service action required.
140502	X-ray generator internal error.	Error	Generator Starter. ADC Ref Error. Zero Offset in ADC Module can not be calibrated.	• Restart the System. • If the error persists, replace the UARC Board (A3615).
140503	X-ray generator internal error.	Error	Generator Starter. VREF41 Error. External Reference for ADC converter is out of range.	• Restart the System. • If the error persists, replace the UARC Board (A3615).
140505	X-ray generator internal error.	Error	Generator Starter. Queue memory allocate Error. Integrity failure in Startup memory assignment.	• Restart the System. • If the error persists, replace the UARC Board (A3615).
140506	X-ray generator internal error.	Error	Generator Starter. ADC Distributor Error. Overload.	• Restart the System. • If the error persists, replace the UARC Board (A3615).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140509	X-ray generator internal error.	Error	Generator Starter. Defined spinup type in tube data structure is not supported by the software. Service Action.	• Spin up type not supported by the software. • Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140510	Generator Starter. Tube Configuration. SpinUp Type Mismatch.	Error	Missing tube configuration.	• Set the Tube in the Service Tool.
140511	X-ray generator internal error.	Error	Generator Starter. Switch Emergency Brake. Manual Emergency Brake. Switch Change and Reboot. Service Action.	• Verify that Switch S2-1 is OFF on the UARC Board (A3615). • If it is correct and the error persists, replace the UARC Board (A3615).
140512	Generator Starter powered Off.	Information	Generator Starter. System Powered Off. Power Off Order has been completed.	• No Service action required.
140533	Generator Starter comms error.	Error	Generator Starter. Heartbeat Error. Communications timeout.	• Check the CAN Cable connected to the UARC Board (conector J9): cable condition and connections, replacing if necessary. • If the error persists, replace the UARC Board (A3615). • If the error persists, replace the ADVANCED CONTROL Board (A3678).
140534	Generator Starter. Tube1 mismatch error.	Error	Generator Starter. Check Connection/Configuration in Tube. Tube1 change Impedance Error. Extra logging data for Tube1 Impedance (Logging info data: main:100+Z, aux:200+Z).	• In the UARC Board (A3615), verify the Stator impendance in connector J7. • If it is correct an the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance). • If the error persists, replace the UARC Board (A3615).
140539	Generator Starter Configuration Error.	Error	Generator Starter. Tube configuration error. There is not a valid system configuration in Tube Struct Integrity. Extra logging comms data.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140540	Generator Starter EEPROM Error.	Error	Generator Starter. Tube Eeprom Error. Problem with the integrity of tube saved in EEPROM. When reset default data and configuration are loaded.	• Restart the System. • If the error persists, replace the UARC Board (A3615).
140541	Generator Starter communications Error.	Error	Generator Starter. Can Buffer Rx Overload Error.	• Check the CAN Cable connected to the UARC Board (conector J9): cable condition and connections, replacing if necessary. • If the error persists, replace the UARC Board (A3615).
140542	Generator Starter communications Error.	Error	Generator Starter. Can Buffer Tx Overload Error.	• Check the CAN Cable connected to the UARC Board (conector J9): cable condition and connections, replacing if necessary. • If the error persists, replace the UARC Board (A3615).
140543	HW version mismatch.	Error	Generator Starter. HW version mismatch. Hardware version read in version resistors has never been registered by the software before. Data refers to hw version read and registered. Data = Data: hexadecimal. It is a 1 byte code grouped as: HH SS, [HH: HW version read in board version resistors, SS: last HW version registered in that SW].	• Restart the System. • If the error persists, replace the UARC Board (A3615).
140544	Wrong Dropout Station selection.	Error	Wrong Dropout Station selection.	• Reset error. • If error persists, restart System.
140545	Generator Starter. Low Speed Acceration not allowed.	Error	Generator Starter. Low speed is not allowed.	• Restore the last stable site backup or factory backup (Service Tool).
140546	Generator Starter. High Speed Acceleration not allowed.	Error	Generator Starter. Low speed is not allowed.	• Restore the last stable site backup or factory backup (Service Tool).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140554	Generator Starter. Minimum input voltage Error.	Error	Generator Starter. Min DCBus Error. DC BUS Limit. Limite de Carril. Data refers to read voltage. Data = Read-Voltage (>20 volts) Data<=20, required voltage can not be achieved. T=1ms, x 50 reads for Error.	• Verify UARC Board (A3615) hardware version. • In the UARC Board, measure in connector J10 pin 2-3 to check DCbus Level. • If it is correct and error persists, replace the UARC board (A3615).
140555	Generator Starter. Maximum input voltage Error.	Error	Generator Starter. Max_DCBus_Error. DCBus voltage out of limit.	• Verify UARC Board (A3615) hardware version. • In the UARC Board, measure in connector J10 pin 2-3 to check DCbus Level. • If it is correct and error persists, replace the UARC board (A3615).
140558	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_LS_Excess_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140559	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_LS_Excess_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140560	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_LS_Insuff_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140561	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_LS_Insuff_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140562	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_HS_Excess_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140563	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_HS_Excess_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140564	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_HS_Insuff_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140565	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Acc_HS_Insuff_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140566	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_LS_Excess_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140567	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_LS_Excess_AUX. I_AUX through -W- connection measured in R138 is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140568	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_LS_Insuff_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140569	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_LS_Insuff_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).

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140570	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_HS_Excess_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140571	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_HS_Excess_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140572	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_HS_Insuff_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140573	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Run_HS_Insuff_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140574	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_LS_Excess_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140575	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_LS_Excess_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140576	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_LS_Insuff_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140577	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_LS_Insuff_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140578	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_HS_Excess_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140579	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_HS_Excess_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140580	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_HS_Insuff_AUX. I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140581	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_HS_Insuff_MAIN. I_MAIN through -U- connection measured is out of range (Logging info data: measured mA).	• Check the X-ray Tube connections. • If the error persists, restore the last stable site backup or factory backup (Service Tool - Maintenance).
140582	Generator Starter. Order rejected by Tube HEAT Interlock.	Error	Generator Starter. Acc Order rejected. Tube Overheat.	• Check the X-ray Tube connections.
140583	Generator Starter. Current Error.	Error	Generator Starter. Current_err_Bra_DC_Excess_MAIN_Or_AUX. I_MAIN through -U- or I_AUX through -W- connection measured is out of range (Logging info data: measured mA).	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140584	Generator Starter. Order rejected by DCBUS level.	Error	Generator Starter. Acc Order rejected. Low DCBUS.	• -

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140585	Generator Starter. Incompatible Tube Format.	Error	Wrong format in Tube Struct Version.	• Reload the tube data. If the problem persists, request the proper tube database.
140586	Generator Starter. Order rejected by configuration ONLY_LS.	Error	The starter does not accept HighSpeed Order by Configuration. ONLY_LS Configuration rejects HS_ORDER.	• Review ONLY_LS configuration or select the proper tube.
140587	Generator Starter. Current Error (main).	Error	IMAIN Average current without request.	• -
140588	Generator Starter. Current Error (aux)	Error	IAUX Average current without request.	• -
140589	Generator Starter. Inverter error.	Error	Generator Starter. Inverter error. IGBT power module protection Signal.	• Check the Stator Cable: condition and connections, replacing if necessary. • In the UARC Board (A3615), disconnect and verify stator cable connection in connector J7. • If it is correct and the error persists, replace the UARC Board (A3615). • If the error persists, it could be due to a possible failure in the Stator Cable and/or X-ray Tube, replace the Stator Cable and/or HV Transformer (Monoblock) as necessary.
140590	Generator Starter. Current Error.	Error	Generator Starter. I_Main_AV_MinVal_Error. Current too low. Tube configuration, breakdown or disconnection. (Logging Info Data: 0 on START, 1 on running).	• Replace the UARC Board (A3615).
140591	Generator Starter. Current Error.	Error	Generator Starter. I_Aux_AV_MinVal_Error. Current too low. Tube configuration, breakdown or disconnection. (Logging Info Data: 0 on START, 1 on running).	• Replace the UARC Board (A3615).
140592	Generator Starter. Current Error.	Error	Generator Starter. I_Main_AV_MaxVal_Error. Average current excessive for this tube.	• Replace the UARC Board (A3615).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
140593	Generator Starter. Current Error.	Error	Generator Starter. I_AUX_AV_MaxVal_Error. Average current excessive for this tube.	• Replace the UARC Board (A3615).
140594	Generator Starter. Current Error.	Error	Generator Starter. I_Main_Inst_Out_Of_Range_Error. Peak current excessive. Reached Limit. (Acceleration-50ms or Running-peak over the limit).	• Replace the UARC Board (A3615).
140595	Generator Starter. Current Error.	Error	Generator Starter. I_Aux_Inst_Out_Of_Range_Error. Peak current excessive for this tube. Reached Limit. (Acceleration-50ms or Running-peak over the limit).	• Replace the UARC Board (A3615).
140599	Generator Starter. Error Mismatch.	Error	Generator Starter. Error Mismatch. Unknown Error Type.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
140612	Generator Starter Interlock.	Error	Generator Starter. HW rotor overload. The Anode Rotor/Starter is overloaded because it is being accelerated more than the maximum accepted times per minute due to UARC hardware (hardcoded limit = 5). Interlock message (false interlock off, on interlock on).	• Rotor overload due to hardware. No Service action required.
140613	Generator Starter Interlock.	Error	Generator Starter. Tube 1 rotor overload. The Anode Rotor/Starter is overloaded because it is being accelerated more than the maximum accepted times per minute due to for Tube 1 (tube digitalization limit). Interlock message (false interlock off, on interlock on).	• Rotor overload due to Tube 1. • No Service action required.
140617	Generator Starter. MIN VOLTAGE interlock (DCBUS)	Inhibit Exposure	Generator Starter. DCBUS under operational level (200V).	• No Service action required.
290001	System Communication Error with GPIO Head.	Error	Identification not found of the GPIO Head target.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (D1) of the GPIO HEAD Board (A40004). • If the error persists, replace the GPIO HEAD Board.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
290002	System Communication Error with Battery Monitor.	Error	Identification not found of the Battery Monitor target.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (D36) of the GPIO TROLLEY Board (A40001). • If the error persists, replace the GPIO TROLLEY Board.
290003	System Communication Error with RFID.	Error	Identification not found of the RFID target.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (DS2) of the RFID Board (A9598). • If the error persists, replace the RFID Board.
290004	System Communication Error with ADMC.	Error	Identification not found of the motion control target.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (TBD) of the ADMC Board (A3686). • If the error persists, replace the ADMC Board.
290005	Component Identification Mismatch.	Error	Identification mismatch of the Head target.	• Check Firmware versions of the GPIO HEAD Board (A40004).
290006	Component Identification Mismatch.	Error	Identification mismatch of the Battery Monitor target.	• Check Firmware versions of the GPIO TROLLEY Board (A40001).
290007	Component Identification Mismatch.	Error	Identification mismatch of the RFID target.	• Check Firmware versions of the RFID Board (A9598).
290008	Component Identification Mismatch.	Error	Identification mismatch of the ADMC target.	• Check Firmware versions of the ADMC Board (A3686).
290020	Collimator Apertures Error.	Warning	Collimator Apertures Error.	• Check mechanical part to potentiometers and the GPIO Head cables. Measure potentiometers.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
290100	Positioner configuration checksum is wrong.	Error	Positioner configuration checksum is wrong.	• Replace the ADVANCED CONTROL Board (A3678).
290101	Configuration file not loaded.	Error	There was an error loading the configuration file positioner.xml.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
290102	Configuration file not loaded.	Error	There was an error loading the configuration file positioner_usability_settings.xml.	• Restore the last stable site backup or factory backup (Service Tool - Maintenance).
290103	Invalid configuration parameters according to the license installed.	Error	Configuration not allow by the License.	• Check the System configuration according to the License installed, or replace the System License.
290104	System will power off: Incorrect system in license.	Error	Incorrect system in License.	• Replace the System License.
290105	System will power off: Incorrect startup mode in license.	Error	Incorrect startup mode in License.	• Replace the System License.
290106	Updating license client.	Information	Detected new client in License.	• No Service action required.
290200	Collision detected.	Inhibit Movement	The equipment has detected an object on the movement path.	• No Service action required.
290201	CRITICAL BATTERY LEVEL. Operation is not allowed. Please, connect the system to a power source. Time remaining before shutdown 00:{0}:{1}.	Warning	CRITICAL BATTERY LEVEL. Operation is not allowed. Please, connect the system to a power source. Time remaining before shutdown 00:{0}:{1}.	• Check the Batteries voltage and status, replacing as necessary. • Check the Battery Chargers, replacing as necessary. • If the problem persists, replace the GPIO TROLLEY Board (A40001).
290202	Battery Very Low, please connect the system to power supply.	Warning	Battery Very Low Detected.	• No Service action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
290203	Battery Low, please connect the system to power supply.	Information	Battery Low, please connect the system to power supply.	• No Service action required.
290205	Collimator Apertures have not been calibrated.	Warning	Collimator Apertures have not been calibrated.	• Enter Service Mode and calibrate Collimator apertures.
290206	Focal Skin Distance has not been calibrated.	Warning	Focal Skin Distance has not been calibrated.	• Enter Service Mode and calibrate Focal Skin distance sensor.
290207	Collimator Apertures have not been calibrated.	Warning	Head-assembly handles pressed during the boot up.	• No Service action required.
290208	Head-assembly buttons pressed during booting up.	Warning	Head-assembly buttons pressed during the boot up.	• No Service action required.
290300	System communication error located in the Head.	Error	Heartbeat lost.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (D1) of the GPIO HEAD Board (A40004). • If the error persists, replace the GPIO HEAD Board.
20301	System communication error located in the smart on/off.	Error	Heartbeat lost.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (D36) of the GPIO TROLLEY Board (A40001). • If the error persists, replace the GPIO TROLLEY Board.
290302	System communication error located in the RFID.	Error	Heartbeat lost.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (DS2) of the RFID Board (A9598). • If the error persists, replace the RFID Board.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
290303	System communication error located in the motion control.	Error	Heartbeat lost.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (TBD) of the ADMC Board (A3686). • If the error persists, replace the ADMC Board.
290400	The system has not been used for long time and will shutdown in 00:{0}:{1} unless you connect it to power source or click here.	Warning	The system has not been used for long time and will shutdown in 00:{0}:{1} unless you connect it to power source or click here.	• No Service action required.
290401	System is powering off. Please wait...	Information	System is powering off. Please wait...	• No Service action required.
290402	Remote Handswitch is out of the placement longer than configuration time.	Information	Remote handswitch is out of the placement more than configuration time.	• Return the remote Handswitch to its placement or click on “accept button” to disable the warning.
290500	usability_setting.xml is outdated. Please, enter in service mode and update this file.	Warning	usability_setting.xml is outdated. Please, enter in service mode and update this file.	• Reinstall Software package Initial Settings (according to the Master version).
290501	positioner_1.xml is outdated. Please, enter in service mode and update this file.	Warning	positioner_1.xml is outdated. Please, enter in service mode and update this file.	• Reinstall Software package Initial Settings (according to the Master version).
290700	Inhibit X-ray due to current RFID tag does not allow X-ray.	Inhibit Exposure	Inhibit X-ray due to current RFID tag does not allow X-ray.	• No Service action required.
290701	Inhibit X-ray due to screen has been powered off.	Inhibit Exposure	Inhibit X-ray due to screen has been powered off.	• No Service action required.
290702	Inhibit X-ray due to parking position.	Inhibit Exposure	Inhibit X-ray due to parking position.	• Check the Parking device and its cable connections. • If the error persists, replace the GPIO TROLLEY Board (A40001).
290703	Inhibit X-ray due to system is moving.	Inhibit Exposure	Inhibit X-ray due to system is moving.	• No Service action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
290704	Inhibit X-ray due to brakes are released.	Inhibit Exposure	Inhibit X-ray due to brakes are released.	• No Service action required.
290705	Inhibit X-ray due to board configuration pending.	Inhibit Exposure	Inhibit X-ray due to board configuration pending.	• Check the CAN Cables: cable condition and connections, replacing if necessary. • Check the power supply and LED ON (D1) of the microcontroller of the corresponding Board. • If the problem persists, replace the corresponding Board.
290706	Inhbit X-ray due to System in Critical Battery Level.	Inhibit Exposure	Inhbit X-ray due to System in Critical Battery Level.	• Check the Batteries voltage and status, replacing as necessary. • Check the Battery Chargers, replacing as necessary. • If the problem persists, replace the GPIO TROLLEY Board (A40001).
290707	Inhibit X-ray due to Dosimeter is not ready.	Inhibit Exposure	Inhibit X-ray due to Dosimeter is not ready.	• Access to the Service Mode and remove the dosimeter (remote) to continue working. • Check the Dosimeter and its cable connections. • If the problem persists, replace the Dosimeter.
290708	Inhibit X-ray due to Collimator filters are moving.	Inhibit Exposure	Inhibit X-ray due to Collimator filters are moving.	• No Service action required.
290709	Inhibit X-ray due to tube thermostat is released.	Inhibit Exposure	Inhibit X-ray due to tube thermostat is released.	• Check the Tube Thermostat connector at the GPIO HEAD Board (A40004). • If the error persists, replace the GPIO HEAD Board (A40004).

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290710	Inhibit X-ray due to tube fan is released.	Inhibit Exposure	Inhibit X-ray due to Tube fan is released.	• Check J3-10 of the MONOBLOCK BUFFER Board (A40003). • Check J1-2 of the MONOBLOCK BUFFER Board (A40003). • Check J3-2 of the GPIO HEAD Board (A40004). • Check the power supply to Fan. • If the problem persists, replace the HV Transformer (Monoblock).
290711	Fan Tube released.	Information	Fan Tube released.	• No Service action required.
290712	Fine positioning buttons pressed longer than allowed.	Information	Fine positioning buttons pressed longer than allowed.	• Release the Fine positioning buttons.
290714	DAP value cannot be measured.	Information	DAP value cannot be measured.	• Check if the DAP connection is plugged into the GPIO Head Board (A40004-XX).
290750	Dosemeter values have not been received from GPIO Head.	Information	Dosemeter values have not been received from GPIO Head.	• Possible cause: GPIO HEAD Board (A40004) restoration during the exposure.
290751	ExposureSoundOn Acknowledge Message has not been received from RFID Board.	Information	ExposureSoundOn Acknowledge Message has not been received from RFID Board.	• Replace the RFID Board (A9598).
291001	Internal error located in the battery monitor.	Error	RAM memory error during the RAM test before initializing the system.	• Replace the GPIO TROLLEY Board (A40001).
291002	Internal error located in the battery monitor.	Error	Dynamic memory error trying to allocate memory.	• Replace the GPIO TROLLEY Board (A40001).
291003	Internal error located in the battery monitor.	Error	Error watchdog.	• Replace the GPIO TROLLEY Board (A40001).
291004	Internal error located in the battery monitor.	Error	Error EEPROM map corrupted.	• Replace the GPIO TROLLEY Board (A40001).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
291005	Internal error located in the battery monitor.	Error	Error EEPROM failed.	• Replace the GPIO TROLLEY Board (A40001).
291014	System communication error located in the battery monitor.	Error	Error CAN0 bus status change.	• Check the power supply to GPIO TROLLEY Board (A40001) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D36 on GPIO TROLLEY Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO TROLLEY Board (A40001).
291015	System communication error located in the battery monitor.	Error	Error CAN0 Rx Hw overrun.	• Check the power supply to GPIO TROLLEY Board (A40001) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D36 on GPIO TROLLEY Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO TROLLEY Board (A40001).

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291016	System communication error located in the battery monitor.	Error	Error CAN0 Rx SW overrun.	• Check the power supply to GPIO TROLLEY Board (A40001) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D36 on GPIO TROLLEY Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO TROLLEY Board (A40001).
291017	System communication error located in the battery monitor.	Error	Error CAN0 Tx Sw overrun.	• Check the power supply to GPIO TROLLEY Board (A40001) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D36 on GPIO TROLLEY Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO TROLLEY Board (A40001).
291018	Peripheral communication error located in the battery monitor.	Error	Error CAN4 bus status change.	• No Service action required.
291019	Peripheral communication error located in the battery monitor.	Error	Error CAN4 Rx Hw overrun.	• No Service action required.
291020	Peripheral communication error located in the battery monitor.	Error	Error CAN4 Rx SW overrun.	• No Service action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
291021	Peripheral communication error located in the battery monitor.	Error	Error CAN4 Tx Sw overrun.	• No Service action required.
291023	Internal error located in the battery monitor.	Error	Error queue overflow. Some error messages may be lost.	• Check previous errors, keep in mind that some errors may have been lost. • If the error persists, check the errors in the LOG list starting with the most recent ones.
291024	System communication error located in the battery monitor.	Error	Error protocol heartbeat.	• Check the power supply to GPIO TROLLEY Board (A40001) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D36 on GPIO TROLLEY Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO TROLLEY Board (A40001).
291039	Internal error located in the battery monitor.	Error	Error FPGA access.	• No Service action required.
291040	Peripheral communication error located in the battery monitor.	Error	Error I2C0.	• Replace the GPIO TROLLEY Board (A40001).
291041	Peripheral communication error located in the battery monitor.	Error	Error SPI0.	• Replace the GPIO TROLLEY Board (A40001).
291050	Internal error located in the battery monitor.	Error	Error digital potentiometer AD5171 access.	• Replace the GPIO TROLLEY Board (A40001).
291051	Internal error located in the battery monitor.	Error	Error FRAM memory FM24W256 access.	• Replace the GPIO TROLLEY Board (A40001).
291052	Internal error located in the battery monitor.	Error	Error FRAM memory FM24W256 corrupted.	• Replace the GPIO TROLLEY Board (A40001).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
291053	Internal error located in the battery monitor.	Error	Error digital potentiometer AD5175 access.	• Replace the GPIO TROLLEY Board (A40001).
291100	Battery below critically low, shutting down the system.	Warning	Battery below critically low, shutting down the system by hardware.	• If the error message occurs out of the “Battery below critically low” conditions, check the batteries voltage. • If the voltage is correct (>396 V), replace the GPIO GPIO TROLLEY Board (A40001).
291101	Download not performed due to a hardware failure.	Information	Download not performed due to a hardware failure.	• Check the “ready CAN” signal (24 V HW, other than the 24 V of the system). • Check the CAN Cables: cable condition and connections, replacing if necessary. • If both are correct and the problem persists, plug the unit to mains and, after activing the bootloader mode, manually download the Firmware with the USB-CAN adapter.
292001	Internal error located in the RFID.	Error	RAM memory error during the RAM test before initializing the system.	• Replace the RFID Board (A9598).
292002	Internal error located in the RFID.	Error	Dynamic memory error trying to allocate memory.	• Replace the RFID Board (A9598).
292003	Internal error located in the RFID.	Error	Watchdog error.	• Replace the RFID Board (A9598).
292004	Internal error located in the RFID.	Error	EEPROM map error. It was detected a corrupted EEPROM memory map.	• Replace the RFID Board (A9598).
292005	Internal error located in the RFID.	Error	EEPROM error: reading or writing process failed.	• Replace the RFID Board (A9598).
292006	Internal error located in the RFID.	Error	EEPROM error: reading or writing process failed.	• Replace the RFID Board (A9598).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
292014	System communication error located in the RFID.	Error	CAN 0 bus status error.	• Check the power supply to RFID Board (A9598) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED DS2 on RFID Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the RFID Board (A9598).
292015	System communication error located in the RFID.	Error	CAN 0 RX HW overrun error.	• Check the power supply to RFID Board (A9598) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED DS2 on RFID Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the RFID Board (A9598).
292016	System communication error located in the RFID.	Error	CAN 0 RX HW overrun error.	• Check the power supply to RFID Board (A9598) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED DS2 on RFID Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the RFID Board (A9598).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
292017	System communication error located in the RFID.	Error	CAN 0 TX SW overrun error.	• Check the power supply to RFID Board (A9598) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED DS2 on RFID Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the RFID Board (A9598).
292023	Internal error located in the RFID.	Error	Error queue overflow. Some error messages may be lost.	• Check previous errors, keep in mind that some errors may have been lost. • If the error persists, check the errors in the LOG list starting with the most recent ones.
292024	RFID System Communication Error.	Error	Error protocol heartbeat.	• Check the power supply to RFID Board (A9598) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED DS2 on RFID Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the RFID Board (A9598).
292040	RFID Peripheral Communication Error.	Error	I2C error.	• Replace the RFID Board (A9598).
292041	RFID Peripheral Communication Error.	Error	SPI0 error.	• Replace the RFID Board (A9598).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
292100	RFID reset by WDT.	Information	RFID reset by WDT.	• Refer to Error ID 292003.
292101	RFID not available	Information	RFID device error.	• Check RFID device.
293004	Motion Control: Left Motor Differential Signal error.	Error	Left Motor Encoder or Hall Effect signals error. J2 connector from A3686 Motion Control Board.	• Check all the cable pins between the left motor and connector J2 (ENCODER LEFT) of the ADMC Board (A3686), repairing or replacing as necessary. • If the cable is correct and the problem persists, replace the ADMC Board (A3686). • If the error persists, replace the left motor.
293005	Motion Control: Right Motor Differential Signal error.	Error	Right Motor Encoder or Hall Effect signals error. J3 connector from A3686 Motion Control Board.	• Check all the cable pins between the right motor and connector J3 (ENCODER RIGHT) of the ADMC Board (A3686), repairing or replacing as necessary. • If the cable is correct and the problem persists, replace the ADMC Board (A3686). • If the error persists, replace the right motor.
293006	Motion Control: Power Supply error in left motor power isolated area.	Error	ADMC board error in left motor power isolated area (DS26).	• Check voltage at Neon DS26 of the ADMC Board (A3686). • If DS26 is ON and the voltage is correct, replace the ADMC Board (A3686). • If DS26 is OFF check all cables and conections, repairing or replacing as necessary.
293007	Motion Control: Power Supply error in right motor power isolated area.	Error	ADMC board error in right motor power isolated area (DS29).	• Check voltage at Neon DS29 of the ADMC Board (A3686). • If DS29 is ON and the voltage is correct, replace the ADMC Board (A3686). • If DS29 is OFF check all cables and connections, repairing or replacing as necessary.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
293008	Motion Control: Left Motor IGBTs error.	Error	ADMC board left IGBTs over temperature, over current or short circuit. Connector J9 from A3686.	• Measure continuity (between phases) in motor windings, connector J9 (2.6 Ohm ± 10%; 7 mH ± 20%). • Measure continuity (between phases and GND) in motor windings (if the circuit is open: >500 k). • If the motor measurements are correct, replace the ADMC Board (A3686).
293009	Motion Control: Right Motor IGBTs error.	Error	ADMC board right IGBTs over temperature, over current or short circuit. Connector J14 from A3686.	• Measure continuity (between phases) in motor windings, connector J14 (2.6 Ohm ± 10%; 7 mH ± 20%). • Measure continuity (between phases and GND) in motor windings (if the circuit is open: >500 k). • If the motor measurements are correct, replace the ADMC Board (A3686).
293010	Motion Control: Left Motor AC Overcurrent error.	Error	Left Motor AC Overcurrent. Connector J9 from A3686.	• Measure continuity (between phases) in motor windings, connector J9 (2.6 Ohm ± 10%; 7 mH ± 20%). • Measure continuity (between phases and GND) in motor windings (if the circuit is open: >500 k). • If the motor measurements are correct, replace the ADMC Board (A3686).
293011	Motion Control: Right Motor AC Overcurrent error.	Error	Right Motor AC Overcurrent. Connector J14 from A3686.	• Measure continuity (between phases) in motor windings, connector J14 (2.6 Ohm ± 10%; 7 mH ± 20%). • Measure continuity (between phases and GND) in motor windings (if the circuit is open: >500 k). • If the motor measurements are correct, replace the ADMC Board (A3686).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
293012	Motion Control: Left 1 Force Sensor Error.	Error	Handle bar left 1 force sensor error.	• Check the wiring of the J10 connector (FORCE SENSORS LEFT) on the ADMC Board (A3686). • If it is correct, replace the left gauge. • If the error persists, replace the ADMC Board (A3686).
293013	Motion Control: Left 2 Force Sensor Error.	Error	Handle bar left 2 force sensor error.	• Check the wiring of the J10 connector (FORCE SENSORS LEFT) on the ADMC Board (A3686). • If it is correct, replace the left gauge. • If the error persists, replace the ADMC Board (A3686).
293014	Motion Control: Right 1 Force Sensor error.	Error	Handle bar right 1 force sensor error.	• Check the wiring of the J15 connector (FORCE SENSORS RIGHT) on the ADMC Board (A3686). • If it is correct, replace the right gauge. • If the error persists, replace the ADMC Board (A3686).
293015	Motion Control: Right 2 Force Sensor error.	Error	Handle bar right 2 force sensor error.	• Check the wiring of the J15 connector (FORCE SENSORS RIGHT) on the ADMC Board (A3686). • If it is correct, replace the right gauge. • If the error persists, replace the ADMC Board (A3686).
293019	Motion Control: Left Motor AC Current Presence previously to start up error.	Error	Left Motor AC current presence previous to start up.	• Measure continuity (between phases) in motor windings, connector J9 (2.6 Ohm ± 10%; 7 mH ± 20%). • Measure continuity (between phases and GND) in motor windings (if the circuit is open: >500 k). • If the motor measurements are correct, replace the ADMC Board (A3686).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
293020	Motion Control: Right Motor AC Current Presence previous to start up error.	Error	Right Motor AC current presence previous to start up.	• Measure continuity (between phases) in motor windings, connector J14 (2.6 Ohm ± 10%; 7 mH ± 20%). • Measure continuity (between phases and GND) in motor windings (if the circuit is open: >500 k). • If the motor measurements are correct, replace the ADMC Board (A3686).
293024	Motion Control: Overheating error.	Error	ADMC board overheating or IGBTs overheating.	• Check that there are no obstructions in the ventilation ducts. • If ventilation is correct and the error persists, replace the ADMC Board (A3686).
293029	Motion Control: FPGA Heartbeat error.	Error	FPGA HeartBeat failure.	• Replace the ADMC Board (A3686).
293030	Motion control: FPGA Golden FW.	Error	FPGA Flash running Golden Program.	• Rewrite the FPGA. • If the error persists, replace the ADMC Board (A3686).
293032	Motion Control: Proximity Sensors fault detection.	Warning	The unit performs a safety state under proximity sensors fault detection. The maximum speed allowed is 1.6 km/h.	• In the event of a failure of the proximity sensors, the SW checks the proximity sensors board every 2 minutes. • If the error persists after this time and several attempts, check the cable from connector J1 of the ANTICOLLISION Board (A3708) to connector J1 of the ADMC Board (A3686), replacing if necessary. • If wiring and connections are correct, check LEDs (DS14, DS28, DS13); these LEDs light at different intensity when bringing an object closer to the sensors; if the LEDs light steady or are OFF, replace the ANTICOLLISION Board (A3708). *Note: if the problem persists, it is possible to disable the proximity sensors detection provisionally (before replacing the board) to drive the System at a nominal speed.*

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
293033	Motion Control: Bumper fault.	Warning	Bumper wire is broken. The unit performs a safety state under bumper fault detection. The maximum speed allowed is 1.6 km/h. The unit performs a safety state under bumper fault detection. The maximum speed allowed is 1.6 km/h.	• Check the System bumper (TP23 at 3V with bumper released. TP23 at 0V with bumper pressed); if it is correct and the problem persists, replace the ADMC Board (A3686). • If TP23 at 5V, check the cable going to J16 BUMPER connector of the ADMC Board (A3686) and the bumper switches, replacing as necessary.
293034	Motion Control: Stop due to Battery charging.	Information	Mains on signal active. The unit remains still until unplug the battery charger wire.	• Check that the converter is not connected to the mains. • If the error persists, check the J17 connector (Mains ON) of the ADMC Board (A3686), and check that LED DS8 does not lit red. • If the error persists, replace the ADMC Board (A3686).
293035	Motion Control: Stop due to Deadman pressed at start up.	Information	The unit remains still until the user release deadman and push it again.	• Check connector J19 (LED DS19 lights yellow if Deadman is pressed) and the Deadman cable and connection, replacing if necessary.
293036	Motion Control: Stop due to Handle bar pressed at start up.	Information	The unit remains still until the user release the handle bar and push it again.	• Make sure that the Handlebar is not pressed during the System starting up. • If the error persists, perform the Calibration and then check that LEDs DS9, DS10, DS11 and DS15 are not lit when the Handlebar is not pressed. • If the error persists, check the gauges. • If the error persists, change the ADMC Board (A3686).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
293037	Motion Control: Stop due to Header key pressed at start up.	Information	The Mobile init remains still until release the key and press it again.	• Check that the capacitive Handlebar is not pressed during the starting up of the System and that there is not any object, gel, or liquid present on the surface. • Check the wiring coming from the keys located on the Head-Assembly handgrips to the connectors J10 and J16 of the GPIO HEAD Board (A40004). • If the error persists, replace the GPIO HEAD Board (A40004). • If the error persists, replace the ADMC Board (A3686).
293038	Motion Control: Stop due to Force Sensors Calibration Fault.	Information	Force sensors placed at handle bar have not been calibrated.	• Check that the capacitive Handlebar is not pressed during the starting up of the System and that there is not any object, gel, or liquid present on the surface. • Perform a Calibration of the Handlebar sensors. • If the error persists, replace the ADMC Board (A3686).
293051	Motion Control: Header Key not working properly.	Warning	If any Header Key is pressed, the unit remains still due to hardware malfunction.	• Restart System.
294001	Internal error located in the Head.	Error	RAM memory error during the RAM test before initializing the System.	• Replace the GPIO HEAD Board (A40004).
294002	Internal error located in the Head.	Error	Dynamic memory error trying to allocate memory.	• Replace the GPIO HEAD Board (A40004).
294003	Internal error located in the Head.	Error	Watchdog error: time expired executing main loop.	• Replace the GPIO HEAD Board (A40004).
294004	Internal error located in the Head.	Error	EEPROM map error. It was detected a corrupted EEPROM memory map.	• Replace the GPIO HEAD Board (A40004).
294005	Internal error located in the Head.	Error	EEPROM error: reading or writing process failed.	• Replace the GPIO HEAD Board (A40004).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
294014	System communication error located in the Head.	Error	CAN 0 bus status error.	• Check the power supply to GPIO HEAD Board (A40004) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D1 on GPIO HEAD Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO HEAD Board (A40004).
294015	System communication error located in the Head.	Error	CAN 0 RX HW overrun error.	• Check the power supply to GPIO HEAD Board (A40004) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D1 on GPIO HEAD Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO HEAD Board (A40004).
294016	System communication error located in the Head.	Error	CAN 0 RX SW overrun error.	• Check the power supply to GPIO HEAD Board (A40004) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D1 on GPIO HEAD Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO HEAD Board (A40004).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
294017	System communication error located in the Head.	Error	CAN 0 TX SW overrun error.	• Check the power supply to GPIO HEAD Board (A40004) and to ADVANCED CONTROL Board (A3678). • Check the CAN Cables: cable condition and connections, replacing if necessary. • Check that the Status LED on each Board is blinking orange (LED D1 on GPIO HEAD Board and LED DS1 on ADVANCED CONTROL Board). ▪ If any of them are wrong, replace the defective Board. ▪ If both Boards are correct, replace the GPIO HEAD Board (A40004).
294018	Peripheral communication error located in the Head.	Error	CAN 4 bus status error.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).
294019	Peripheral communication error located in the Head.	Error	CAN 4 RX HW overrun error.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).
294020	Peripheral communication error located in the Head.	Error	CAN 4 RX SW overrun error.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
294021	Peripheral communication error located in the Head.	Error	CAN 4 TX SW overrun error.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).
294023	Internal error located in the Head.	Error	Error queue overflow. Some error messages may be lost.	• Check previous errors, keep in mind that some errors may have been lost. • If the error persists, check the errors in the LOG list starting with the most recent ones.
294027	Collimator Internal Error.	Error	Collimator general error.	• Ceck the Collimator connections: cable condition and connections, replacing if necessary. • Check for blockages on the Collimator Filter Disk. • If the error persists, replace the GPIO HEAD Board (A40004) and check for correct operation. • If the error persists, replace the Collimator.
294028	Collimator Configuration Error.	Error	Collimator is not selected.	• Check the Collimator configuration. • Check the CAN Cables connected to the ADVANCED CONTROL Board (A3678): cable condition and connections, replacing if necessary.
294030	Dosimeter Internal Error.	Error	Dosimeter general error.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
294031	Dosimeter Configuration Error.	Error	Dosimeter is not selected.	• Check the Collimator configuration. • Check the CAN Cables connected to the ADVANCED CONTROL Board (A3678): cable condition and connections, replacing if necessary.
294032	Dosimeter Communication Error.	Error	Dosimeter communication error.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).
294033	Dosimeter restarted error.	Error	Dosimeter has been reset due to some problem.	• Check the power supply to Dosimeter. • Check the Dosimeter Cable: cable condition and connections, replacing if necessary. • Replace the Dosimeter and check for correct operation. • If the error persists, replace the GPIO HEAD Board (A40004).
294039	Internal communication bus error located in the Head.	Error	FPGA access error.	• Replace the GPIO HEAD Board (A40004).
294040	Peripheral communication error located in the Head.	Error	I2C error.	• Replace the GPIO HEAD Board (A40004).
294041	Peripheral communication error located in the Head.	Error	SPI0 error.	• Replace the GPIO HEAD Board (A40004).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
294046	Internal error located in the Head.	Error	Error in the Focal Skin distance sensors.	• Check the configuration according to the installed Hardware. • Check the cable connections of the “Skin-Focus Distance” Sensor. • Check the “Skin-Focus Distance” Sensor. Replace if necessary. *WARNING: if the Sensor is replaced, it must be calibrated.* • If the “Skin-Focus Distance” Sensor is correct and the error persists, replace the GPIO HEAD Board (A40004).
294050	Peripheral communication error located in the Head.	Error	SPI1 error.	• Replace the GPIO HEAD Board (A40004).
294051	Internal error located in the Head.	Error	Flash failure.	• Replace the GPIO HEAD Board (A40004).
294053	Digital accelerometer error located in the Head.	Error	Digital accelerometer error.	• Replace the GPIO HEAD Board (A40004) or the ACCELEROMETER Board if it is an external Board to GPIO HEAD Board.
294054	Internal error located in the Head.	Error	Error in the Focal Skin distance sensors.	• Check the configuration according to the installed Hardware. • Check the cable connections of the “Skin-Focus Distance” Sensor. • Check the “Skin-Focus Distance” Sensor. Replace if necessary. *WARNING: if the Sensor is replaced, it must be calibrated.* • If the “Skin-Focus Distance” Sensor is correct and the error persists, replace the GPIO HEAD Board (A40004).
294059	Internal error located in the Head.	Error	Error board unknown.	• Check that the version of the FPGA (HDL) corresponds to the appropriate version of the GPIO HEAD Software. If not, replace the GPIO HEAD Board (A40004).

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
300003	Switches configuration could not be loaded.	Error	-	• Check that the exposure_switches.xml configuration file is well coded. • If the error persists, restore the original configuration file. • Another option is to run the SettingSetupInstaller.exe again.
300006	Generator configuration could not be loaded.	Error	-	• Check that the generator.xml configuration file is well coded. • If the error persists, restore the original configuration file. • Another option is to run the SettingSetupInstaller.exe again.
300007	Workstations configuration could not be loaded.	Error	-	• Restore the last stable site backup or factory backup (Service Tool - Maintenance). • Another option is to run the SettingSetupInstaller.exe again.
300008	Image receptors configuration could not be loaded.	Error	-	• Restore the last stable site backup or factory backup (Service Tool - Maintenance). • Another option is to run the SettingSetupInstaller.exe again.
300009	Positioner disconnected.	Error	Positioner disconnected.	• Check that the Smart Hub is correctly installed in the “Smart Hub monitor” tool of the Windows menu. • If necessary, restart the Smart Hub.
300010	Console disconnected.	Error	Console has disconnected from the Smart-hub.	• Check that the Smart Hub is correctly installed in the “Smart Hub monitor” tool of the Windows menu. • If necessary, restart the Smart Hub.
300011	Generator disconnected.	Error	Generator disconnected.	• Check that the Smart Hub is correctly installed in the “Smart Hub monitor” tool of the Windows menu. • If necessary, restart the Smart Hub.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
300012	Workstation mismatch for Generator and Positioner.	Error	Data inconsistency detected for the selected Workstation.	• Check the errors in the LOG list starting with the most recent ones.
300013	Active Procedure mismatch for Generator and Positioner.	Error	Data inconsistency detected for the activated Procedure.	• Check the errors in the LOG list starting with the most recent ones.
300014	Positioner configuration could not be loaded.	Error	-	• Check that the positioner.xml configuration file is well coded. • If the error persists, restore the original configuration file. • Another option is to run the SettingSetupInstaller.exe again.
300015	Configuration changes could not be saved.	Error	Configuration changes could not be saved.	• It can occur after loading a new configuration. • Check the errors in the LOG list starting with the most recent ones.
300016	Initializing communications ...	Information	Connecting to Smart Hub ...	• Check that the Smart Hub is correctly installed in the “Smart Hub monitor” tool of the Windows menu. • If necessary, restart the Smart Hub.
300019	Generator working in Service mode.	Warning	Generator working in Service operation mode.	• Check that no consoles appear in the Service console. • If the error persists, restart the System.
300020	Positioner working in Service mode.	Warning	Positioner working in Service operation mode.	• Check that no consoles appear in the Service console. • If the error persists, restart the System.
300021	Could not verify Service access.	Warning	Could not verify Service access.	• Make sure the RFID Card used has assigned the proper permissions for Service Mode Access.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
300024	Usability settings configuration could not be loaded.	Error	-	• Check that the usability_settings.xml configuration file is well coded. • If the error persists, restore the original configuration file. • Another option is to run the SettingSetupInstaller.exe again.
300028	Calibration in progress.	Inhibit Exposure	Calibration in progress.	• No Service action required.
300029	Snapshots in progress.	Inhibit Exposure	Snapshots in progress.	• No Service action required.
300031	The exposure settings have been modified during calibration. Please make sure to recover the exposure settings from the Image System application	Inhibit Exposure	The exposure settings have been modified during calibration. Please make sure to recover the exposure settings from the Image System application.	• Recover the exposure settings from the Image System application.
300035	Calibration file could not be loaded.	Error	-	• No Service action required.
300036	Waiting for generator license...	Information	The system is waiting to obtain the generator license during the startup.	• If message does not disappear after the start up is finished, call Service.
300037	Waiting for generator operation mode to be initialized...	Information	The system is waiting for the initialization of the generator operation mode.	• If message does not dissapear after the start up is finished, call Service.
300038	Waiting for positioner operation mode to be initialized...	Information	The system is waiting for the initialization of the positioner operation mode.	• If message does not disappear after the start up is finished, call Service.
300039	Processing Downloader. This action can take several minutes, please wait.	Information	Processing the software update with Downloader.	• No Service action required.
300040	Downloader finished with error code {0}	Information	Downloader has finished the software update with error.	• No Service action required.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
300041	Downloader finished successfully.	Information	Downloader has successfully completed the software update.	• No Service action required.
301000	eDAP is not calibrated.	Warning	eDAP is not calibrated.	• Calibrate eDAP in the “Positioner Setup -> EDAP Calibration” menu of the Service Tool.
301001	DAP value cannot be estimated.	Inhibit Exposure	DAP value cannot be estimated.	• Fix Collimator errors.
301002	DOSE value cannot be estimated.	Inhibit Exposure	DOSE value cannot be estimated.	• Fix Collimator or Focal Skin Distance errors.
301003	eDAP estimation out of range, please recalibrate.	Warning	eDAP estimation out of range, please recalibrate.	• Calibrate the eDAP for different filters in the “Positioner Setup -> EDAP Calibration” menu of the Service Tool.
301004	eDAP is not available for these configuration settings.	Warning	No estimation has been done for these configuration settings.	• Check that eDAP is enabled in the settings of the “Positioners“ configuration window. Change settings to those supported by the manufacturer.
301005	No license available for DAP estimation.	Warning	No estimated license available.	• Upgrade to a license with this functionality or disable estimated dose options from the settings of the “Positioners” configuration window.
301006	Wrong positioner configuration. Cannot estimate dose	Warning	Wrong positioner configuration. Cannot estimate Dose.	• Check that the eDAP/eDOSE settings in the “Positioners” configuration window corresponds to the system license.
301007	Wrong positioner configuration. Cannot estimate DAP	Warning	Wrong positioner configuration. Cannot estimate DAP.	• Check that the eDAP/eDOSE settings in the “Positioners” configuration window corresponds to the system license.
301008	Wrong eDAP calibration value for No filter	Error	Wrong eDAP calibration value for filter 0.	• Repeat the calibration exposure considering the displayed settings and parameters.
301009	Wrong eDAP calibration value for 2mmAl Filter	Error	Wrong eDAP calibration value for 2mmAl Filter.	• Repeat the calibration exposure considering the displayed settings and parameters.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
301010	Wrong eDAP calibration value for 2mmAl+0.2mmCu Filter	Error	Wrong eDAP calibration value for 2mmAl+0.2mmCu Filter.	• Repeat the calibration exposure considering the displayed settings and parameters.
301011	Wrong eDAP calibration value for 2mmAl+0.1mmCu Filter	Error	Wrong eDAP calibration value for 2mmAl+0.1mmCu Filter.	• Repeat the calibration exposure considering the displayed settings and parameters.
301012	Dose values cannot be estimated for this procedure type	Information	The selected procedure/technique is not compatible with Dose Estimation.	• No Service action required.
500004	Selecting technique.	Inhibit Exposure	Selecting technique.	• No Service action required.
500008	Generator parameters modified.	Information	Generator parameters modified.	• No Service action required.
500012	There is no workstation configured for this request.	Information	There is no workstation configured for this request. New workstation selection is needed.	• No Service action required.
500014	Technique not loaded in generator.	Inhibit Exposure	Technique not loaded in generator.	• Check the kV, mA, time, Focus selected for the technique. • Check the APR settings and configuration for this technique.
500015	Detector not ready for exposure.	Inhibit Exposure	Detector not ready for exposure.	• Check the detector is charged and ON. • Only exposures in film mode (direct) are allowed if pressing Accept and change the workstation to film.
500016	Error loading APR Technique, please retry.	Inhibit Exposure	Error loading APR Technique, please retry.	• Check that the Workstation and Workspace names matches (refer to the Configuration and Calibration chapter of the Service Manual). • Check the APR settings and configuration for this technique.
500020	APR settings not defined.	Inhibit Exposure	APR settings not defined.	• Define the APR parameters for the technique.

ID	DESCRIPTION	CATEG.	SERVICE LOG_DESCRIPTION	SERVICE ACTION
500022	Console not available.	Inhibit Exposure	Console not available.	• Check that the CXDI Canon NE application starts in the RAD Console.
500024	Please, reselect technique.	Inhibit Exposure	Please, reselect technique.	• Check the errors in the LOG list starting with the most recent ones.
500025	Please, select a protocol from Image System.	Inhibit Exposure	Please, select a protocol from Image System.	• Select a protocol from Image System.
500033	EDAP not available.	Information	EDAP not available.	• Check if dose estimator node is connected to Smart Hub.
500043	Please, press the handswitch to start the exposure.	Information	Waiting for Preparation Request.	• No Service action required.
500044	Image System not available.	Inhibit Exposure	Image System not available.	• -