SEDECAL

Technical Publication
SM-0524R4

Service Manual

SEDECAL X

Universal Radiographic System

CE 0120

Este producto ostenta una marca CE de acuerdo con las disposiciones de la Directiva 93/42/CEE del 14 de Junio de 1993 sobre Productos Médicos.
This product bears a CE marking in accordance with the provisions of the 93/42/EEC MDD dated June 14, 1993.

REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	AUG 2, 2004	First edition
1	OCT 4, 2005	Schematics
2	JUN 28, 2006	New Balance Adjustment System
3	FEB 08, 2011	Schematics
4	MAY 17, 2011	Renewal Parts

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

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

ADVISORY SYMBOLS

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

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

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

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

Note ☞

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

SAFETY SYMBOLS

The following safety symbols will be used in the equipment.
Their meaning are described below.

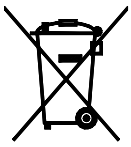
Attention, consult accompanying documents.

Ionizing radiation.

Type B equipment.

Dangerous voltage.

Ground.



This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.

TABLE OF CONTENTS

SECTION 1 INTRODUCTION

1.1 TOOLS

The following hand tools are required for the Installation:

- Standard service engineers tool kit.
- Electric drill motor and assorted bits.

1.2 PRE-INSTALLATION CHECKS

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

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

Maximum Height	2720 mm
Maximum Width	2260 mm
Maximum Length	1400 mm

- Conduits and walls are ready to install the system.

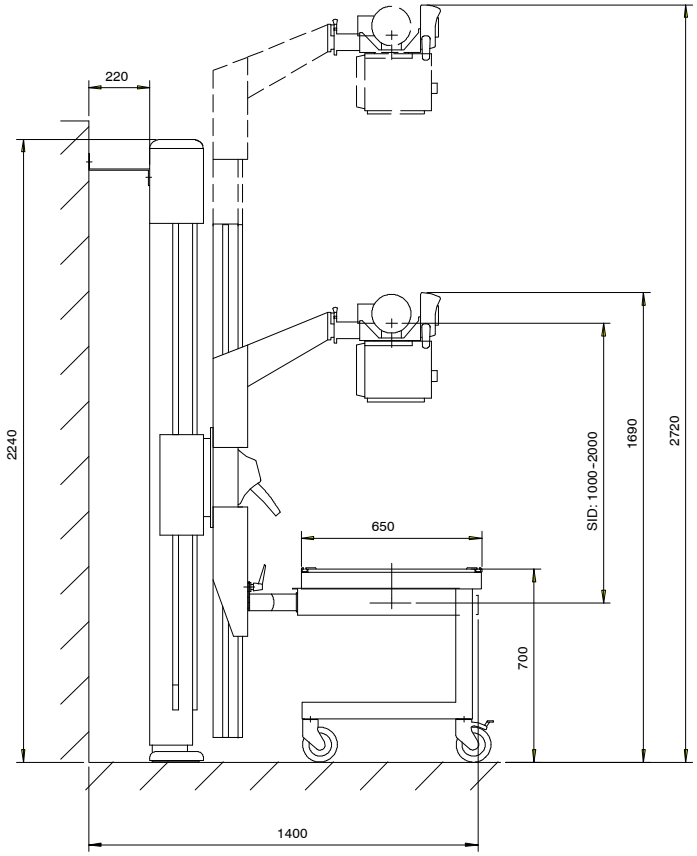
- Electricity installation:

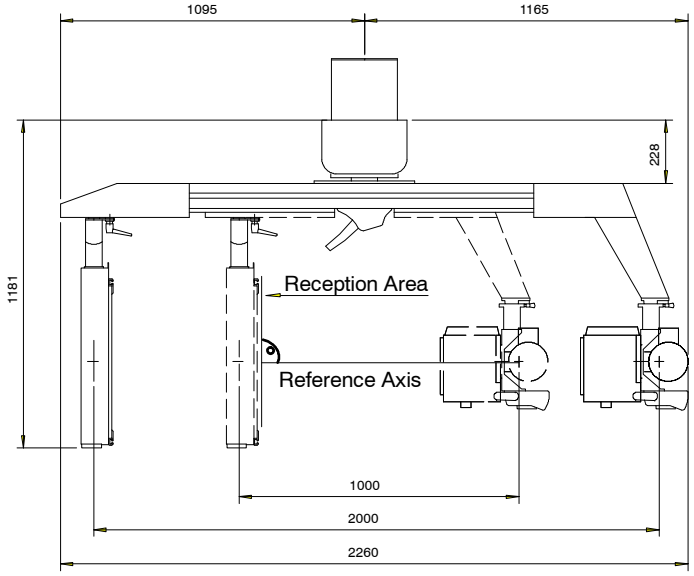
  Main Supply: Single phase, 50 / 60 Hz
  115 / 208 / 230 / 240 V~

  Minimum power input required: 400 VA

ACCORDING TO THE MDD/93/42/EEC, THIS UNIT IS EQUIPPED WITH EMC FILTERS. THE LACK OF THE PROPER GROUNDING MAY PRODUCE ELECTRICAL SHOCK TO THE USER.

Illustration 1-1
Dimensions





SECTION 2 UNPACKING

The whole system is shipped in several boxes to facilitate transport and installation. Upon receipt of the X-ray unit and associated equipment, inspect all shipping containers for signs of damage. If damage is found, notify the carrier or his agent immediately.

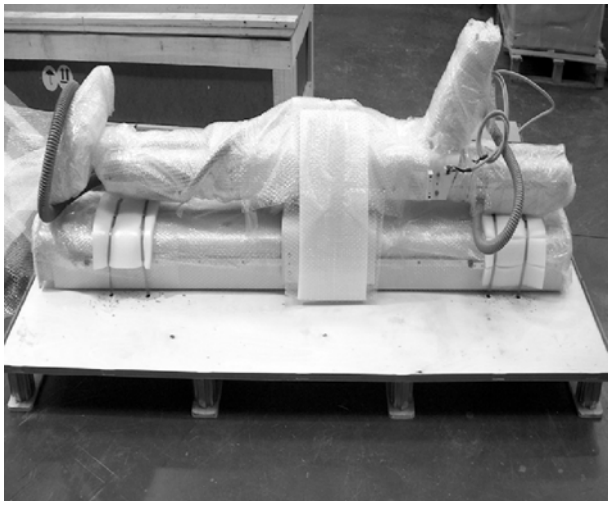
1. Place the shipping pallet near its final site in the room and remove all its laterals. Do not discard any packing material such as envelopes, boxes, bags until all parts are accounted for as listed on the packing list.

WARNING

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

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

Illustration 2-1
Unpacking



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SECTION 3 INSTALLATION

Note ☞

This Section describes the Installation procedure for a system (standard model) with the Receptor placed at the left side of the unit when the Swivel Arm is in horizontal position. If the system (optional model) has the Receptor placed at the right side of the unit, position of the Control Unit (Wall Box), Bucky, Tube-Collimator Assembly, ceiling pole and clamp to fasten the HV Cables of the X-ray Tube should be installed in the reverse side.

Perform Installation following the order described below.

WARNING

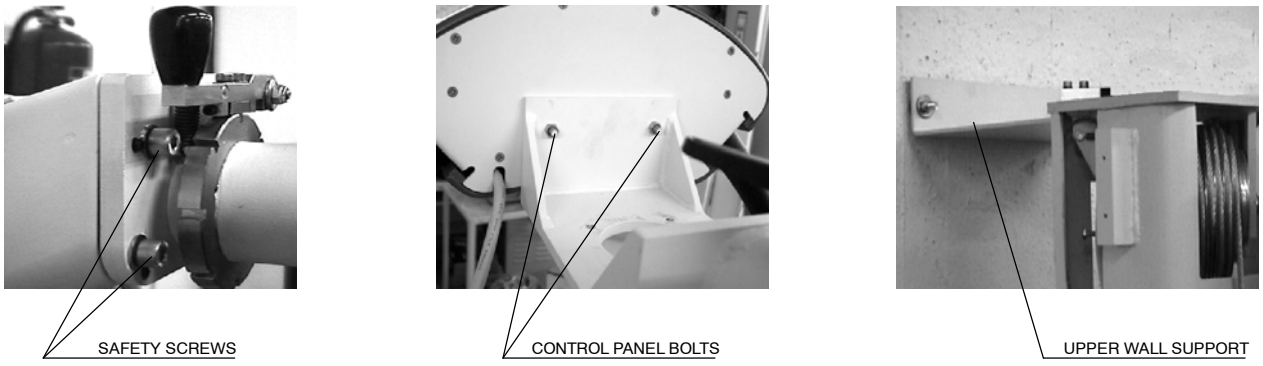
DO NOT REMOVE SAFETY LOCKING ROD FROM THE CENTRAL CARRIAGE UNTIL SPECIFICALLY INSTRUCTED IN THIS DOCUMENT. *(REFER TO ILLUSTRATION 3-3)*.

Note ☞

At least two people are required to perform next operation.

1. Assemble the Support of the Tube-Collimator to the Upper Carriage using the four Safety Screws installed in the carriage.
2. Install the Control Panel by using the two bolts at its rear side.
3. Lift the Column as much as necessary as to mount the Upper Wall Support in its upper part.
4. Place the Column standing-up and position it against the wall on its final site in the room. While one person is holding up the Column, the other one should level it vertically on both lateral sides and on the front, marking its anchoring positions on the floor and on the wall.

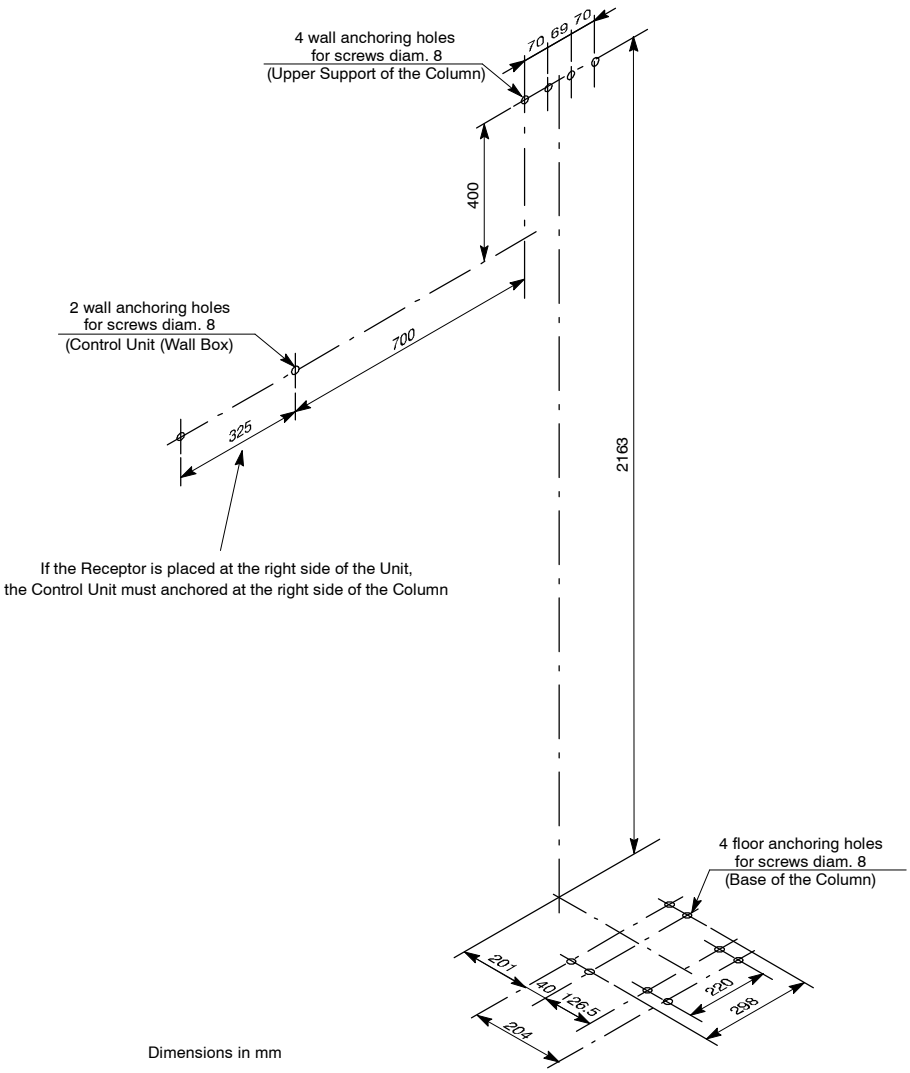
Illustration 3-1
Installation of Tube-Collimator Assembly and Upper Wall Support



5. Move the Column and prepare the anchorages.

Note ☞ *Distances shown on Illustration 3-2 may also be taken as reference to mark the anchoring holes position.*

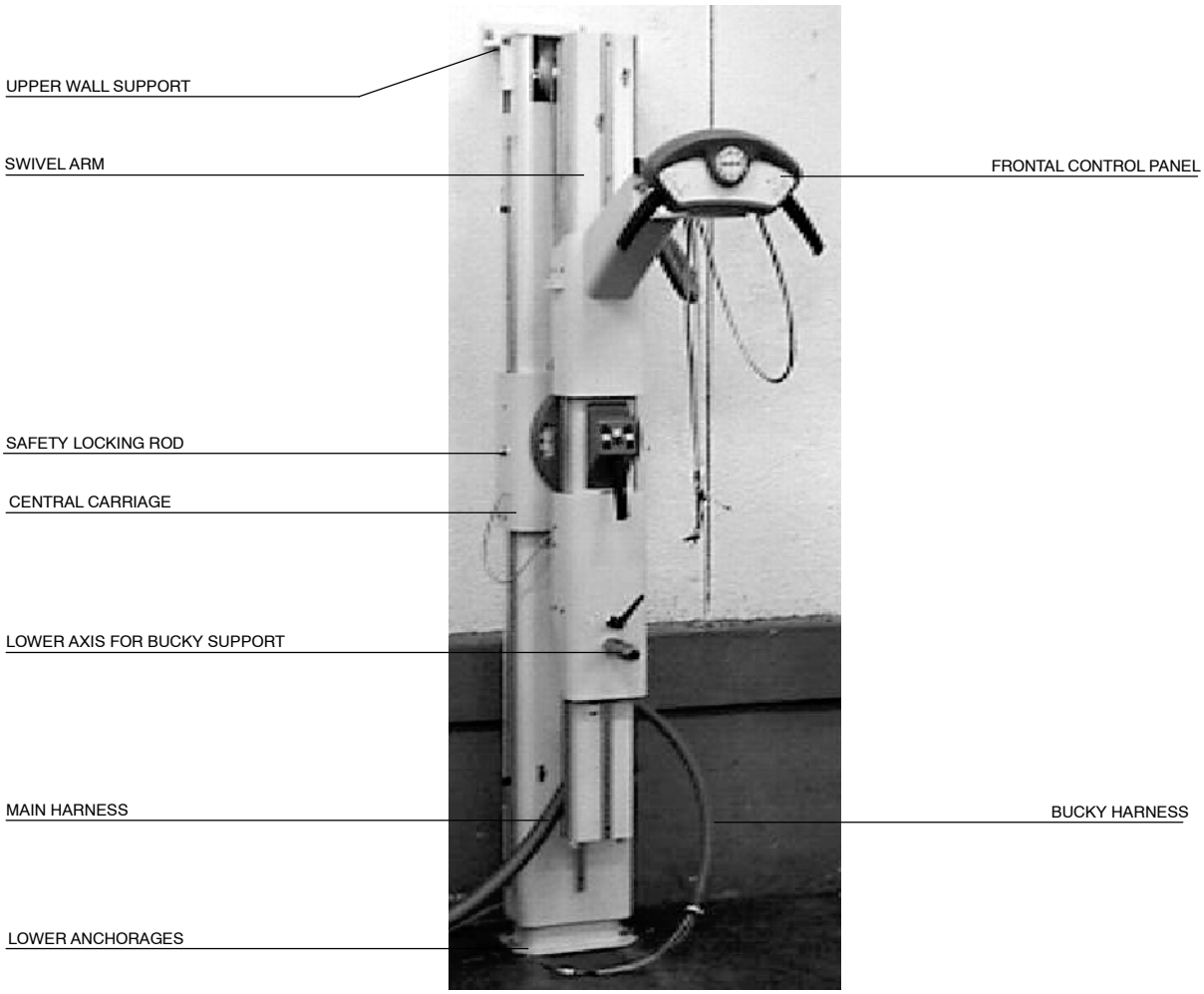
Illustration 3-2
Drill Template



6. Position the Column and make it firm to floor and wall. Check that it is properly levelled on both lateral sides and on the front. Make sure the Column is firmly anchored. (*Refer to Illustration 3-3*.)

Note ☞ *It is recommended that the upper part of the Column should be placed slightly leaned towards the wall with its top in a closer position to the wall than its base. This position will compensate Column levelling in the installation of the Tube-Collimator Assembly and Bucky.*

Illustration 3-3
Column anchoring



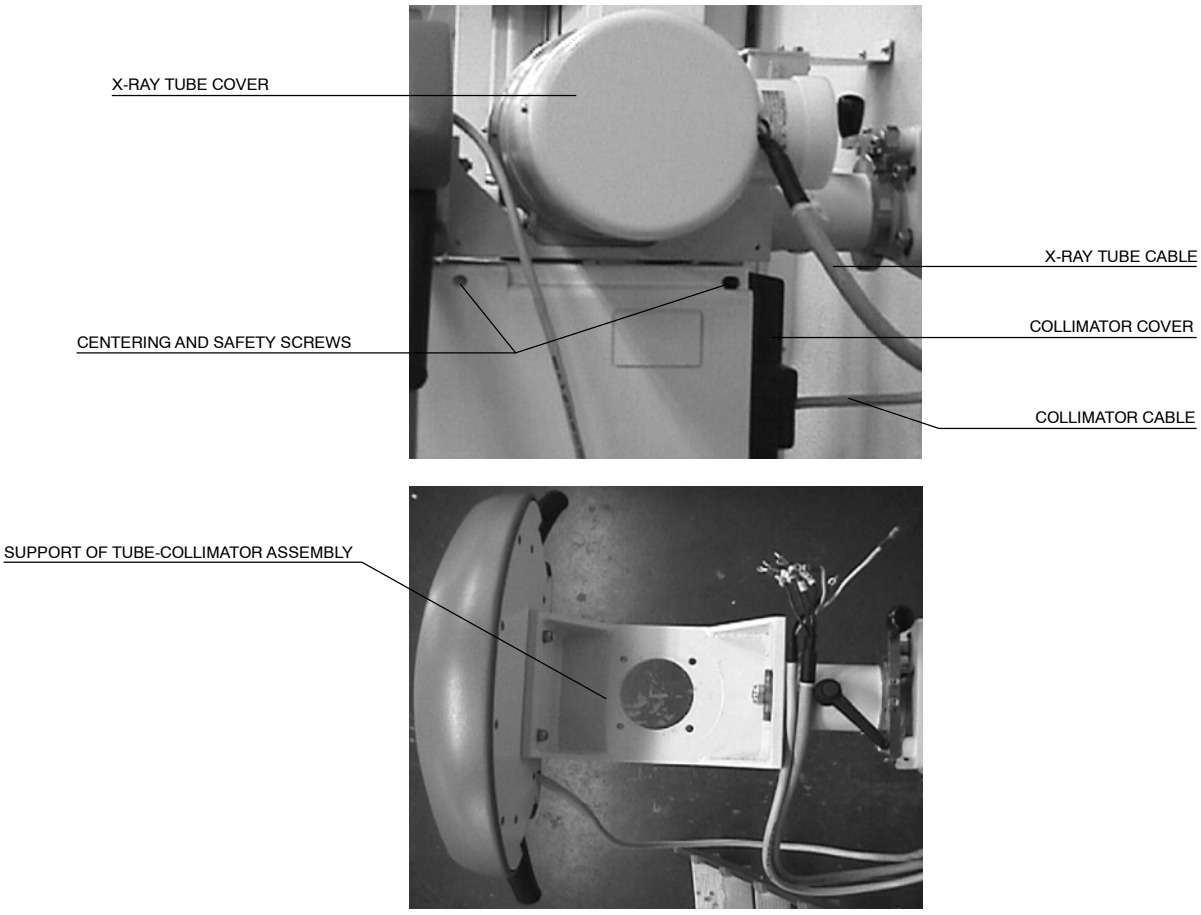
7. Install the X-ray Tube in the Upper Support of the Column using the Collimator Adaptation Ring and its four Safety Screws (Allen).

8. Before installing the Collimator, unscrew equally the four Centering Adjustment and Safety Screws (Allen) to allow the Collimator installation in the Collimator Adaptation Ring. Adjust the Collimator Blades to their widest setting and carefully install the Collimator centering it with the X-ray Tube window.

   Tighten carefully the four Centering Adjustment and Safety Screws (Allen) equally (same number of turns) until Collimator is centered and held firmly on the Coupling Ring (support). (*Also, refer to Collimator Manual*).

9. Remove the X-ray Tube and Collimator covers and connect the wires from the upper harness to the X-ray Tube and Collimator accordingly to their identification *(refer to Interconnections Map IM-041 for Manual Version or A6541-03-S of Motorized Version).*

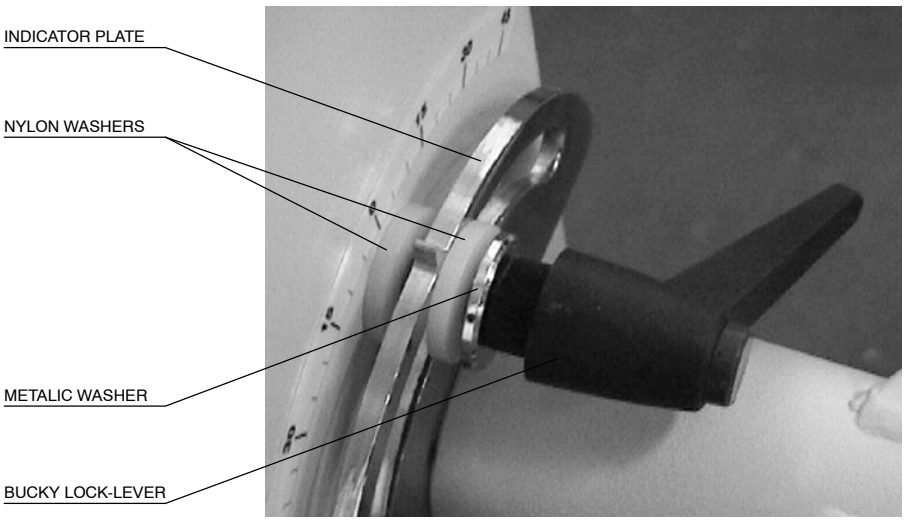
Illustration 3-4
Installation of X-ray Tube and Collimator



10. Remove the Bucky Lock-Lever. Install the Bucky Assembly inserting it into the lower axis of the Swivel Arm.

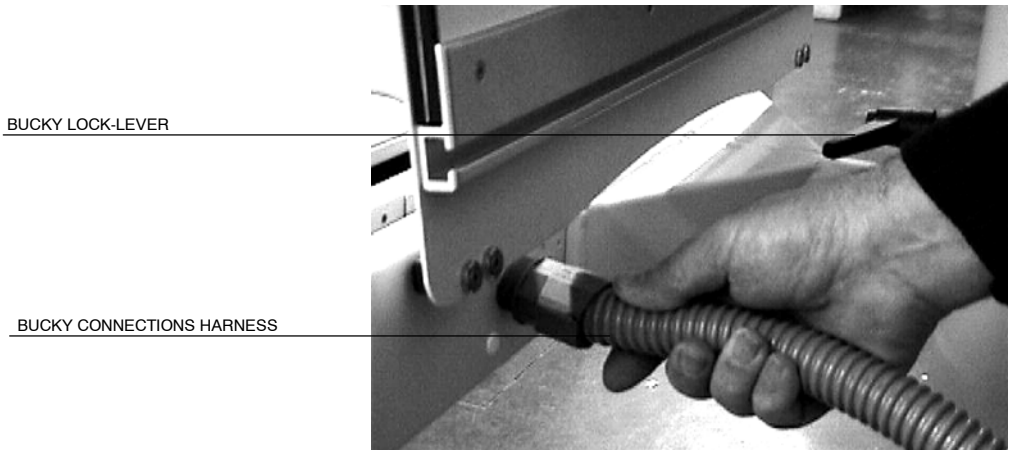
11. Re-install the Bucky Lock-Lever keeping the indicator plate between both nylon washers, and the metallic washers close to the lever.

Illustration 3-5
Bucky Lock-Lever



12. Open the Bucky cover removing its two frontal screws. Release the plastic lock nut from the Bucky harness of the Swivel Arm (small harness). Route cables through their entrance into Bucky Assembly and put back the lock nut into its hole to fasten the harness to the Assembly. Connect cables inside the Bucky Assembly (*Refer to Illustration 3-6).*

Illustration 3-6
Bucky Connections

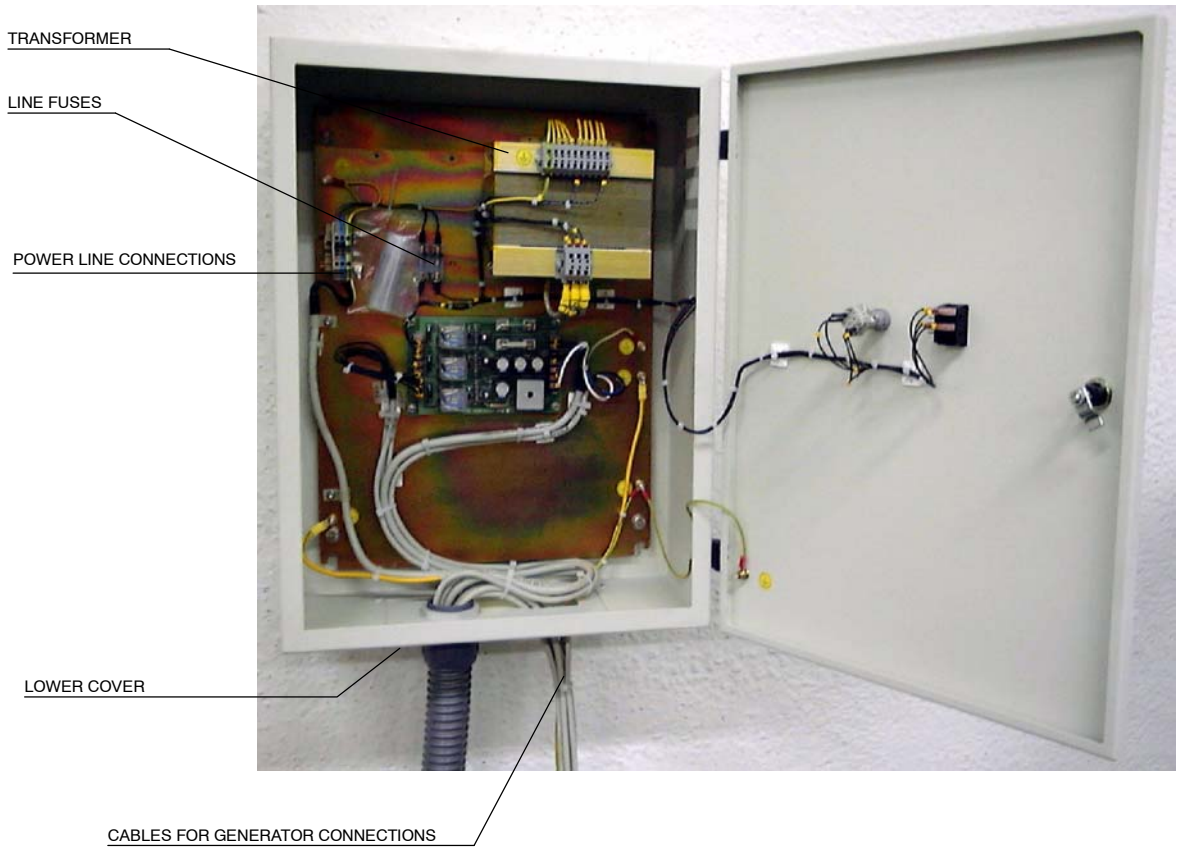


13. Install the Control Unit on the wall near the Column (*refer to Illustration 3-2*).

14. **For the Manual version**:

    a. Install the lower cover of the Control Unit Box. Identify and separate the cables to be connected to the Control Unit and the cables to be connected to the Generator Cabinet.

Illustration 3-7
Control Unit Box Connections for Manual Version



b. Connect to the Optima Universal Board (*A3127-XX*) all the wires from the main harness (GND and wires to TS2 and TS3) (*refer to Interconnections Map I/M-041).*

c. Connect to the Generator the cables from the main harness (Stator, Bucky and ground (GND) cables routed directly from the Column) *(for these connections refer to Interconnections Map I/M-041 and also to Generator Service Manual).*

d. Connect directly the ground cables (GND) from the Column and Control Unit Box to the Main ground stud (GND) of the Generator.

e. Cables to be connected directly in the Generator Cabinet must be routed through the lower cables entrance of the Control Unit.

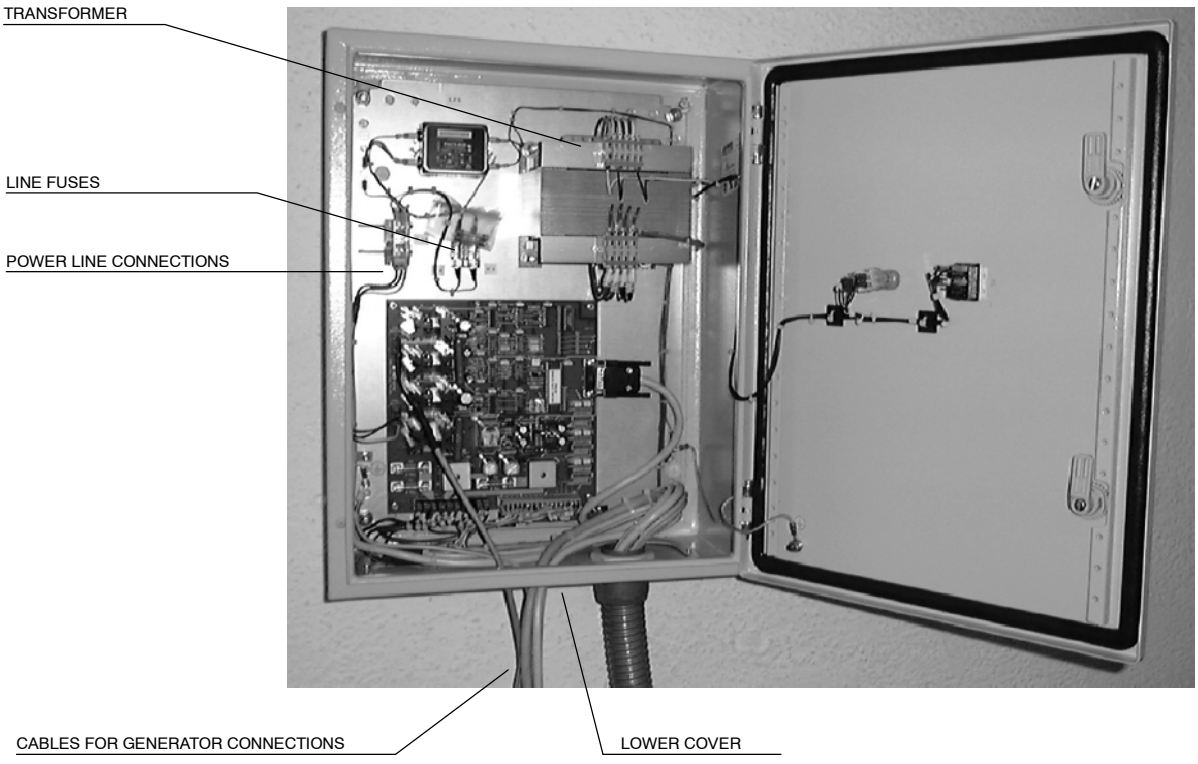
f. Verify that the transformer and the fuses of the Control Unit Box are in accordance to the power line*. (Refer to Maps I/M-041 and A6408-xx).*

g. Route the Power cable (*A3153-01*) through the lower cables entrance of the Control Unit Box. Connect one of its ends to Terminals TS1 of the Control Unit and, in the other end, install a suitable connector to the wall plug. *(Refer to Schematics I/M-041 and A6408-xx).*

15. **For the Motorized version**:

a. Install the lower cover of the Control Unit Box. Identify and separate the cables to be connected in the Control Unit and the cables to be connected to the Generator Cabinet.

Illustration 3-8
Control Unit Connections for Motorized Version



b. Connect to the Control Unit Board (*A3194-XX*) all connectors and wires from the main harness (J1, J2, wires to TS1 and TS2) (*refer to Interconnections Map A6541-03-S).*

c. Connect to the Generator the cables from the main harness (Stator, Bucky and ground (GND) cables routed directly from the Column) *(for these connections refer to Interconnections Map A6541-03-S and also to Generator Service Manual).*

d. Route the Height Motor cable (*A3386-01*) through the lower cables entrance of the Control Unit and plug in to Connector TS3 of the Control Unit Board (*A3194-XX*).

e. Connect directly the ground cables (GND) from the Column and Control Unit Box to the Main ground stud (GND) of the Generator.

f. Cables to be connected directly in the Generator Cabinet must be routed through the lower cables entrance of the Control Unit.

g. Verify that the transformer and the fuses of the Control Unit are in accordance to the power line *(refer to Interconnections Map A6541-03-S).*

h. Route the Power cable (*A3153-02*) through the lower cables entrance of the Control Unit Box. Connect one of its ends to Terminals TS1 of the Control Unit and, in the other end, install a suitable connector to the wall plug. *(Refer to Interconnections Map A6541-03-S).*

16. Close the Control Unit door.

Note ☞ *Do not plug the Control Unit until specifically advice in this Document.*

Note ☞ *Power supply connections must be in compliance with Local Codes.*

17. Connect HV Cables of the X-ray Tube.

Terminal Pins of HV Cables are extremely delicate and they are easily damaged. Take particular care to handle them carefully. Make sure that they are all straight and that the splits in the pins are open (parallel to sides).

Prepare the High Voltage terminals that will be installed in the X-ray Tube receptacles. Apply Silicone Paste over the entire surface of the Plug including the Pins.

Carefully connect cables to their related receptors of the Tube and fix their nuts tightly.

18. Fasten HV cables to lateral sides of Swivel Arm with the clamp on the carriage of the Tube Collimator Assembly. Give the cable length enough to enable movements of the of Swivel Arm (*refer to Illustration 3-9*).

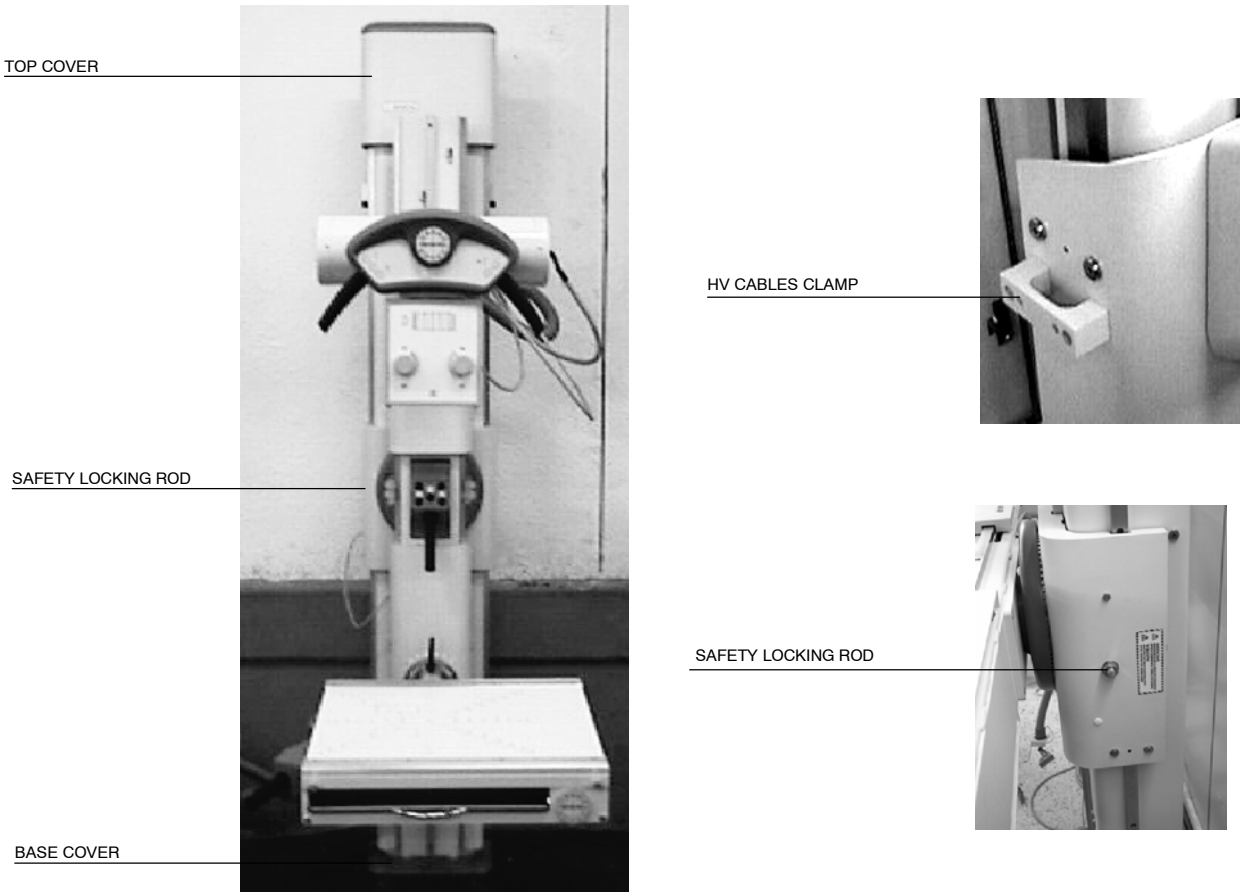
Note ☞ *Tube HV Cables may also be tied up to a ceiling pole to avoid collisions and to easy movements of the system.*

19. Install the Top Cover of the Columm with the supplied screws (*refer to Illustration 3-9*).

20. Install the Decorative Base of the Columm (pressing it) (*refer to Illustration 3-9*).

21. Remove now the Safety Locking Rod from the Central Carriage (*refer to Illustration 3-9*).

Illustration 3-9
Covers and HV Cables Clamp



22. Plug the Control Unit and turn the system on. Check that all controls and movements operate correctly.

SECTION 4 ADJUSTMENTS

4.1 ADJUSTMENT TOOLS

The following special Tools are commonly used for adjustment of the Rad Room:

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

Note ☞ *These tools **are not included** with the System. Use the suggested tools or equivalent.*

4.2 BALANCE TEST OF THE SWIVEL ARM AND CENTRAL CARRIAGE

Note ☞ *This section only applies to systems where the X-ray Tube or the Collimator has to be replaced by a new different X-ray Tube or Collimator (different weight).*

4.2.1 SWIVEL ARM BALANCE IN HORIZONTAL POSITION

1. Turn the unit ON. Place the Swivel Arm in horizontal position and open SID at maximum meters.

2. Press the "*Rotation*" button and check that the Swivel Arm is balanced, that is, the Swivel Arm should not tilt in any direction without force applied at any point.

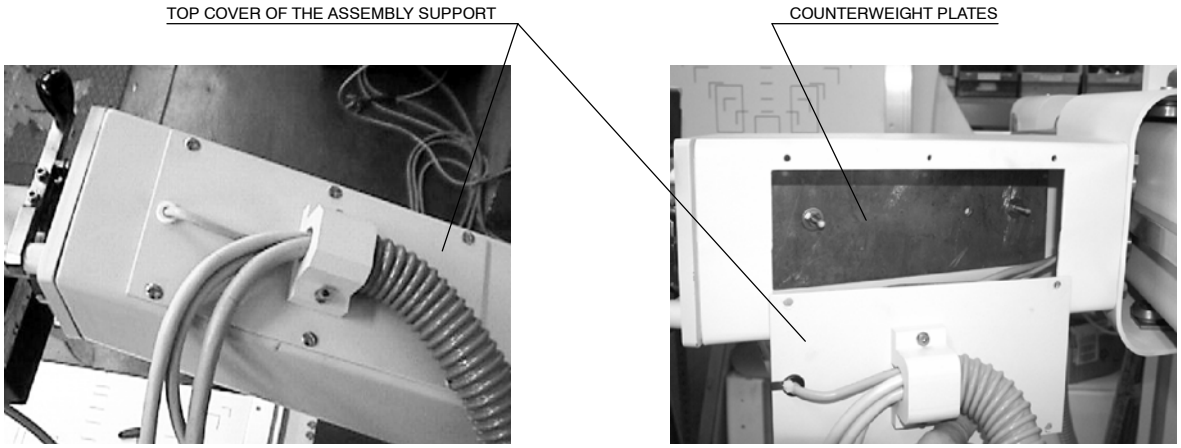
   If the Swivel Arm is correctly balanced, check the next section. If not, perform the following steps:

   a. Remove the Top Cover of the Tube-Collimator Assembly Support.

   b. Install or remove the Counterweight Plates required to balance the Swivel Arm, so that the Tube-Collimator Assembly end weights the same than the Bucky Assembly end. Re-install the Top Cover.

   c. If all Counterweight Plates are removed and it is required to increase the weight of the Bucky Assembly end, install additional Counterweights inside or outside of the Bucky Assembly as closer as possible to the Bucky Axis.

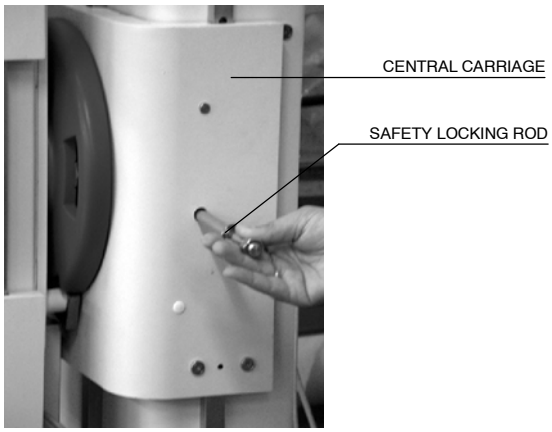
Illustration 4-1
Counterweights Housing

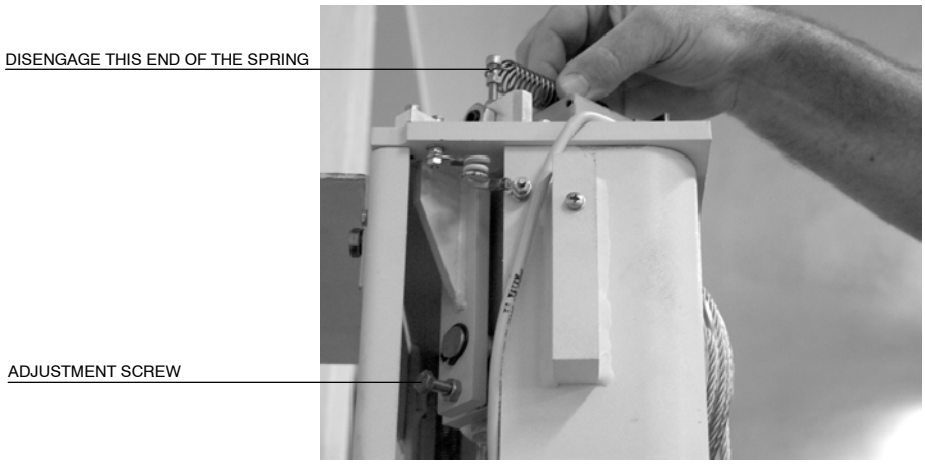


4.2.2 CENTRAL CARRIAGE BALANCE FOR MANUAL VERSION

1. With the unit turned ON. Place the Swivel Arm in horizontal position and open SID at 1.5 meters.
2. Re-install the Safety Locking Rod in the Central Carriage.
3. Remove the Top Cover of the Column.
4. Disengage the Spring located on the Top of the Column (only one end).
5. Loosen the Adjustment Screw of the Vertical Movement Lock.

Illustration 4-2
Adjustment of the Central Carriage Balance





6. Carefully, remove the Safety Locking Rod from the Central Carriage.

7. Check that the Central Carriage is correctly balanced. It must remain in position when it is released and needs the same strength (approx. a force of 8 kg) for moving it up or down.

   If the Central Carriage is not correctly balanced:

   a. Tighten or loosen the Tightener Screw located at the back of the Column base *(refer to illustration below)* with an open/box wrench in order to adjust it. If the Central Carriage is moving up, loose the screw. If the Central Carriage is moving down, tighten the screw.

   b. Check that the Central Carriage remains in position when it is released. Then check with a Dynamometer that the Central Carriage needs the same strength (approx. a force of 8 kg) to be moved up or down.

      In case a Dynamometer is not available, place the Central Carriage to its higher position, release it and check that the distance from the Rubber Stop to the Carriage is 1 cm maximum after releasing the Carriage *(refer to illustration below)*, if not repeat the procedure.

Illustration 4-3
Adjustment of the Central Carriage Balance

8. When the Central Carriage is correctly balanced:

   a. Tighten the Adjustment Screw of the Vertical Movement Lock.

   b. Engage the Spring on the Top of the Column.

   c. Re-install the Top Cover of the Column.

4.2.3 CENTRAL CARRIAGE BALANCE FOR MOTORIZED VERSION

1. With the unit turned ON. Place the Swivel Arm in horizontal position and open SID at 1.5 meters.
2. Re-install the Safety Locking Rod in the Central Carriage.
3. Remove the Top Cover of the Column.
4. Loosen slightly the three Safety Screws of the Motor. Then, loosen completely the Stop Screw of the Motor.
5. Move up the Motor and take away the Chain.

Illustration 4-4
Motor and Chain

6. Carefully, remove the Safety Locking Rod from the Central Carriage.

7. Check that the Central Carriage is correctly balanced. It must remain in position when it is released and needs the same strength (approx. a force of 8 kg) for moving it up or down.

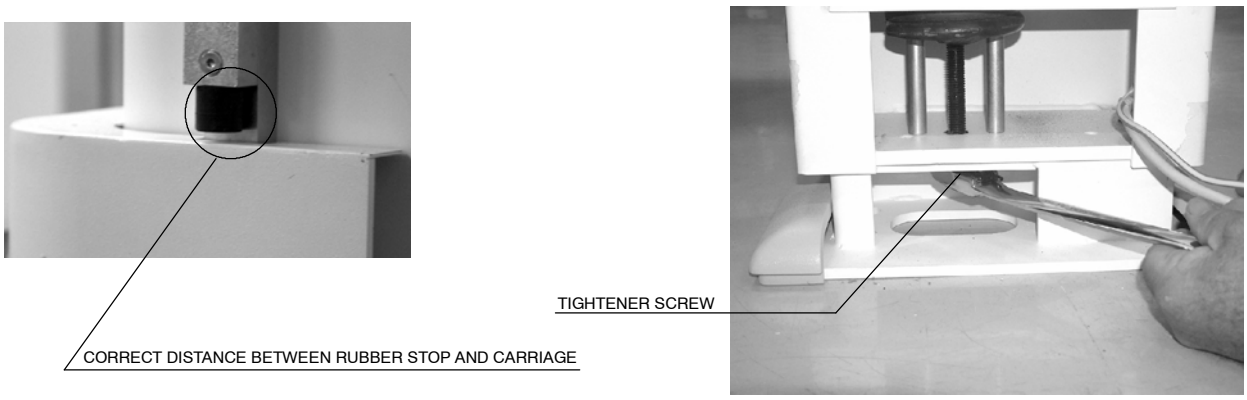
   If the Central Carriage is not correctly balanced:

   a. Tighten or loosen the Tightener Screw located at the back of the Column base *(refer to illustration below)* with an open/box wrench in order to adjust it. If the Central Carriage is moving up, loose the screw. If the Central Carriage is moving down, tighten the screw.

   b. Check that the Central Carriage remains in position when it is released. Then check with a Dynamometer that the Central Carriage needs the same strength (approx. a force of 8 kg) to be moved up or down.

      In case a Dynamometer is not available, place the Central Carriage to its higher position, release it and check that the distance from the Rubber Stop to the Carriage is 1 cm maximum after releasing the Carriage *(refer to illustration below)*, if not repeat the procedure.

Illustration 4-5
Adjustment of the Central Carriage Balance



8. When the Central Carriage is correctly balanced:

   a. Re-install the Chain.

   b. Tighten the Stop Screw of the Motor to tighten the Chain.

   c. Tighten the three Safety Screws of the Motor tightly.

   d. Re-install the Top Cover of the Column.

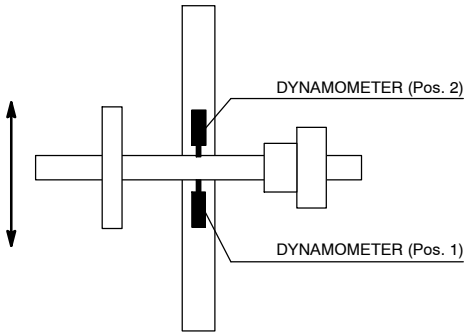
4.3 ADJUSTMENT OF MOTORIZED MOVEMENTS OF THE SWIVEL ARM

Note ☞ *Perfom this section only during Periodic Maintenance tasks, it is factory adjusted and is not necessary during the unit installation.*

The motorized movements of the Swivel Arm (SID and Vertical movements) are blocked automatically for safety reasons when an obstacle is found in its travel applying a strength above 15 ± 3 kg.

4.3.1 ADJUSTMENT OF VERTICAL MOVEMENT OF THE SWIVEL ARM

1. With the unit turned ON. Place the Swivel Arm centered in horizontal position and open SID at 1.5 meters.



2. Press the respective button to start the vertical down movement of the Swivel Arm and check with a Dynamometer located in contact with the lower side of the Swivel Arm (centered) that the vertical down movement is blocked when a strength of 15 ± 3 kg (Peak) is measured on the Dynamometer.

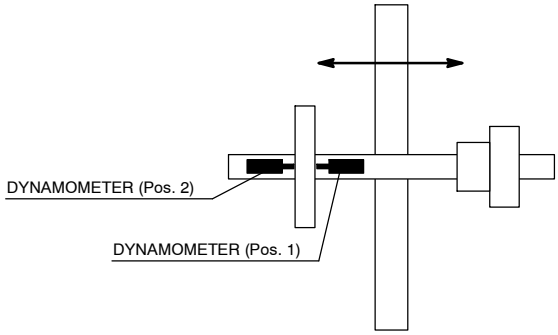
3. Press the respective button to start the vertical up movement of the Swivel Arm and check with a Dynamometer located in contact with the upper side of the Swivel Arm (centered) that the vertical up movement is blocked when a strength of 15 ± 3 kg (Peak) is measured on the Dynamometer.

4. If it is not correct, adjust the Potentiometer R66 of the Control Unit Board (*A3194-XX).* Turn the potentiometer screw CW to increase the strength and turn it CCW to reduce the strength.

5. Check it again, and repeat the adjustment if needed.

4.3.2 ADJUSTMENT OF SID MOVEMENT OF THE RECEPTOR ASSEMBLY

1. With the unit turned ON. Place the Swivel Arm centered in horizontal position and open SID at 1.5 meters.



2. Press the respective button to reduce the SID and check with a Dynamometer located in contact with the inner side of the Receptor (Table-Top) that the horizontal movement closing the SID is blocked when a strength of 15 ± 3 kg (Peak) is measured on the Dynamometer.

3. Press the respective button to increase the SID and check with a Dynamometer located in contact with the outer side of the Receptor (back side) that the horizontal movement opening the SID is blocked when a strength of 15 ± 3 kg (Peak) is measured on the Dynamometer.

4. If it is not correct, adjust the Potentiometer R67 of the Control Unit Board (*A3194-XX).* Turn the potentiometer screw CW to increase the strength and turn it CCW to reduce the strength.

5. Check it again, and repeat the adjustment if needed.

4.4 ALIGNMENT OF X-RAY BEAM

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies.

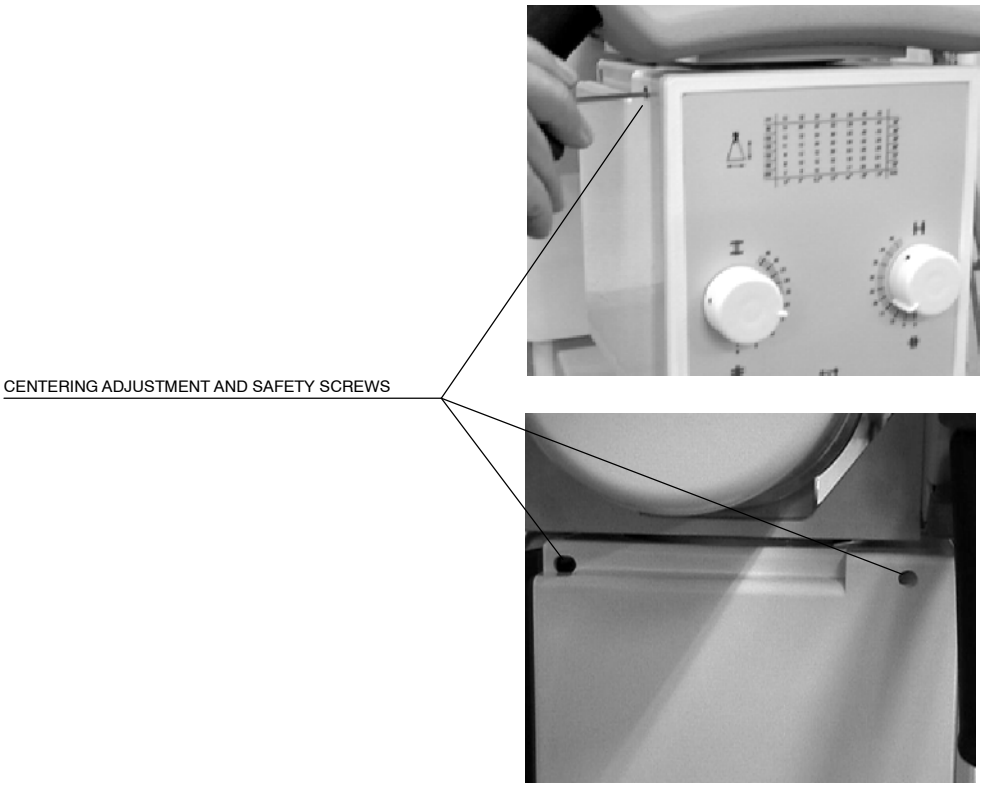
2. Place SID at 1 meter.

Illustration 4-6
Vertical Position of Swivel Arm with Alignment Tools

3. Turn on Collimator light and center the Collimator in relation to the Bucky Table-Top. Horizontal and transversal position of the light axes projected by the Collimator Lamp must be in line with the axes or film sizes marked on the Table-Top.

   If needed, modify Collimator position by carefully unscrewing and screwing the four Centering Adjustment and Safety Screws (Allen) of Collimator.

Illustration 4-7
Collimator Screws



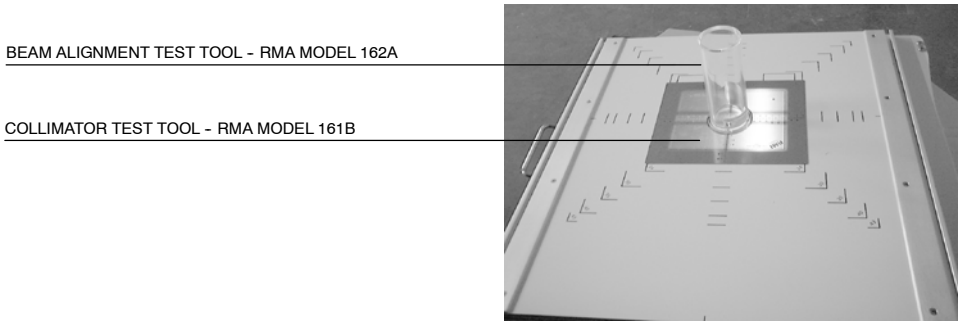
4. Position the Collimator Test Tool (RMI model 161B) on the Bucky Table-Top.

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

6. Adjust the Light Field of the Collimator Lamp to the rectangle drawn inside the Collimator Test Tool.

7. Place centered the Beam Alignment Test Tool (RMI model 162A) on the Collimator Test Tool.

Illustration 4-8
Alignment Test Tools



8. Load Cassette film Tray with cassette film 24x30 and insert it.

9. Make an exposure at 60 kVp / 5 mAs.

10. Process film and:

    a. Check that the X-ray Field falls just within the image of the inner rectangle of the Collimator Test Tool.

       If an edge of the X-ray Field falls out of the inner rectangle means a misalignment of the Light Field respect to the X-ray Field. The maximum misalignment allowed is 2 % of SID (for SID 1m = 2 cm tolerance).

       Refer to Section 4.4.1 for alignment of Light Field with X-ray Field.

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

Based on next illustration, the criteria for SID at 1 meter is:

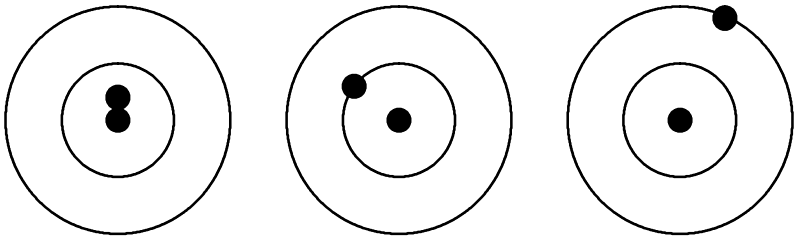
- If the image of the two balls overlap (A) the X-ray Beam is perpendicular to within 0.5°.

- If the image of the top ball (larger shadow) intercepts the first circle (B), the X-ray Beam is about 1.5° away from the perpendicular.

- If the image of the top ball (larger shadow) intercepts the second circle (C), the X-ray Beam is about 3° away from the perpendicular.

In cases (A) and (B) perpendicularity is within tolerance for SID at 1 meter (top ball is within or intercepting the first circle). The third case (C) needs readjustment.

Refer to Section 4.4.2 for perpendicularity adjustment.



c. Check that the X-ray Beam is properly centered with the Image Receptor. To determine the center of the Image Receptor, draw diagonal lines from corner to corner of the X-ray Film. (Alternately, the film can be folded in half and creased at the center). The two lines will cross in the center of the Image Receptor (film). Then draw diagonal lines from the corners of the imaged X-ray Field.

If the center of the X-ray Field and Image Receptor is the same, the diagonals of both sets of lines should cross at the same point. The maximum misalignment allowed is 2 % of SID (for SID 1m = 2 cm tolerance).

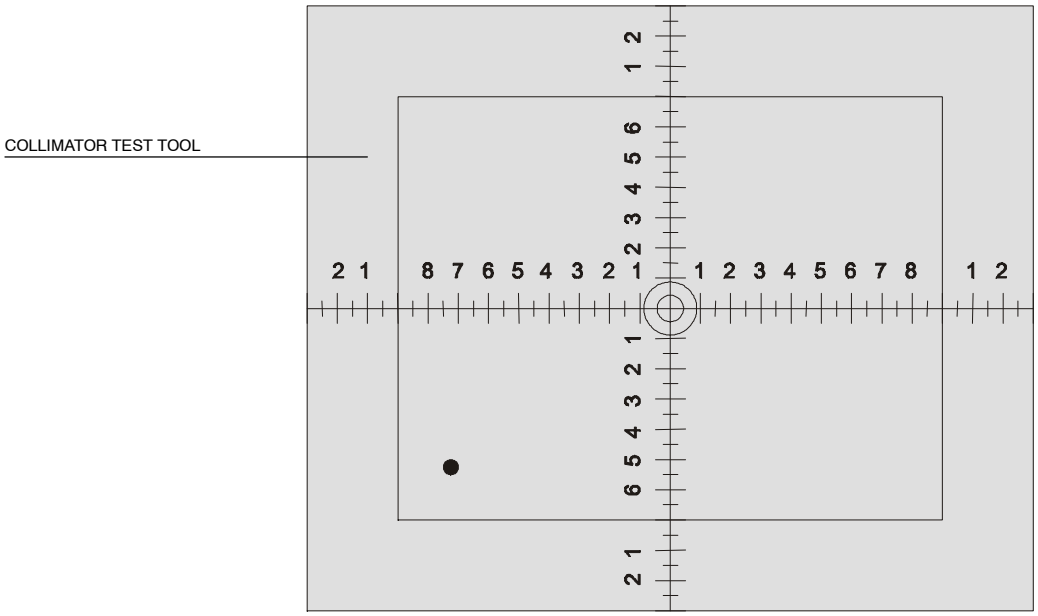
Refer to Section 4.4.3 for centering of X-ray Field and Image Receptor.

4.4.1 ALIGNMENT OF LIGHT FIELD WITH X-RAY FIELD

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies.

2. Place SID at 1 meter.

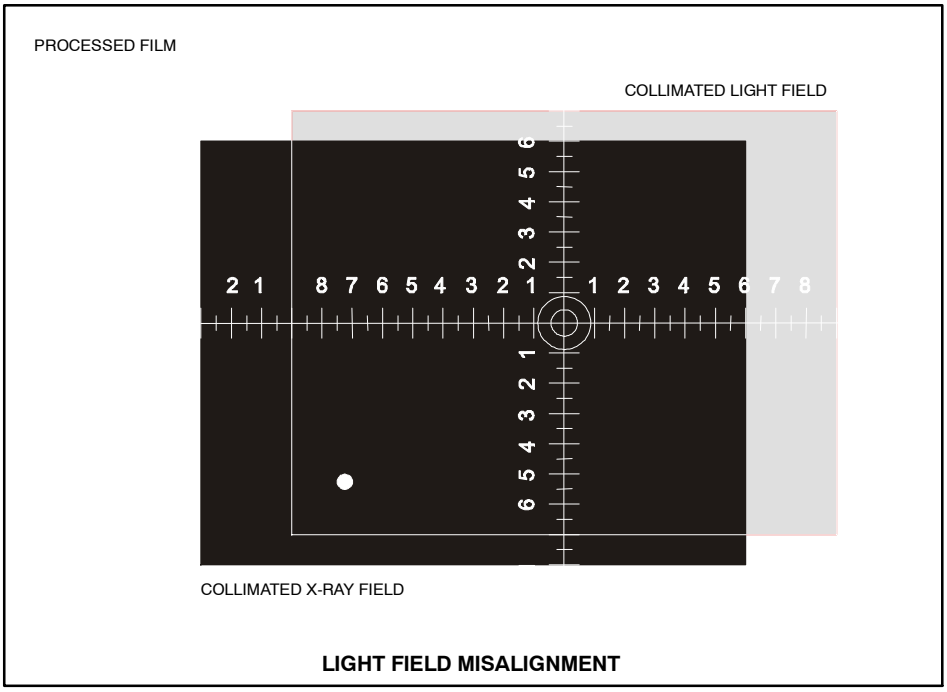
3. Position the Collimator Test Tool (RMI model 161B) on the Bucky Table-Top.



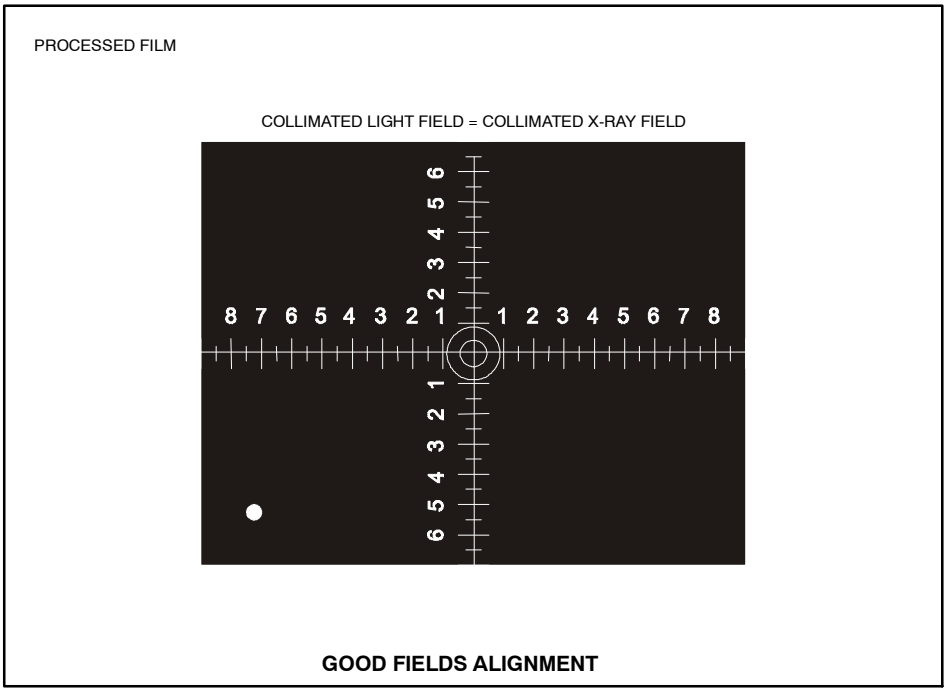
4. Turn on Collimator light and center the Collimator Test Tool with the light axes projected by the Collimator Lamp.

5. Adjust the Light Field of the Collimator Lamp to the rectangle drawn inside the Collimator Test Tool.

6. Check on the processed film the adjustment required to meet the Light Field with the X-ray Field. Identify the deviation on the axes imaged on the film.



LIGHT FIELD MISALIGNMENT



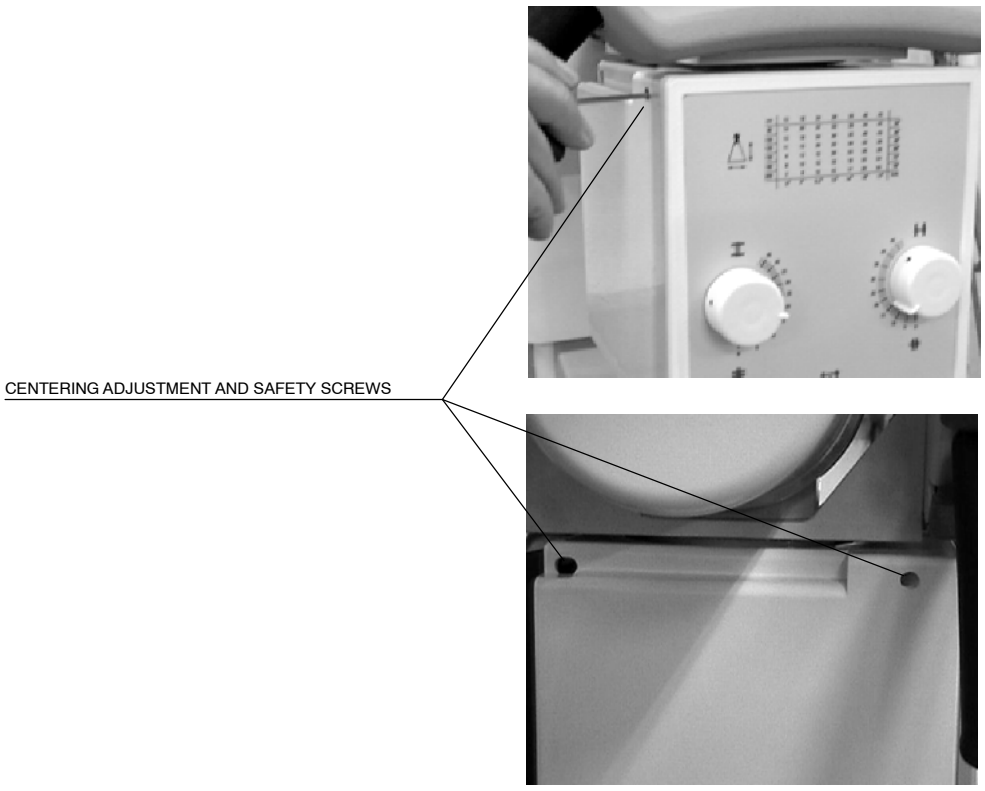
GOOD FIELDS ALIGNMENT

7. Do not remove the Collimator Test Tool from its original position and adjust the Light Field by moving the Collimator Unit and/or the Collimator Lamp.

   a. Collimator Lamp must be ON during Light Field adjustment.

   b. Modify Collimator position by carefully unscrewing and screwing the four Centering Adjustment and Safety Screws (Allen) until the Light Field coincides with the axes reference imaged (numbers and dots) on the processed film.

Illustration 4-9
Collimator Screws



   c. If adjustment is still necessary, modify position of Collimator Lamp (*refer to Collimator Manual*).

8. Repeat exposure and procedure until the result is satisfactory. The maximum misalignment allowed is 2 % of SID (for SID 1m = 2 cm of tolerance).

4.4.2 PERPENDICULARITY ADJUSTMENT OF X-RAY BEAM WITH IMAGE RECEPTOR

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

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies.

   The Bucky Assembly is factory adjusted (slightly up) and it is recommended do not perform any additional correction. During procedure, it must be horizontally placed at 0^{o} (check position with a level and with its indicator plate).

2. Place SID at 1 meter.

3. Position the Collimator Test Tool (RMI model 161B) on the Bucky Table-Top.

4. Turn on Collimator light and center the Collimator Test Tool with the light axes projected by the Collimator Lamp.

5. Place centered the Beam Alignment Test Tool (RMI model 162A) on the Collimator Test Tool and observe if shadow of the Beam Alignment Test Tool is projected in equal proportion around it.

6. Check on the processed film the adjustment required to center the top ball mark. Shadow around the Beam Alignment Test Tool can also help to make a first correction.

7. Loosen slightly the four Safety Screws (Allen M8) of the Tube-Collimator Assembly. If required, perform the following adjustments:

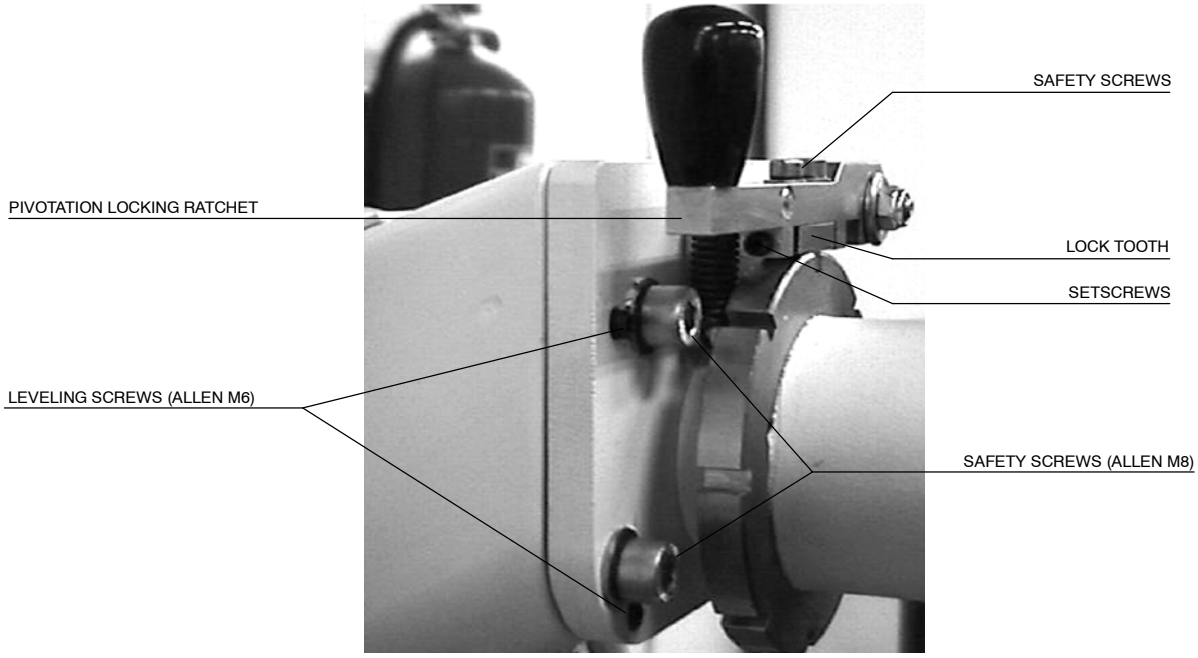
   - For horizontal correction move horizontally the Tube-Collimator Assembly before tightening the four Safety Screws.

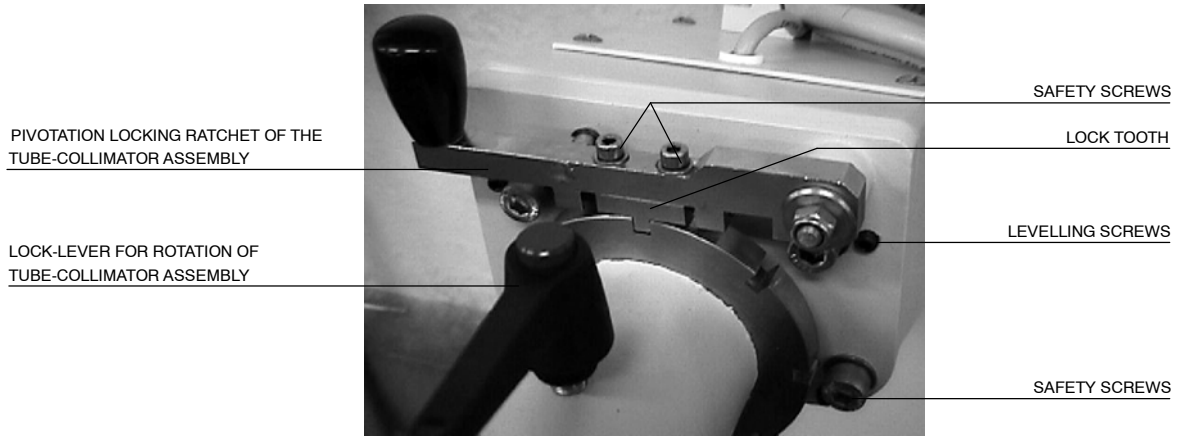
   - For vertical correction loosen or tighten carefully the four Leveling Screws (Allen M6) of the Tube-Collimator Assembly before tightening the four Safety Screws.

   - Angle correction is factory adjusted and it is recommended do not perform any additional correction. If needed, loosen slightly the two Safety Screws of the Pivoting Locking Ratchet and adjust very carefully the two Setscrews of the Ratchet to position left right the Lock Tooth. After adjustment, tighten the two Safety Screws again.

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

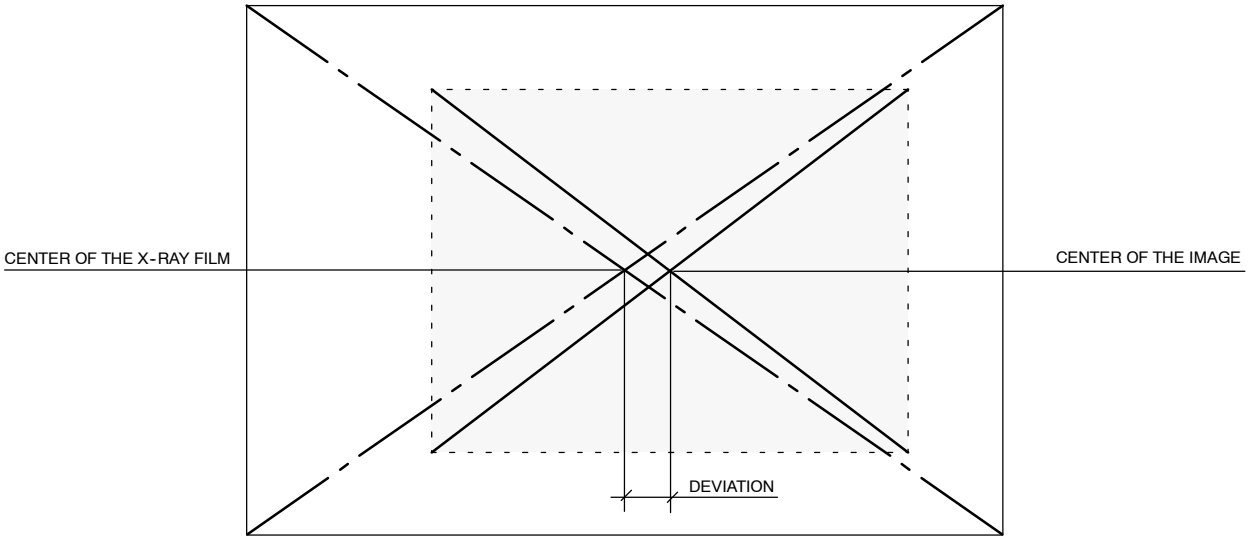
Illustration 4-10
Levelling Rods of the Tube-Collimator Assembly Support





4.4.3 CENTERING OF X-RAY FIELD AND IMAGE RECEPTOR

The error between centers of the X-ray Field and the Image Receptor should not be greater than 2% of the SID. (for SID 1m = 2 cm tolerance).



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

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

Centering adjustments may affect to perpendicularity corrections.

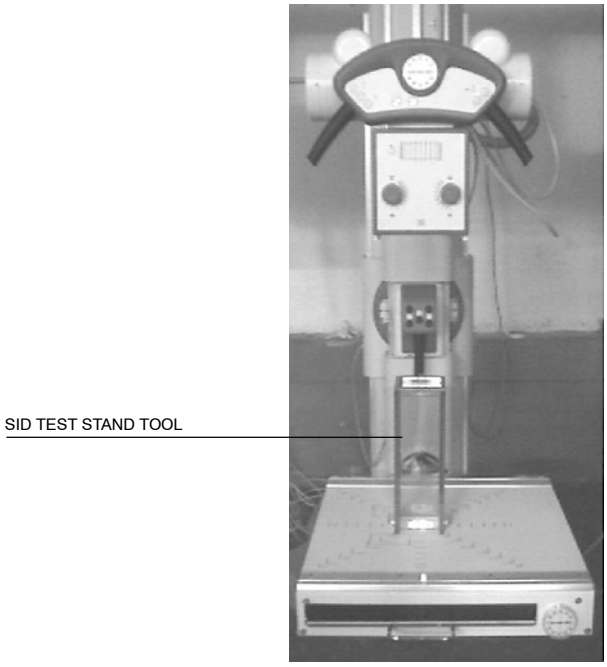
2. Repeat exposure and check centering until the result is satisfactory (centers position are within tolerance).

4.5 SID INDICATOR TEST

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

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies (*refer to Illustration 4-11).*

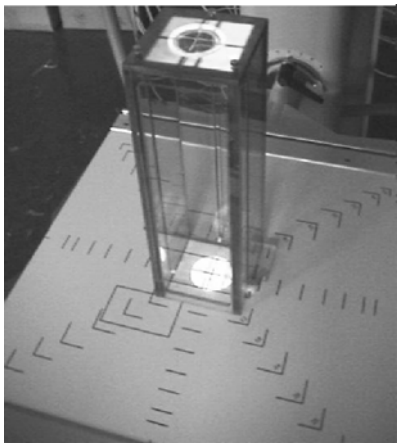
Illustration 4-11
SID Test Stand Tool



2. Position SID at 1 meter (use the SID scale of the Column).
3. Place the SID Test Stand Tool on the Bucky Table-Top. (*Refer to Illustration 4-11).*
4. Turn on the Collimator Light and by means of Collimator Control Knobs, center the SID Test Stand Tool with the light axes projected by the Collimator Lamp.
5. Adjust the Light Field to cover the window (circle) on the top SID Stand Test Tool. *(Refer to Illustration 4-12).*

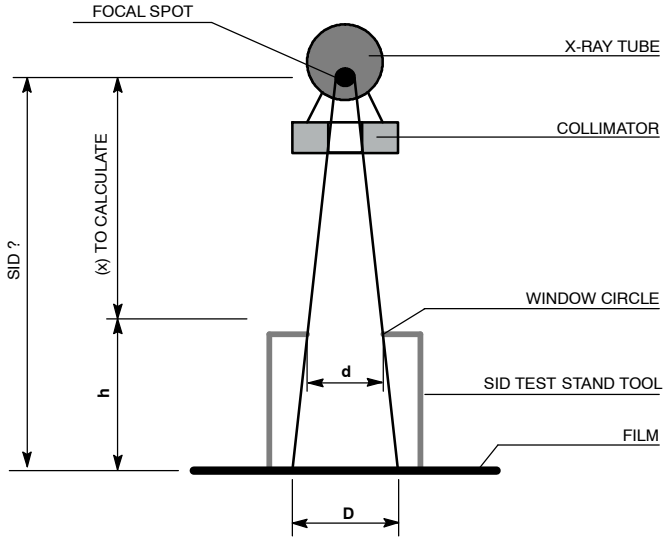
6. Place the Small Tool included in the SID Stand Test Tool with two straight narrow wires crossed on the center of circle at top SID Stand Test Tool. Place a small signal on the circle in order to mark the position.

Illustration 4-12
Light Field over SID Test Stand Tool



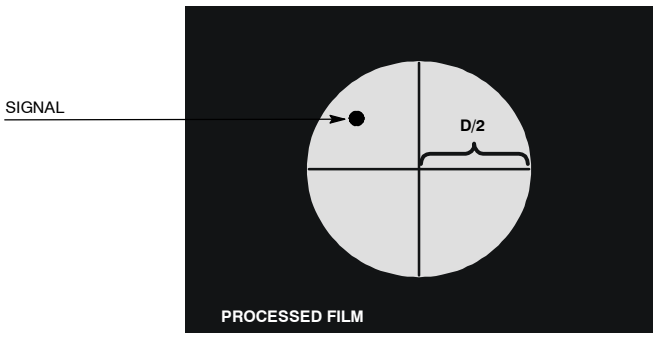
7. Load on the cassette film Tray with a cassette film of 24 x 30 cm centered and insert it.
8. Make an exposure at 60 kVp, 1 mAs.
9. Process film and check the following measurements known *(Refer to Illustration 4-13):*
    a. Measure the height **h**, it is the height of the SID Test Stand Tool plus the distance from the Table-Top to the Film.
    b. Measure the radius of window (**d**/2) on the SID Test Stand Tool.

Illustration 4-13
SID Calculation

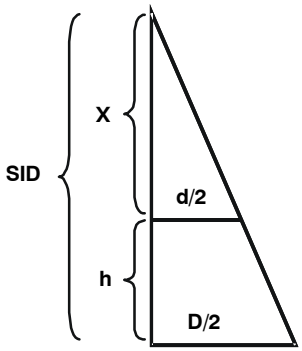


c. Measure the radius of the circle (**D**/**2**) obtained on the Processed Film *(refer to Illustration 4-14).*

Illustration 4-14
Radius in Processed Film



10. With the measurements obtained on the step-9., calculate the "*X*" value, where:



$$X = \frac{(d/2) \times h}{(D/2) - (d/2)}$$

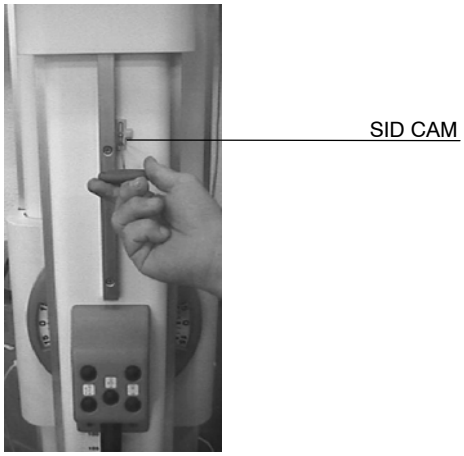
11. The SID value to calculate will be: $SID = X + h$

12. The difference between the indicated SID and the calculated SID may not exceed 1.8 % (rejection limit) of indicated SID. Therefore the deviation of SID calculated should be not higher than 18 mm for SID at 1 meter.

13. **For the Manual Version**, if the SID value calculated is out acceptance limits, it will be necessary to readjust the SID Scale position of the Manual Universal Radiographic System.

14. **For the Motorized Version**, if the SID value calculated is out acceptance limits, it will be necessary to readjust the SID Cam for the Motorized Universal Radiographic System. For that, loose the two screws that fix the SID Cam and move it to the required position.

Illustration 4-15
SID Cam Adjustment



4.6 FIELD SIZE INDICATOR TEST

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

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies.

2. Position SID at 1 meter (use the SID scale on the Column).

3. Open the Collimator blades to set a Field Size of 24 x 30 cm for SID 1 m.

4. Turn on the Collimator Light and center the Collimator in relation to the Bucky Table-Top. Horizontal and transversal position of the light axes projected by the Collimator Lamp must be in line with the axes or Film Size marked on the Table-Top.

5. Load on the Cassette Film Tray with a Cassette Film of 35 x 43 cm centered and insert it.

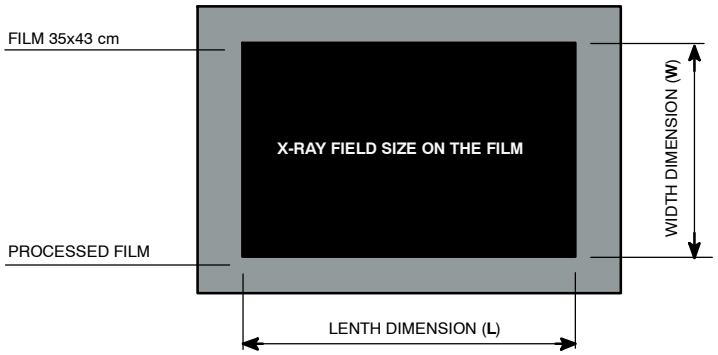
6. Make an exposure at 60 kVp, 1 mAs.

7. Process film and check the following measurements known (*refer to Illustration 4-16*):

   a. Measure the length of the X-ray Field on the Processed Film (identified as **L**)

   b. Measure the width of the X-ray Field on the Processed Film (Identified as **W)**

Illustration 4-16
X-ray Field Size



8. With the measurements obtained and according to the field size indication selected, the results should be:

   - Length dimension (**L**) = 300 mm
   - Width dimension (**W**) = 240 mm

9. The difference between the indicated Field Size and the obtained Field Size may not exceed 1.5 % (rejection limit) of the SID in either direction. Therefore the deviation in any direction should not be higher than 15 mm (rejection limit) for SID at 1 meter.

10. If the deviation of Field Size Indication is out acceptance limits, it is necessary to readjust the index of Collimator Blades Control Knobs. For that, loosen each Collimator Control Knob and position it according to deviation. Repeat the complete tests until the X-Ray Field Size selected (24 x 30 cm) is obtained.

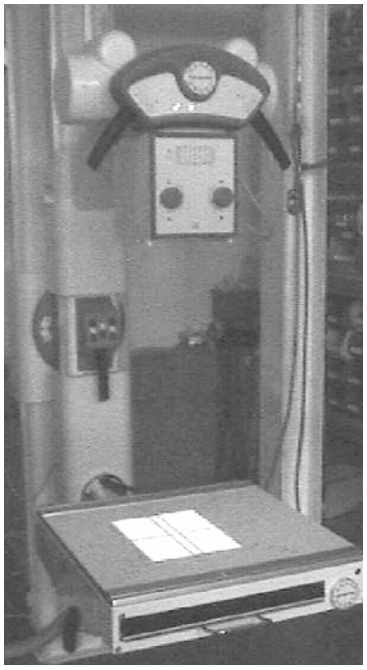
4.7 COLLIMATOR LAMP BRIGHTNESS TEST

Note ☞ *Before starting with the Collimator Lamp Brightness Test, the SID Indicator Test should be performed.*

4.7.1 COLLIMATOR LIGHT FIELD INTENSITY

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies. (*Refer to Illustration 4-17*).

Illustration 4-17
Vertical Position



2. Position SID at 1 meter (use the SID scale of the Column).

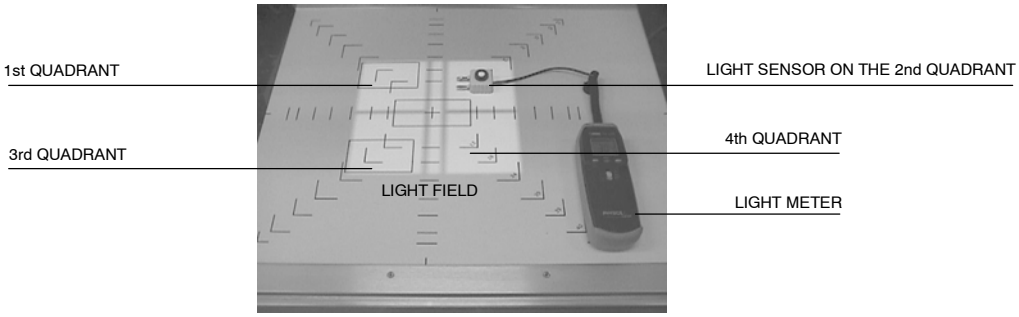
3. Open the Collimator shutter by means of Collimator Control Knobs and set a Field Size of 25 x 25 cm for SID 1m.

4. Turn on the Collimator Light and center the Collimator in relation to the Bucky Table-Top. Horizontal and transversal position of the light axes projected by the Collimator Lamp must be in line with the axes or Film Size marked on the Table-Top.

5. Place the Light Meter on the Table-Top with sensor directed toward the Light Source.

6. Place the Light Meter in the center of one quadrant of the light field (*refer to Illustration 4-18*).

Illustration 4-18
Light Meter on Table-Top



7. With Collimator Lamp OFF, measure and keep record of the ambient light level.

8. Do not move the Light Meter. With the Collimator Lamp ON, measure and keep record of light level of that quadrant.

9. Determine the light intensity of that quadrant by subtracting the ambient light level from the corresponding light level.

10. Repeat measurements at the approximate center of remaining three quadrants of light field.

11. With the measurements obtained on the step-10., the results of Light Field Intensity in all quadrants should be higher of 170 lux (16 foot-candles) and among all the quadrants the intensity light field shall be not differ more than 10%.

12. The average illumination at a distance of 1 meter from the focal spot shall not be less than 160 lux (15 foot-candles). Rejection limit is 170 lux (16 foot-candles).

13. If the deviation of Light Field Intensity is out acceptance limits, it is necessary to take into account the following:

    a. If the difference of Light Field Intensity among all quadrants is higher than 10%, we need to readjust the Collimator Lamp socket. Refer to Collimator Manual.

b. If the light level in all quadrants is less than 170 lux, it is necessary to check the following:

- The lamp voltage level when it is ON shall not be lower of 24 VAC. (Measure on the Bulb socket contact).
- Check that the Collimator Lamp, the Mirror and the Mylar window are not dirty or discolored.
- Check the correct position of the Mirror (*Refer to Collimator Manual*).

c. If the light level is still low:

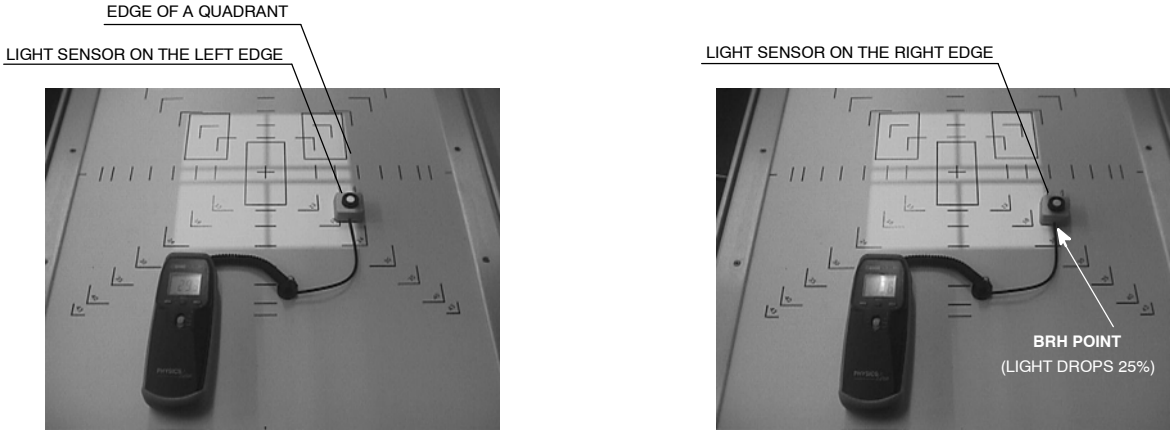
- Replace the Collimator Bulb.
- Replace the Collimator Bulb socket.

4.7.2 COLLIMATOR LIGHT FIELD CONTRAST RATIO

1. Place the Swivel Arm in vertical position. The Tube-Collimator Assembly has to be perfectly aligned with the Bucky Assembly. Check with a level correct horizontal position of both assemblies.
2. Position SID at 1 meter (use the SID scale of the Column).
3. Open the Collimator blades to set a Field Size of 25 x 25 cm for SID 1m.
4. Turn ON the Collimator Light and center the Collimator in relation to the Bucky Table-Top. Horizontal and transversal position of the light axes projected by the Collimator Lamp must be in line with the axes or Film Size marked on the Table-Top.
5. Place the Light Meter on the Table-Top with sensor directed toward Light Source.
6. Place the Light Meter in the center of one quadrant of the light field. (*Refer to Illustration 4-19)*.
7. Minimize the room lighting. With the Collimator Lamp OFF, measure and record the ambient light level.

8. Turn ON the Collimator Light. Measure the maximum illumination; this should occur near the field center. Slide the light sensor along the Table-Top, and locate the point where the illumination drops to a 75% of the maximum. This point is defined by BRH as lying on the edge of the Light Field (*refer to Illustration 4-19*). All subsequent measurements will be referenced to this point and to this definition of “edge”.

Illustration 4-19
Light Contrast Calculation



9. Measure the illumination at a point 3 mm from the edge of the field toward the center of the field (Light sensor on the left of edge). *(Refer to Illustration 4-19*). Record this as $\mathbf{I_1}$.

10. Measure the illumination at a point 3 mm from the edge of the field away from the center of the field (Light sensor on the right of edge). (*Refer to Illustration 4-19*). Record this as $\mathbf{I_2}$.

11. Correct the values of $\mathbf{I_1}$ and $\mathbf{I_2}$ by subtracting from each value the ambient light level measured in step-7. Now divide the corrected value of $\mathbf{I_1}$ by $\mathbf{I_2}$. This ratio should be 4 or more.

12. Repeat the process from step-8. for all quadrants of Light Field.

13. If the deviation of Light Field Contrast Ratio is out acceptance limits, it is necessary check the following:

    - Check that the Collimator Lamp, the Mirror and the Mylar window are not dirty or discolored.
    - The Light Field Intensity level shall be higher of 170 lux.
    - The ambient light level shall be low as it affects the accuracy of the measurements.

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SECTION 5 MAINTENANCE

The purpose of this Periodic Maintenance is to guarantee a continue safe performance of the Unit, to increase serviceability, to reduce costs (down time, repairs, etc.) and to assure the safety (personal risk).

The following checks and maintenance procedures, at the the suggested intervals, are the manufacturer's recommendation for the most effective Periodic Maintenance schedule for this Unit.

Service tasks here described must be performed exclusively by service personnel specifically trained on this medical system. This maintenance service should be performed every twelve (12) months after installation.

5.1 GENERAL CLEANING

NEVER ATTEMPT TO CLEAN OR HANDLE ANY PART OF THE UNIT WHEN IT IS ON. SWITCH IT OFF AND DISCONNECT IT FROM THE MAINS BEFORE CLEANING OR INSPECTING.

GENERAL CLEANING	
EXTERNAL SURFACES	Clean the equipment frequently, particularly if corroding chemicals are present. Clean external covers and surfaces, especially parts in contact with patients, with a cloth moistened in warm water with mild soap. Wipe with a cloth moistened in clean water. Do not use cleaners or solvents of any kind. Also check painted surfaces for scratching and touch up as required.
INTERNAL CLEANING	***DANGER: NEVER ATTEMPT TO CLEAN INTERNALLY THE UNIT. THE UNIT MUST BE ALWAYS KEPT SHUT UNLESS A SPECIFIC RENEWAL PART PROCEDURE IS TO BE UNDERTAKEN BY HIGHLY QUALIFIED MAINTENANCE PERSONNEL.***

5.2 ELECTRICAL CHECKS

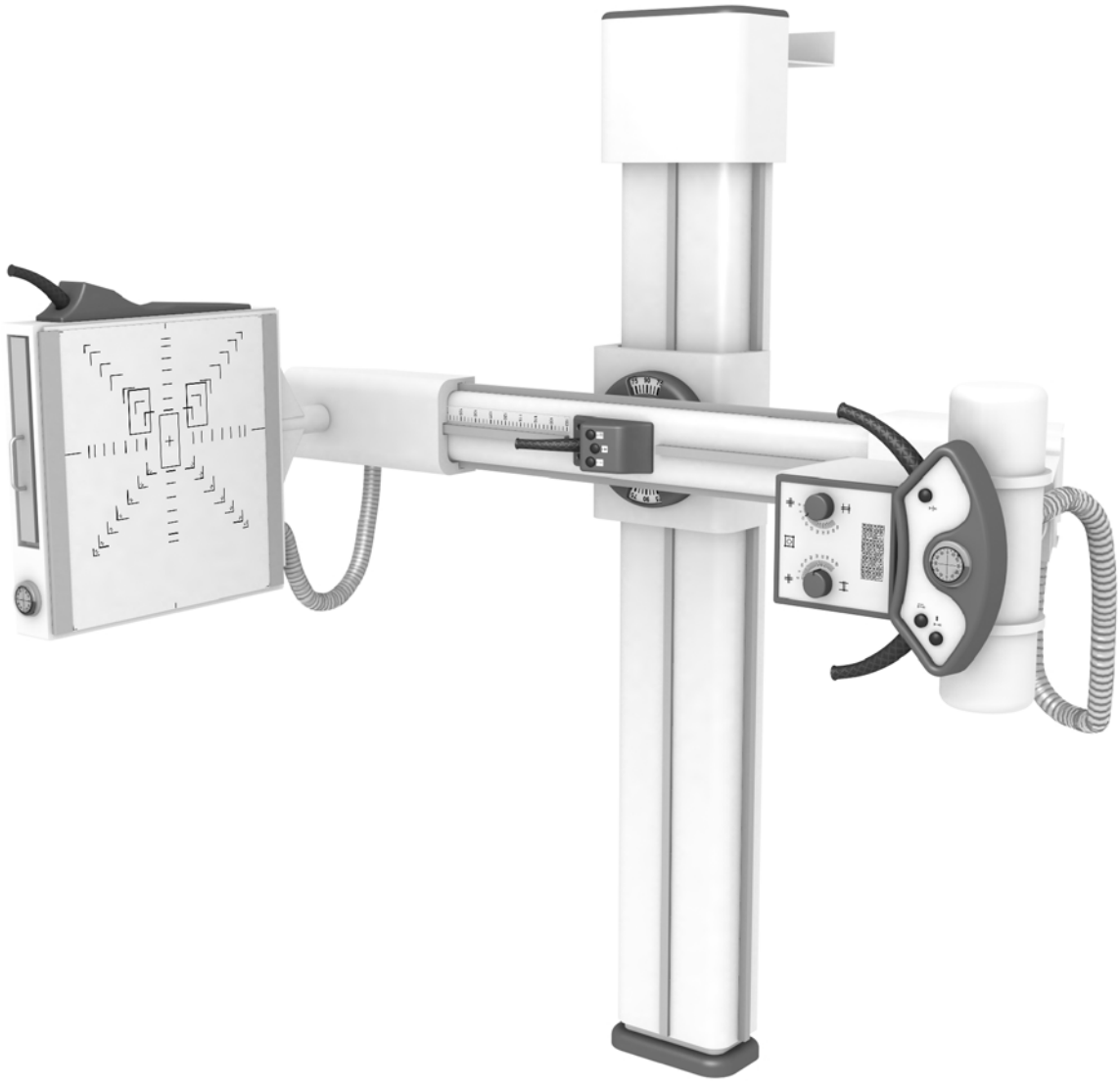
ELECTRICAL CHECKS	
ELECTRICAL CABLES AND CONNECTIONS	Check that all electrical connections are firm and secure and that all cable clamps and strain reliefs are in place. Also check that connectors do not have exposed wires and check cable sheaths for wear and fraying. Check that all cables are correctly routed.

5.3 MECHANICAL CHECKS

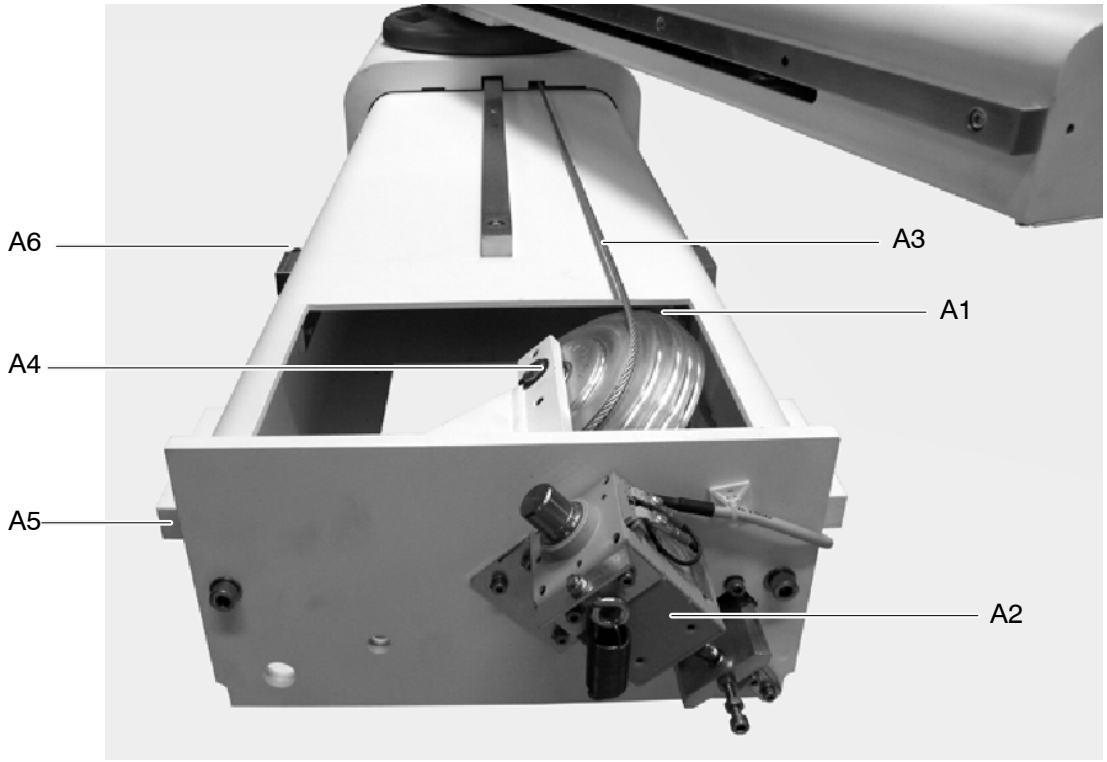
MECHANICAL CHECKS	
MOVEMENT COMPONENTS	Check correct operation of the controls, detents, limits and movements in all possible positions.
STEEL CABLE	Verify that the steel cable is in good condition and appearance. Replace the Cable if any steel wire is damaged.
RAILS	Clean the Column Rails with a cloth moistened in clean water and lubricate both rails with moisten cloth with lubricant oil. In case of noise during movement, clean and lubricate again.
CHAINS / **GUIDES** / **BEARINGS**	Clean and lubricate these type of components.
BRAKES / **LOCKS**	Check correct operation of the Brakes / Locks. Replace if necessary.
FUNCTIONAL CHECKS / **ADJUSTMENTS**	Perform a Functional Check of all Room equipment. Perform the respective adjustments of the equipment if necessary. Adjust the motorized movements of the Swivel Arm if required (*refer to Section 4.3*)

SECTION 6 RENEWAL PARTS

6.1 MANUAL VERSION

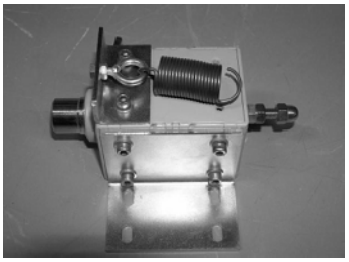


ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
A0	**COLUMN**			
A1	Spring Kit	1	SAT-A8280-01	
A2	Solenoid Kit	1	SAT-A9808-01	
A3	Steel Cable Kit	1	SAT-12040-01	
A4	Concentric Bearing Kit	1	SAT-51501110	includes 2 bearings
A5	Lateral Guide	2	SAT-S02.01.004	
A6	Top Guide Kit	4	SAT-A9810-01	

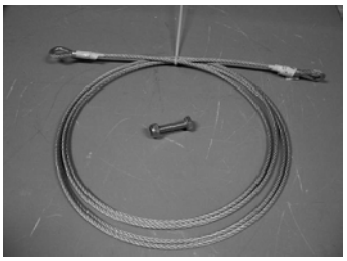


A1

A2



A3



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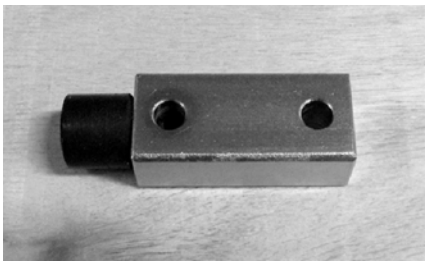
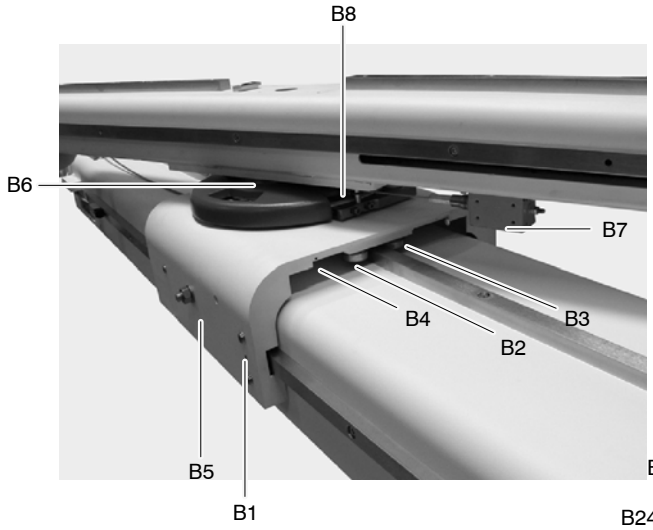


ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
B0	**CENTRAL CARRIAGE + ARM**			
B1	Lower Side Bearing Kit	2	SAT-A9811-01	
B2	Concentric Bearing Kit	6	SAT-51501110	each kit includes 2 bearings
B3	Eccentric Bearing Kit	6	SAT-A9812-01	each kit includes 2 bearings
B4	Spring Kit	1	SAT-S02.03.006	includes 4 springs
B5	Brake Plate	1	SAT-S02.03.001	
B6	Turn Bearing Kit	1	SAT-A9813-01	
B7	Turn Solenoid Kit	1	SAT-A9814-01	
B8	Rotation Spring	1	SAT-S02.04.023	
B9	Chain Kit	1	SAT-A9815-01	
B10	Pulley Block Kit	1	SAT-A9837-01	
B11	Solenoid SID	1	SAT-52301008	
B12	Gear Kit	1	SAT-A9827-01	
B13	SID Carriage Bearing Kit	4	SAT-A9828-01	
B14	Carriage Limit Kit	1	SAT-6533-01	includes 4 bumpers
B15	Console Assembly	1	SAT-S02.10.000	
B16	Button Switch	7	SAT-50613013	
B17	Brake Kit	1	SAT-A9816-01	
B18	Hand Brake Handle Kit	1	SAT-54402008	
B19	Inclinometer	2	SAT-10501-01	
B20	Handgrip Kit	1	SAT-S02.05.000	
B21	Handle	4	SAT-50205012	
B22	Tube-Collimator Assembly Turn Kit	1	A520170-01	
B23	Bucky Assembly Brake Handle Kit	1	SAT-54402007	
B24	Table Top	1	A520312-01	
B25	Profile	2	SAT-8952-01	
B26	Bucky Drawer	1	A523001-01	
B27	Central Gear Kit	1	A520171-01	
B28	Bucky	1	SAT-6685-11	
B29	Ion Chamber	1	SAT-6695-21	
B30	Grid	1	SAT-6697-03	
B31	Tube Fan	1	SAT-53103020	Option
B32	Collimator	1	SAT-6693-XX	Depends on Collimator installed
B33	Tube	1	SAT-6690-XX	Depends on Tube installed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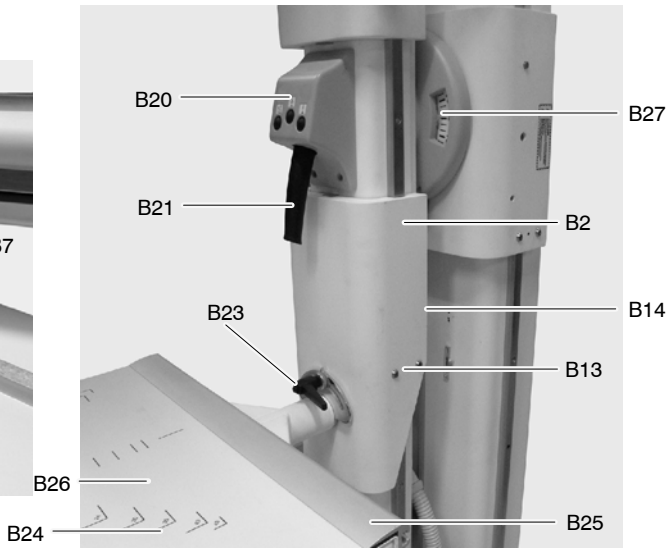
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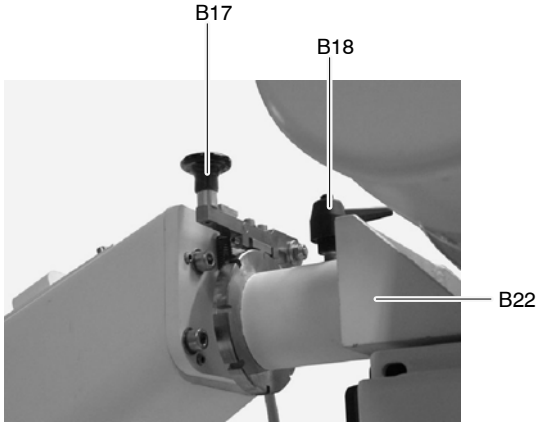
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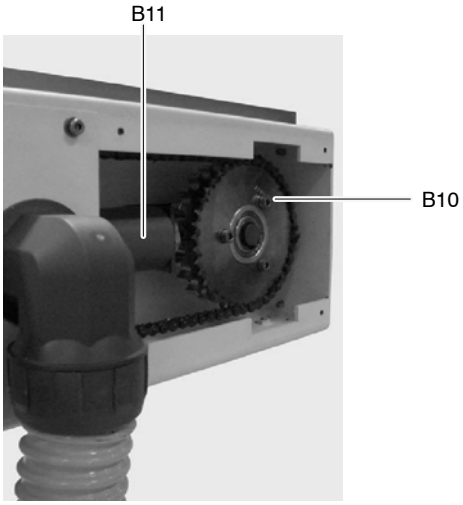
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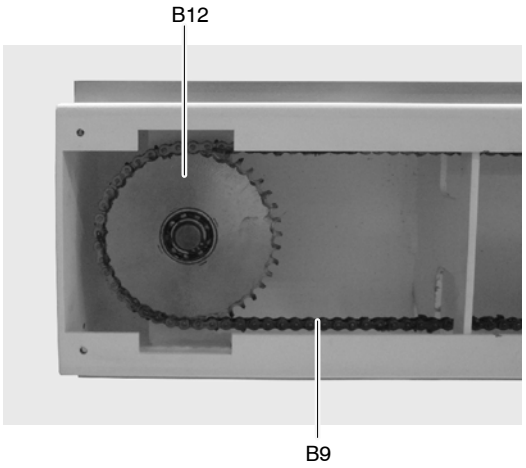
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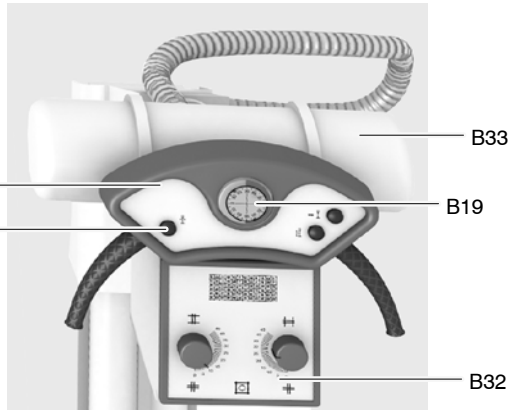
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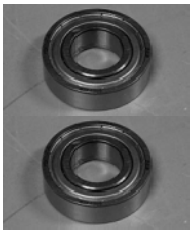

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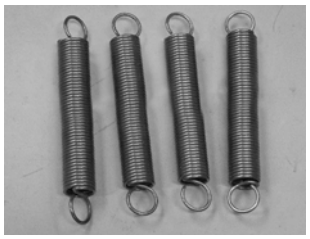

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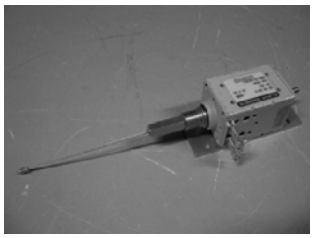

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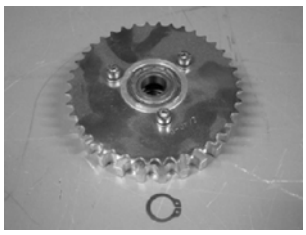

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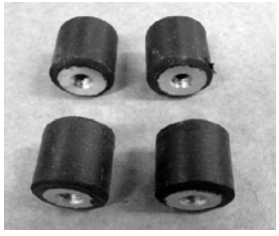

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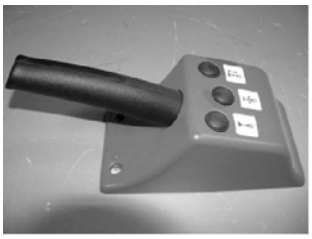

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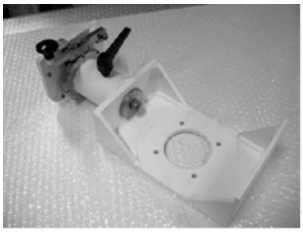

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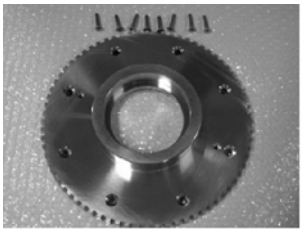
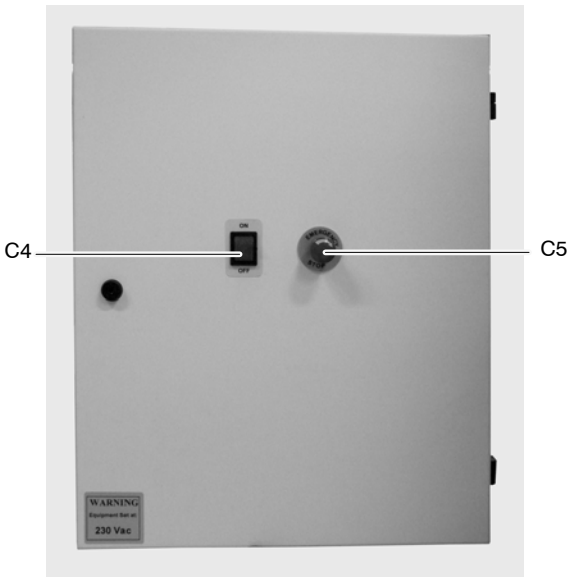
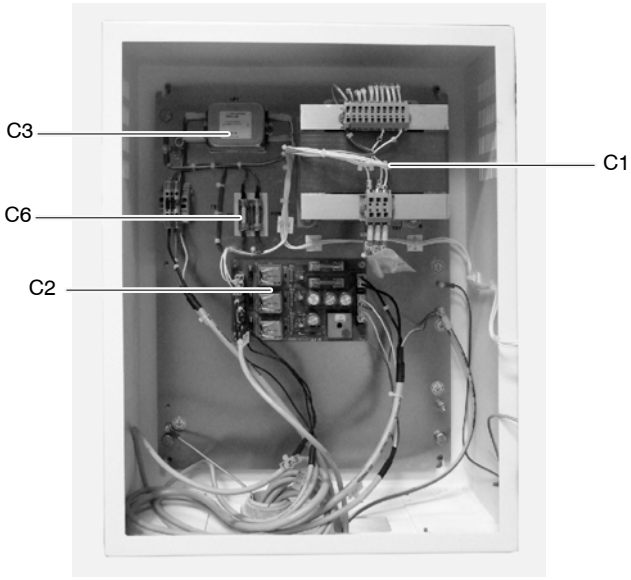


ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
C0	**POWER BOX**			
C1	Transformer	1	SAT-50509008	
C2	Optima Universal Board	1	SAT-A3127-01	
C3	Line Filter	1	SAT-50208001	
C4	Switch Green	1	SAT-50613012	
C5	Emergency OFF Switch Kit	1	SAT-A9830-01	
C6	Fuses Kit	1	SAT-A9817-01	





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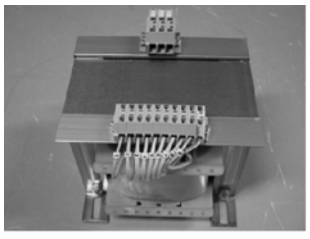

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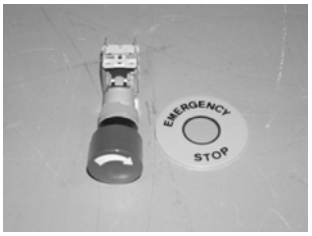

ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
D0	**CABLES**			
D1	Stator Cable	1	SAT-A3052-02	
D1	Stator Cable	1	SAT-A7014-02	
D2	Power Cable	1	SAT-A3153-02	
D3	Vertical Cable	1	SAT-A3154-02	
D4	SID Cable	1	SAT-A3155-02	
D5	Cable Rotation	2	SAT-A3158-02	
D6	Control Cable	1	SAT-A3157-02	
D7	Collimator Panel Cable	1	SAT-A3159-02	
D8	Vertical Panel Cable	1	SAT-A3341-01	
D9	Optima Bucky Cable	1	SAT-A3342-01	
D10	Optima Bucky Cable	1	SAT-A3343-01	
D11	Collimator Cable	1	SAT-A3348-02	
D12	HV Cable, 9 meters	1	SAT-6680-09	
D13	High Voltage Cable Cover, 9 meters	1	SAT-A6855-09	
D14	AEC Cable	1	SAT-A7656-03	
D15	Fan Cable	1	SAT-A7306-01	

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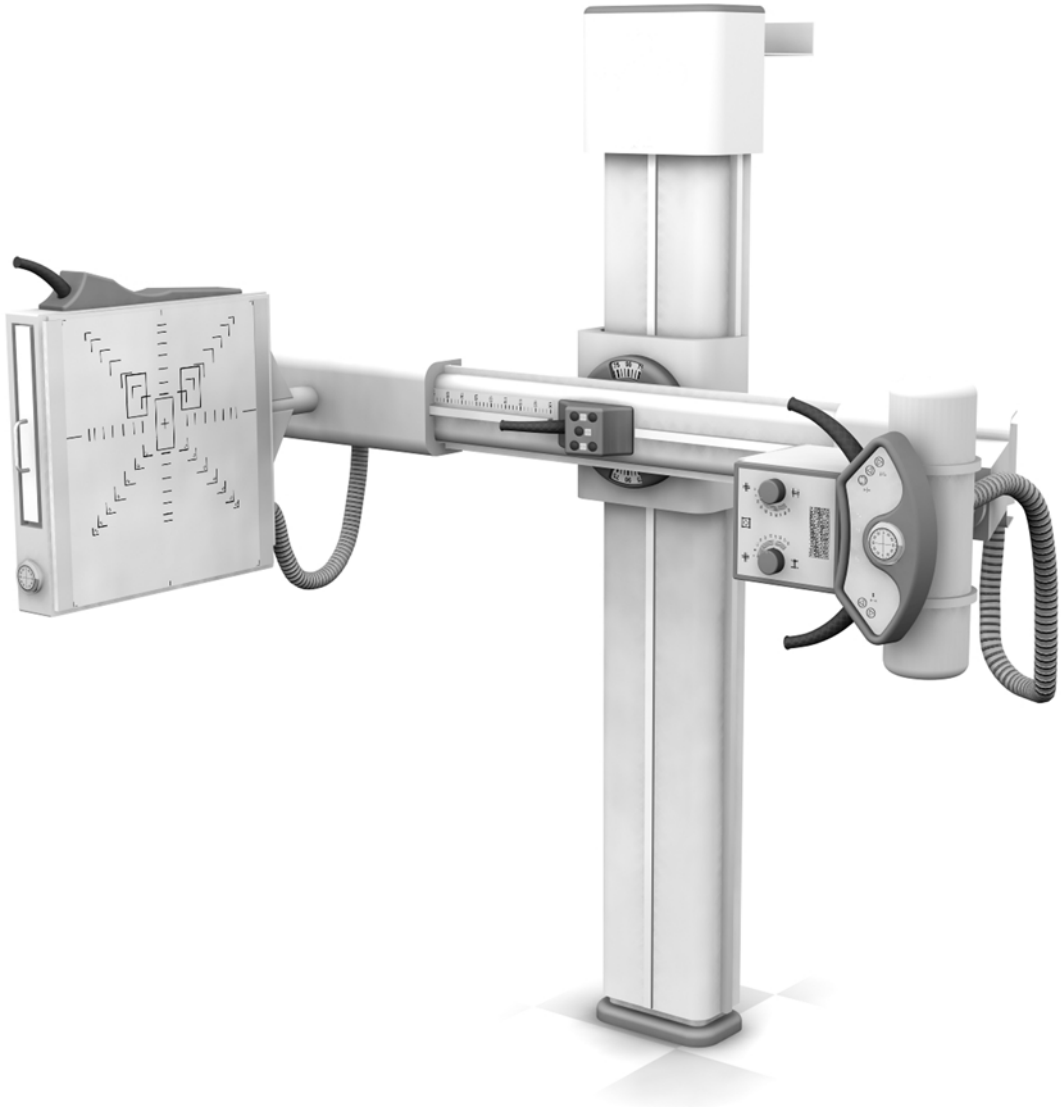
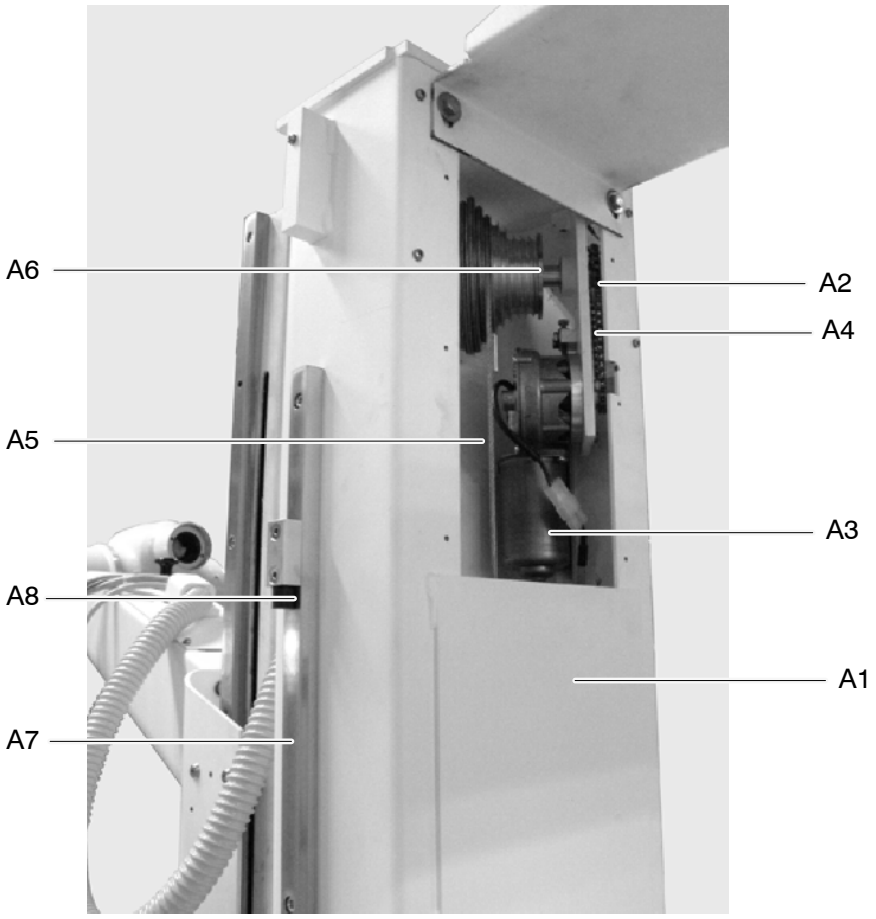
6.2 MOTORIZED VERSION



ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
A0	**COLUMN**			
A1	Spring Kit	1	SAT-A8280-01	- Bucky
			SAT-A8281-01	- Canon 50G - Radax - Trixell
A2	Gear 21 Z	1	SAT-12002-01	
A3	Vertical Motor Kit	1	SAT-A9819-01	
A4	Vertical Motor Chain Kit	1	SAT-A9820-01	
A5	Steel Cable Kit	1	SAT-12040-02	- Bucky - Canon 50G - Trixell
			SAT-12040-08	- Radax
A6	Bearing Kit	1	SAT-51501110	includes 2 bearings
A7	Lateral Guide	2	SAT-S02.01.004	
A8	Top Guide Kit	4	SAT-A9810-01	



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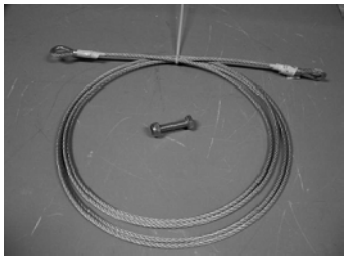

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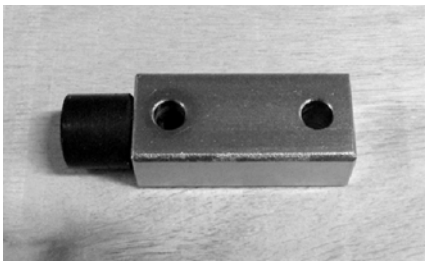
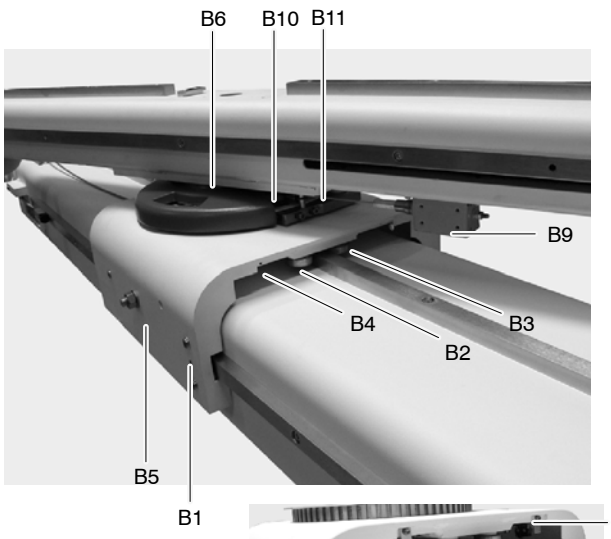


ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
B0	**CENTRAL CARRIAGE + ARM**			
B1	Lower Side Bearing Kit	2	SAT-A9811-01	
B2	Concentric Bearing	6	SAT-51501110	each kit includes 2 bearings
B3	Eccentric Bearing Kit	6	SAT-A9812-01	each kit includes 2 bearings
B4	Spring Kit	1	SAT-S02.03.006	includes 4 springs
B5	Brake Plate	1	SAT-S02.03.001	
B6	Turn Bearing Kit	1	SAT-A9813-01	
B7	Microswitch	1	SAT-50605014	
B8	Level Kit	1	SAT-A9824-01	
B9	Turn Solenoid Kit	1	SAT-A9814-01	
B10	Turn Lock Kit	1	SAT-A9825-01	
B11	Rotation Spring	1	SAT-S02.04.023	
B12	Arm Chain Kit	1	SAT-A9815-01	
B13	SID Motor Kit	1	SAT-A9826-01	
B14	Gear Kit	1	SAT-A9827-01	
B15	Kit Rodamientos Carro SID	1	SAT-A9828-01	
B16	Carriage Limit Kit	1	SAT-6533-01	includes 4 bumpers
B17	SID Microswitch Kit	1	SAT-A9829-01	
B18	Console Assembly	1	SAT-S03.10.000	
B19	Optima URS Motorized Display	1	SAT-A3195-01	
B20	Button Switch	7	SAT-50613013	
B21	Brake Kit	1	SAT-A9816-01	
B22	Hand Brake Handle Kit	1	SAT-54402008	
B23	Inclinometer	2	SAT-10501-01	
B24	Handgrip Kit	1	SAT-S03.05.000	
B25	Handle	4	SAT-50205012	
B26	Tube-Collimator Assembly Turn Kit	1	A520170-01	
B27	Bucky Assembly Brake Handle Kit	1	SAT-54402007	
B28	Table Top	1	A520312-01	
B29	Profile	2	SAT-8952-01	
B30	Bucky Drawer	1	A523001-01	
B31	Central Gear Kit	1	A520171-01	

ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
B32	Bucky	1	SAT-6685-11	
B33	Ion Chamber	1	SAT-6695-21	
B34	Grid	1	SAT-6697-03	
B35	Tube Fan	1	SAT-53103020	Option
B36	Collimator	1	SAT-6693-XX	Depends on Collimator installed
B37	Tube	1	SAT-6690-XX	Depends on Tube installed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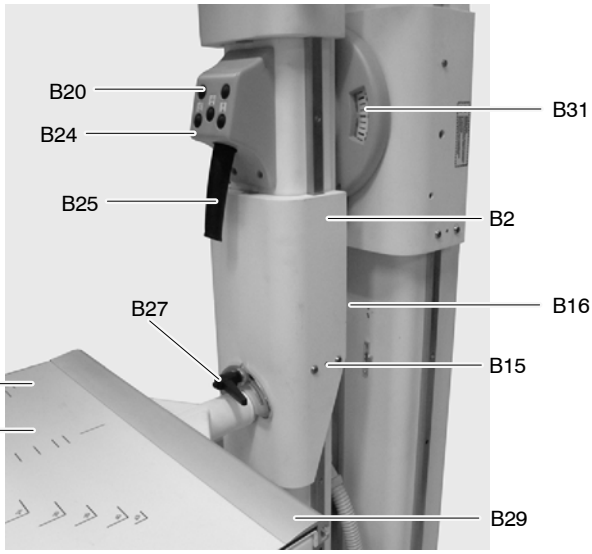
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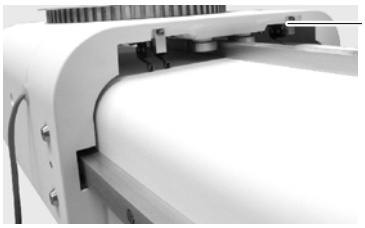
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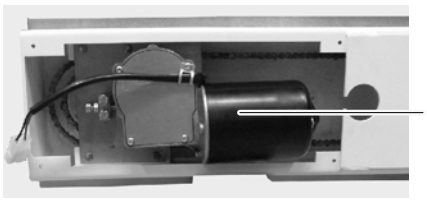
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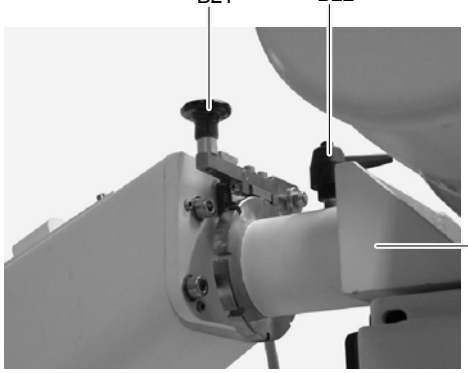
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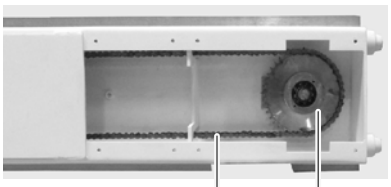
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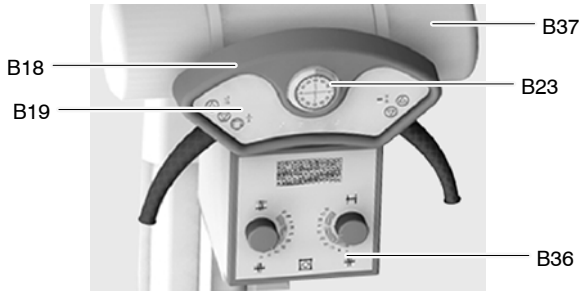
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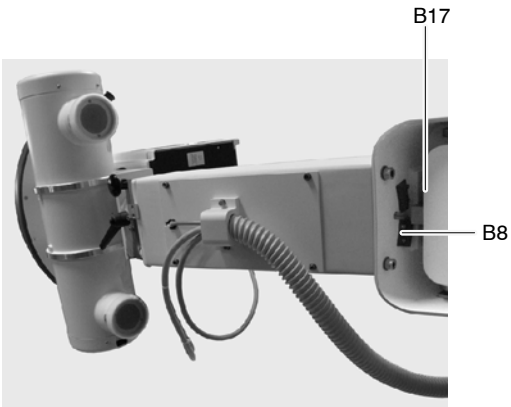
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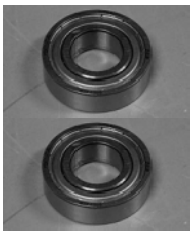

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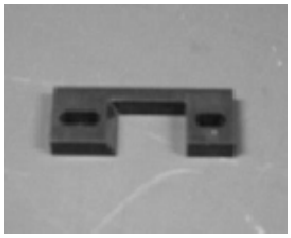

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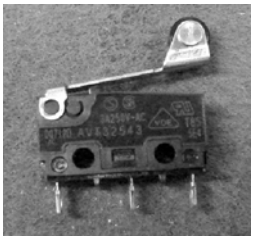

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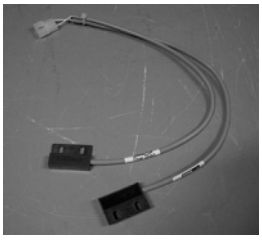

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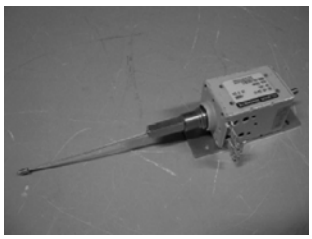

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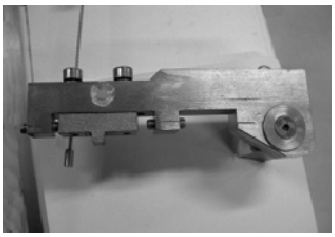

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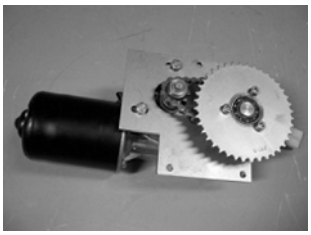

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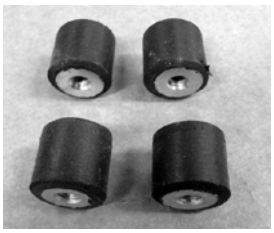

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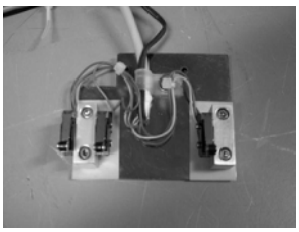

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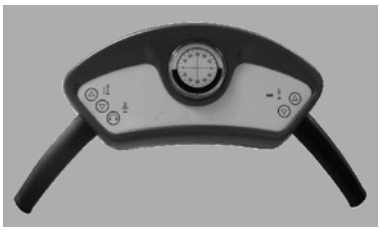

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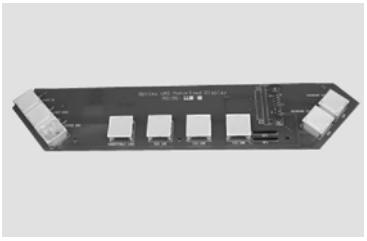


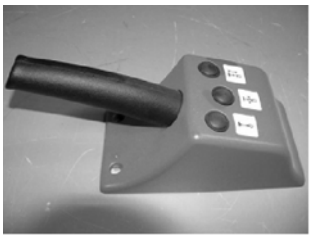
B20

B21

B22

B23

B24



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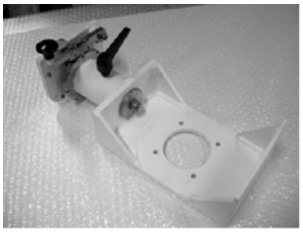
B26



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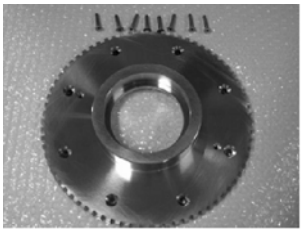
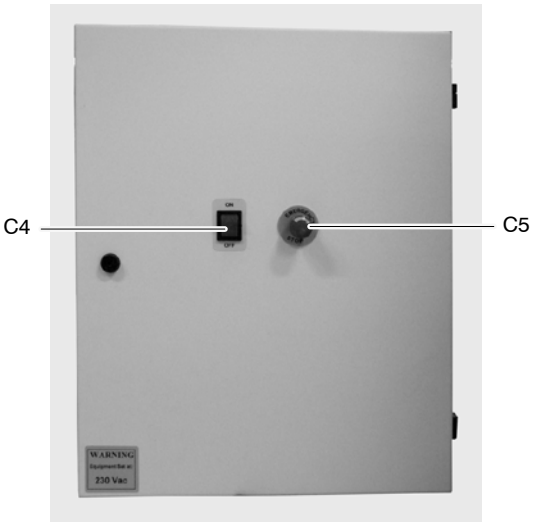
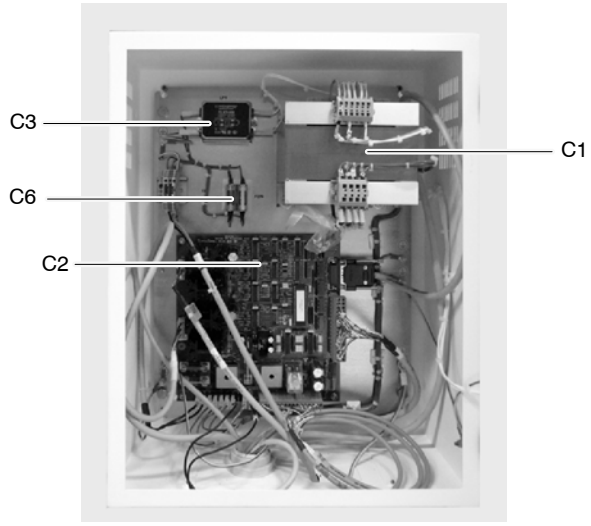
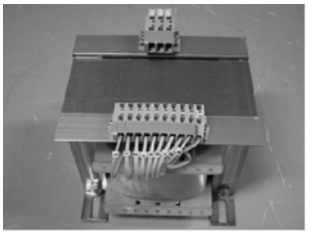


ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
C0	**POWER BOX**			
C1	Transformer	1	SAT-50509033	
C2	Optima Universal Board	1	SAT-A3194-03	
C3	Line Filter	1	SAT-50208001	
C4	Switch Green	1	SAT-50613012	
C5	Emergency OFF Switch Kit	1	SAT-A9830-01	
C6	Fuses Kit	1	SAT-A9831-01	

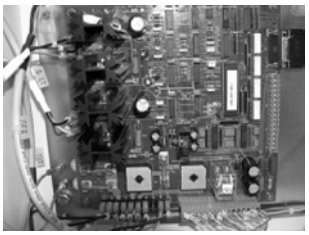




C1



C2



C3

C4

C5

ITEM	DESCRIPTION	QTY	REFERENCE	REMARKS
D0	**CABLES**			
D1	Stator Cable	1	SAT-A3052-02	
D1	Stator Cable	1	SAT-A7014-02	
D2	Power Cable	1	SAT-A3153-02	
D3	Motor Cable	1	SAT-A3386-01	
D4	Motor Harness	1	SAT-A3386-02	
D5	Display Harness	2	SAT-A3387-01	
D6	Collimator Harness	1	SAT-A3388-01	
D7	Rotation Motor Harness	1	SAT-A3389-01	
D8	SID Harness	1	SAT-A3391-01	
D9	Optima Bucky Cable	1	SAT-A3342-01	
D10	Optima Bucky Cable	1	SAT-A3343-01	
D11	Lock Up Cable	1	SAT-A3392-01	
D12	Push-Button Cable	1	SAT-A3393-01	
D13	Height Button Cable	1	SAT-A3394-01	
D14	HV Cable, 9 meters	1	SAT-6680-09	
D15	High Voltage Cable Cover, 9 meters	1	SAT-A6855-09	
D16	AEC Cable	1	SAT-A7656-03	
D17	Fan Cable	1	SAT-A7306-01	

SECTION 7 INTERCONNECTION MAPS

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

SCHEMATIC		MANUAL VERSION	MOTORIZED VERSION
IM-041	Optima Universal Interconnection	X	
A6408-02	Control Unit Box	X	
A6541-03-S	Motorized URS Interconnection		X
A3194-03	Motorized URS		X
A3195-01	Motorized URS Display		X
IF-001	Bucky Interface (connected as Bucky-1)	X	X
IF-002	Bucky Interface (connected as Bucky-2)	X	X
IF-045	US X-ray Bucky Interface	X	X
IM-363	AEC Interconnection for URS (optional)	X	X
IM-366	Fans Adaptation for Motorized URS (optional)		X

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POWER SUPPLY BOX (A6408-02)

OPTIMA UNIVERSAL BOARD (A3127-01)

TS3

TS1

TS2

TS4

J2

Optima Power Cable (A3153-01/02)

TO INPUT LINE

CHASSIS GND

GND STUD

Collimator Cable (A3346-02)

24 VAC

0 VAC

GND

COLLIMATOR

Bucky Cable A3343-01 / Optima Bucky Cable A3342-01

to Generator

GND Cable

Bucky

BUCKY PANEL

Vertical Control Cable (A3158-02) / Vert. Panel Cable A3341-01

VERTICAL

Control Cable (A3157-02)

VERTICAL CONTROL

ROTATION CONTROL

SID CONTROL

GND

COLUMN PANEL

VERTICAL

ROTATION

SID

Collimator Panel Cable (A3159-02)

COLLIMATOR PANEL

VERTICAL

ROTATION

SID

COLUMN

Vertical Lock

Vertical Locks Cable (A3154-02)

VERTICAL LOCK

GND

PIVOTING COLUMN

SID Lock

SID Locks Cable (A3155-02)

SID LOCK

GND

Rotation Lock

Rot. Locks Cable (A3156-02)

ROTATION LOCK

GND

SID LOCK

ROTATION LOCK

GND

REV	DESCRIPTION	ISSUED BY	DATE
A	Version 02	F. Garcia	01/07/01

	NAME	DATE
DRAWING	F.GARCIA	01/07/01
REVISED	A.DIAZ	01/07/01

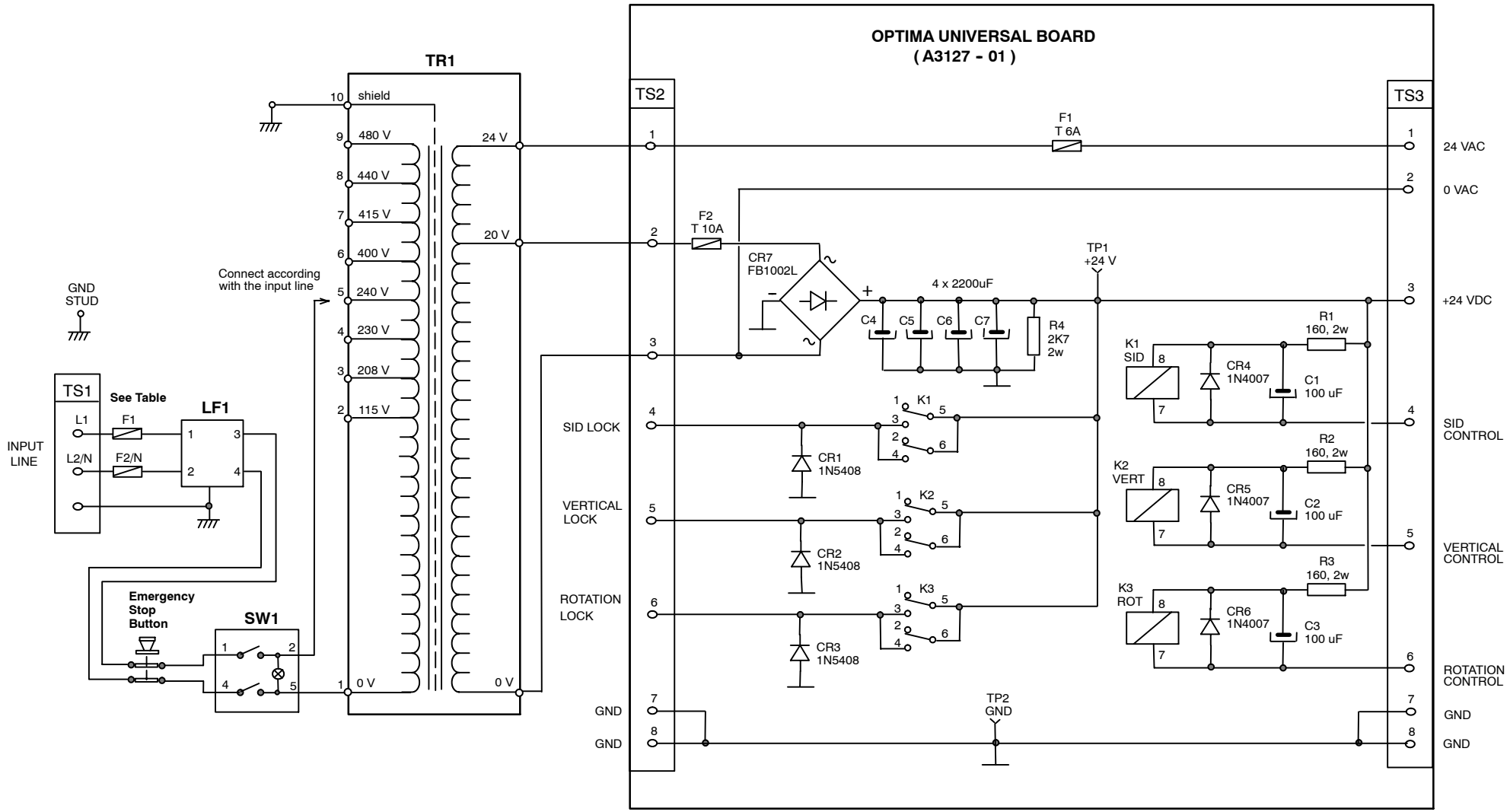
SHEET/OF 1/1

SEDECAL

IM - 041

REV A

OPTIMA UNIVERSAL INTERCONNECTION



INPUT LINE	F1 & F2
115 V 208 V to 240 V	4A, 250 V 2A, 250 V

REV	DESCRIPTION	ISSUED BY	DATE
B	CN 04/077	F. García	27/04/04
A	CN 04/030	F. Garcia	04/04/04

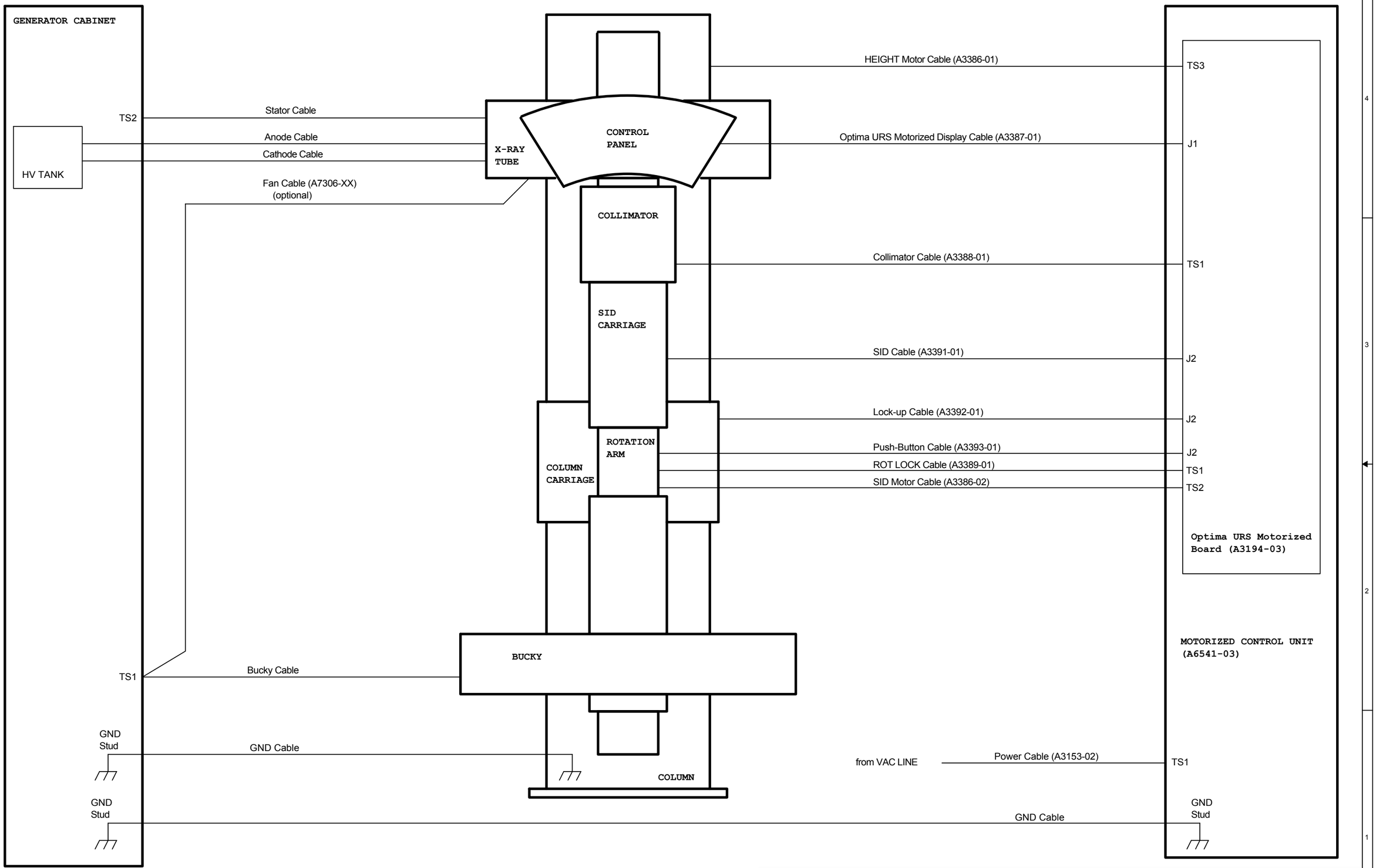
	NAME	DATE	SHEET / OF
DRAWING	F. GARCIA	06/06/01	1 / 1
REVISED	A. DIAZ	06/06/01	

SEDECAL

DWG: A6408-02

REV: B A

POWER SUPPLY BOX
(OPTIMA UNIVERSAL)



REV	DESCRIPTION	ISSUED BY	DATE
A	CN 07/024	F. García	29/01/08

	NAME	DATE
DRAWING	F.GARCIA	06/06/03
REVISED	A.DIAZ	06/06/03

SHEET / OF: 1/2

SEDECAL

A6541-03-S

REV: A

MOTORIZED URS

Motorized Control Unit (A6541-03)

Optima URS Motorized Display Board (A3195-01)

J1

Optima URS Motorized Display Cable (A3387-01)

1	BUTTON COMMON
2	HEIGHT UP
3	HEIGHT DOWN
4	INCREASE SID
5	DECREASE SID
6	ROTATE ARM
7	HEIGHT UP LAMP
8	HEIGHT DOWN LAMP
9	INCREASE SID LAMP
10	DECREASE SID LAMP
11	UNDERTABLE LOCK LAMP
12	SID 100 LAMP
13	SID 180 LAMP
14	SID 200 LAMP
15	LAMP COMMON

J1

Collimator

Collimator Cable (A3388-01)

24 VAC LAMP
0 VAC LAMP
GND

TS1

ROTATION LOCK
GND

ROT LOCK Cable (A3389-01)

L1
Rotation Lock

to GND Stud of the Generator

GND Cable

GND Stud

TR1

6	shield	
5	240V	24V
4	230V	0V
3	208V	
2	115V	20V
1	0V	0V

Power Cable (A3153-02)

from VAC LINE

TS1

1
2
GND

See Table F1

F1
F2

Connect according to the input line

Emergency Stop Button

SW1

LF1

INPUT LINE	F1, F2
115V 208V to 240V	3A, 250V 2A, 250V

WARNING

THE EMERGENCY STOP BUTTON SHOULD BE INSTALLED IN ACCESSIBLE LOCATION FOR USE IN AN EMERGENCY. IT SHOULD BE CONNECTED AS SHOWN.

Optima URS Motorized Board (A3194-03)

TS3

HEIGHT MOTOR

HEIGHT Motor Cable (A3386-01)

MOTOR +
MOTOR -
Shield

HEIGHT MOTOR

TS2

SID MOTOR

SID Motor Cable (A3386-02)

MOTOR +
MOTOR -
Shield

SID MOTOR

J2

SID Cable (A3391-01)

SID CARRIAGE

SW1 SID 100 cm
SW2 SID 180 cm
SW3 SID 200 cm

J1 VERT. POS. SW4-1 SW4-2

Lock-up Cable (A3392-01)

COLUMN CARRIAGE

UPPER LOCK SW5
LOWER LOCK SW6
UNDERTABLE LOCK SW7

Push-Button Cable (A3393-01)

TS1

ROTATION ARM

HEIGHT UP
HEIGHT DOWN
INCREASE SID
DECREASE SID
ROTATE ARM

Height-Button Cable (A3394-01)

BUCKY

J3

HEIGHT UP
HEIGHT DOWN

Tube Assembly

J1

L N

TUBE FAN

Fan Cable (A7306-XX)

230 VAC
0 VAC
Chassis GND

TS1

Generator Cabinet

REV	DESCRIPTION	ISSUED BY	DATE
A	CN 07/024	F. García	29/01/08

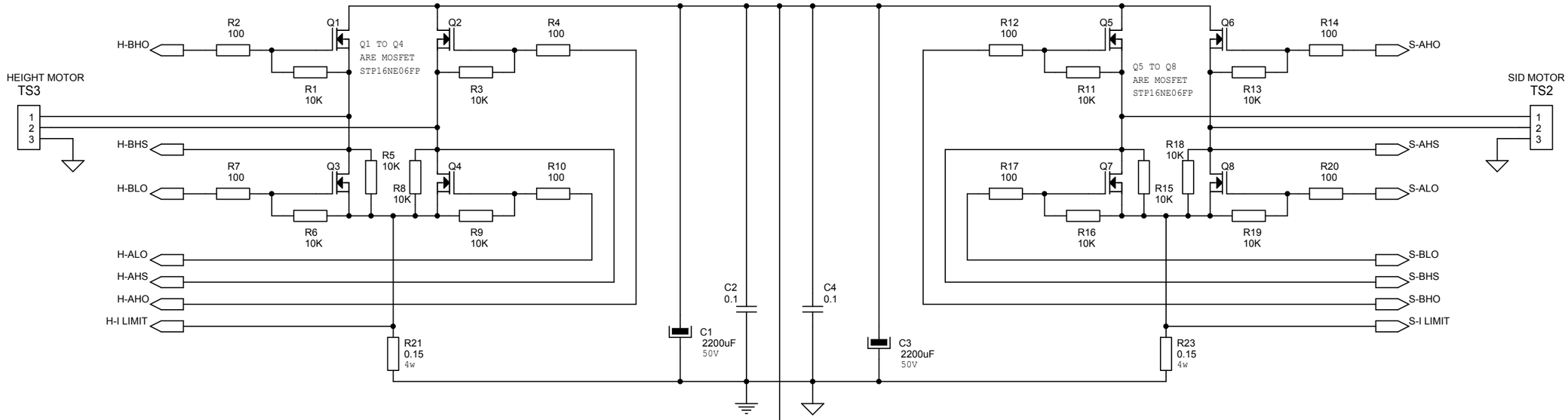
	NAME	DATE	SHEET / OF
DRAWING	F.GARCIA	06/06/03	2/2
REVISED	A.DIAZ	06/06/03	

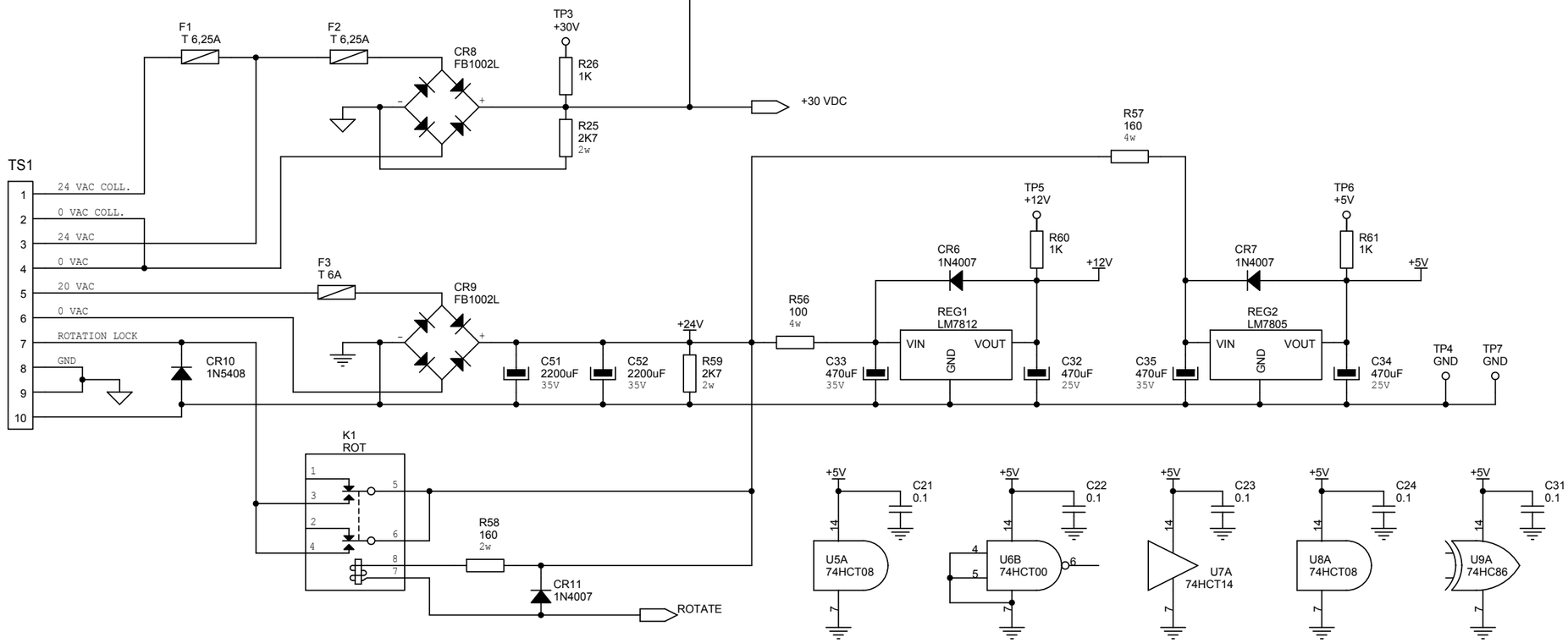
SEDECAL

A6541-03-S

A REV

MOTORIZED URS





REV	DESCRIPTION	ISSUED BY	DATE
D	CN 10/512	S.Pérez	27/12/10
C	CN 09/339	F. Díaz	24/11/09
B	CN 08/365	F. García	05/12/08
A	board validated	F. García	16/01/04

	NAME	DATE
DRAWING	F.GARCIA	07/07/03
REVISED	A.DIAZ	07/07/03

SHEET / OF: 1/3

SEDECAL

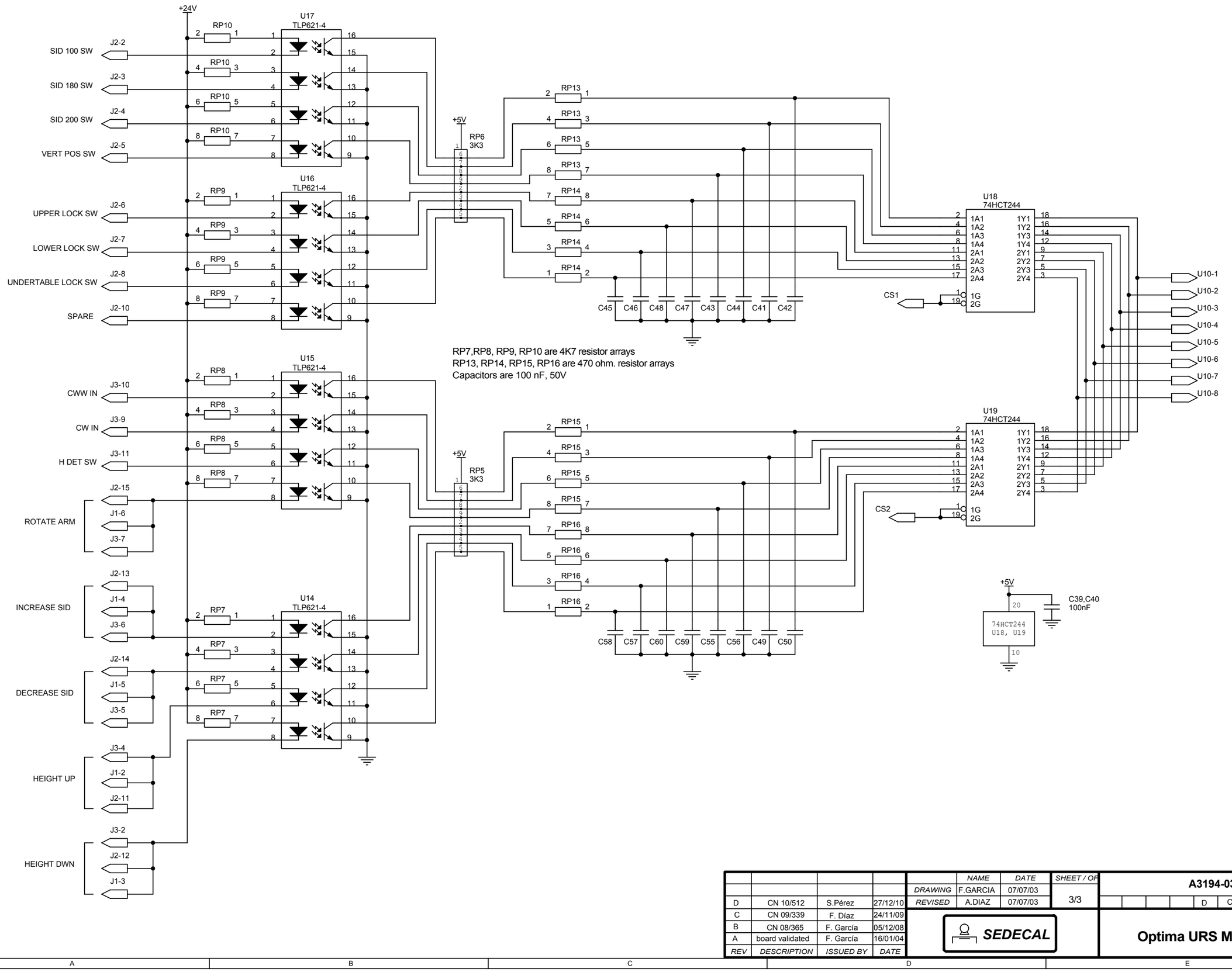
A3194-03

REV: D C B A

Optima URS Motorized

H-I LIMIT
S-I LIMIT
HEIGHT PULSE
SID PULSE
INPUTS TO U10 AS CIRCUITRY ABOVE (SEE SHEET 3)
(SEE SHEET 3)
(SEE SHEET 1)
+30 VDC
H-BHO
H-BHS
H-BLO
H-ALO
H-AHS
H-AHO
S-BHO
S-BHS
S-BLO
S-ALO
S-AHS
S-AHO
f=20KHz

					NAME	DATE	SHEET / OF	A3194-03
				DRAWING	F.GARCIA	07/07/03	2/3	
D	CN 10/512	S.Pérez	27/12/10	REVISED	A.DIAZ	07/07/03		D C B A REV
C	CN 09/339	F. Díaz	24/11/09					
B	CN 08/365	F. García	05/12/08	SEDECAL				Optima URS Motorized
A	board validated	F. García	16/01/04					
REV	DESCRIPTION	ISSUED BY	DATE					



REV	DESCRIPTION	ISSUED BY	DATE
D	CN 10/512	S.Pérez	27/12/10
C	CN 09/339	F. Díaz	24/11/09
B	CN 08/365	F. García	05/12/08
A	board validated	F. García	16/01/04

	NAME	DATE
DRAWING	F.GARCIA	07/07/03
REVISED	A.DIAZ	07/07/03

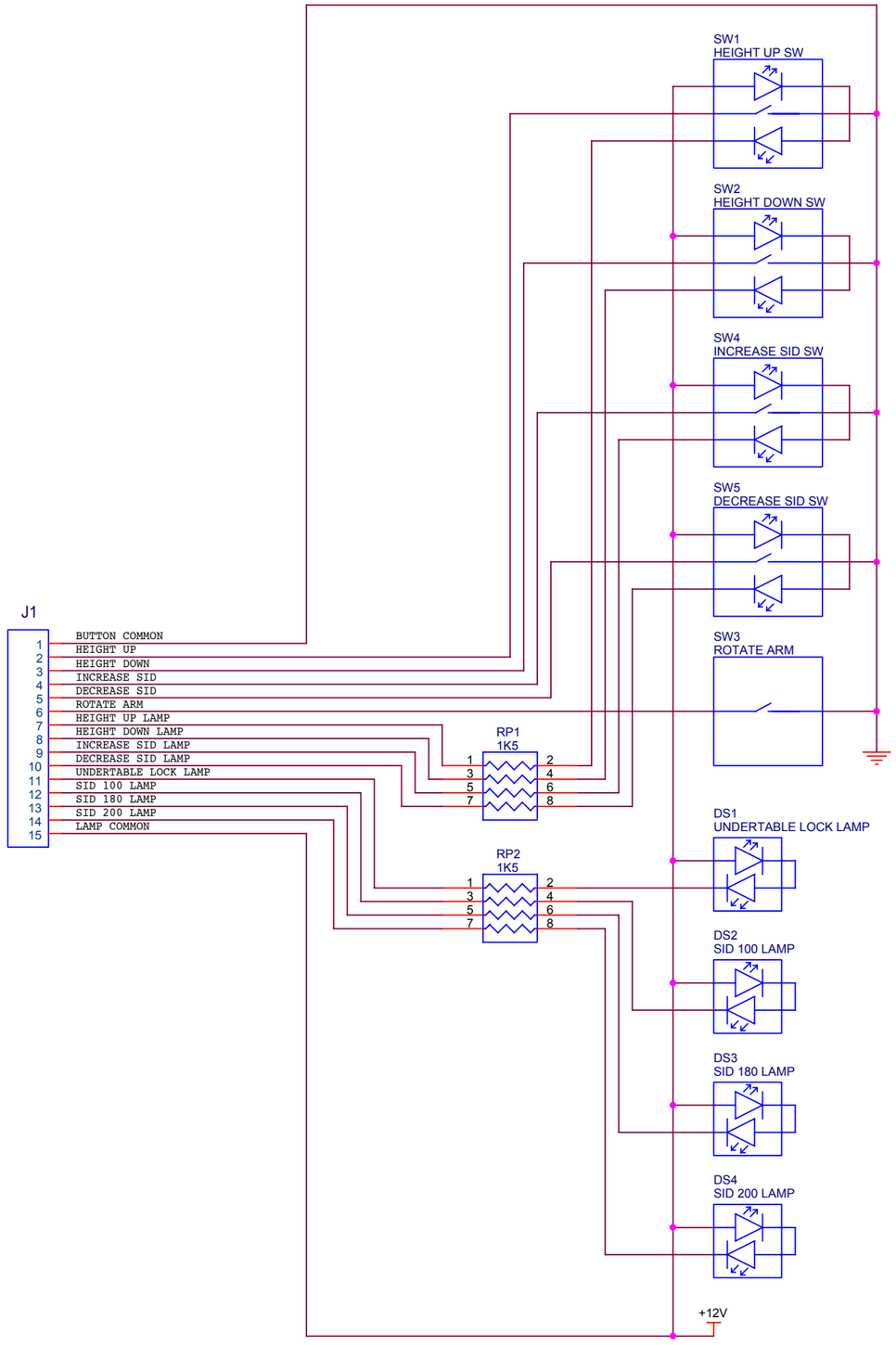
SHEET / OF: 3/3

SEDECAL

A3194-03

D C B A REV

Optima URS Motorized



REV	DESCRIPTION	ISSUED BY	DATE
A	CN 01/171	F. GARCIA	10/10/01

	NAME	DATE
DRAWING	F.GARCIA	01/01/01
REVISED	A.DIAZ	02/02/01

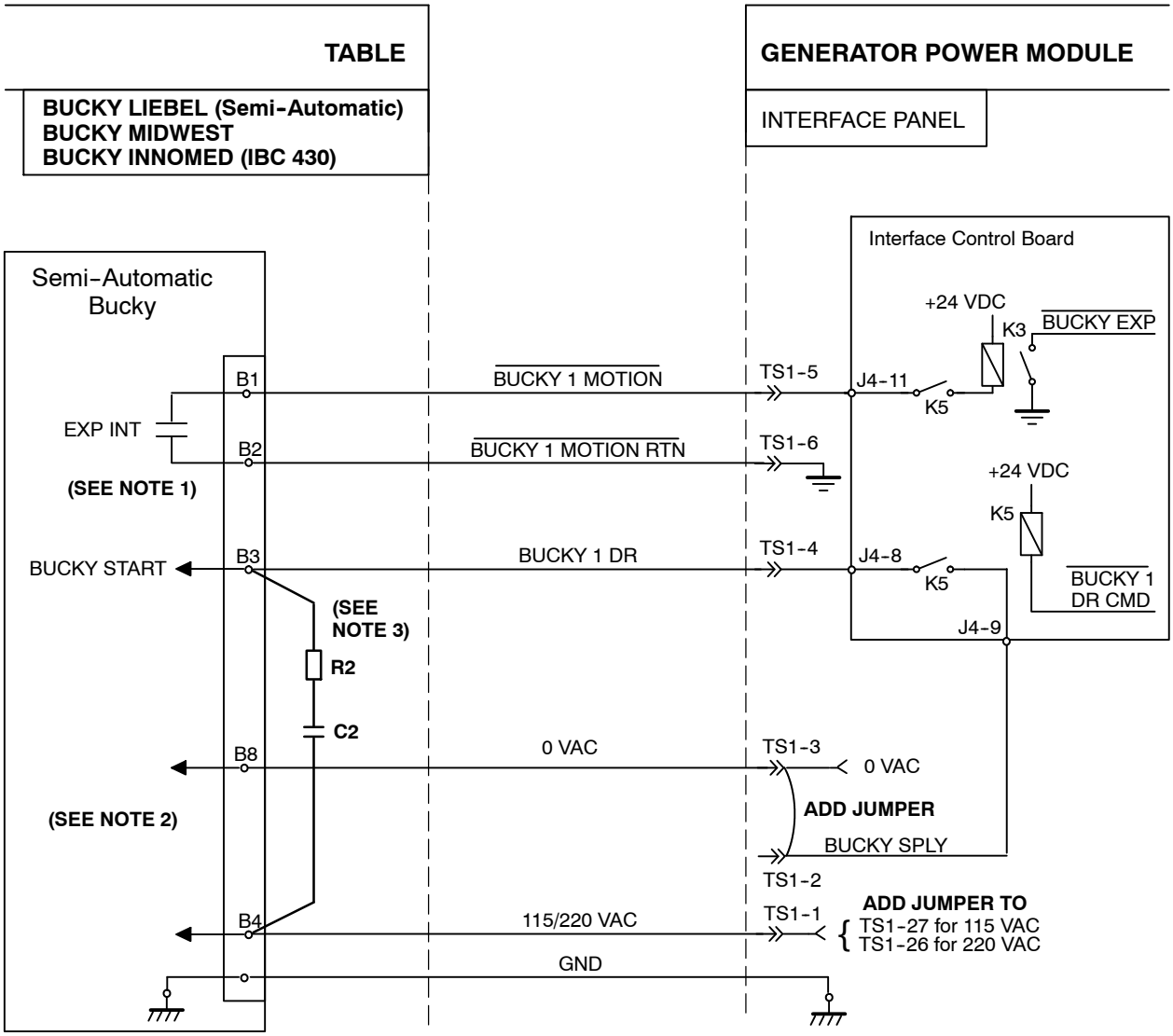
SHEET / OF: 1/1

SEDECAL

A3195-01

A REV

Optima URS Motorized Display



NOTE 1: Be sure that B2 terminal is not connected to B3 terminal.

NOTE 2: Select correct voltage in the bucky according to AC input

NOTE 3: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.
Don't add that R2-C2 for Liebel-Flarsheim 8000 Series Bucky, and remove resistor R36 and R37 in the INTERFACE CONTROL board.

NOTA 1: Asegurarse que el terminal B2 no está conectado al B3.

NOTA 2: Seleccionar la tensión del bucky según la entrada AC

NOTA 3: En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra.
Para Bucky Liebel-Flarsheim Series 8000, no añadir esa R2-C2, y quitar las resistencias R36 y R37 en la tarjeta INTERFACE CONTROL.

REV	DESCRIPTION	ISSUED BY	DATE
8	Interf. board revised	F. GARCIA	14/03/08
7	Innomed added	F. GARCIA	09/09/02

	NAME	DATE	SHEET / OF
DRAWING	F. GARCIA	15/03/95	
REVISED	A. DIAZ	15/03/95	

SEDECAL

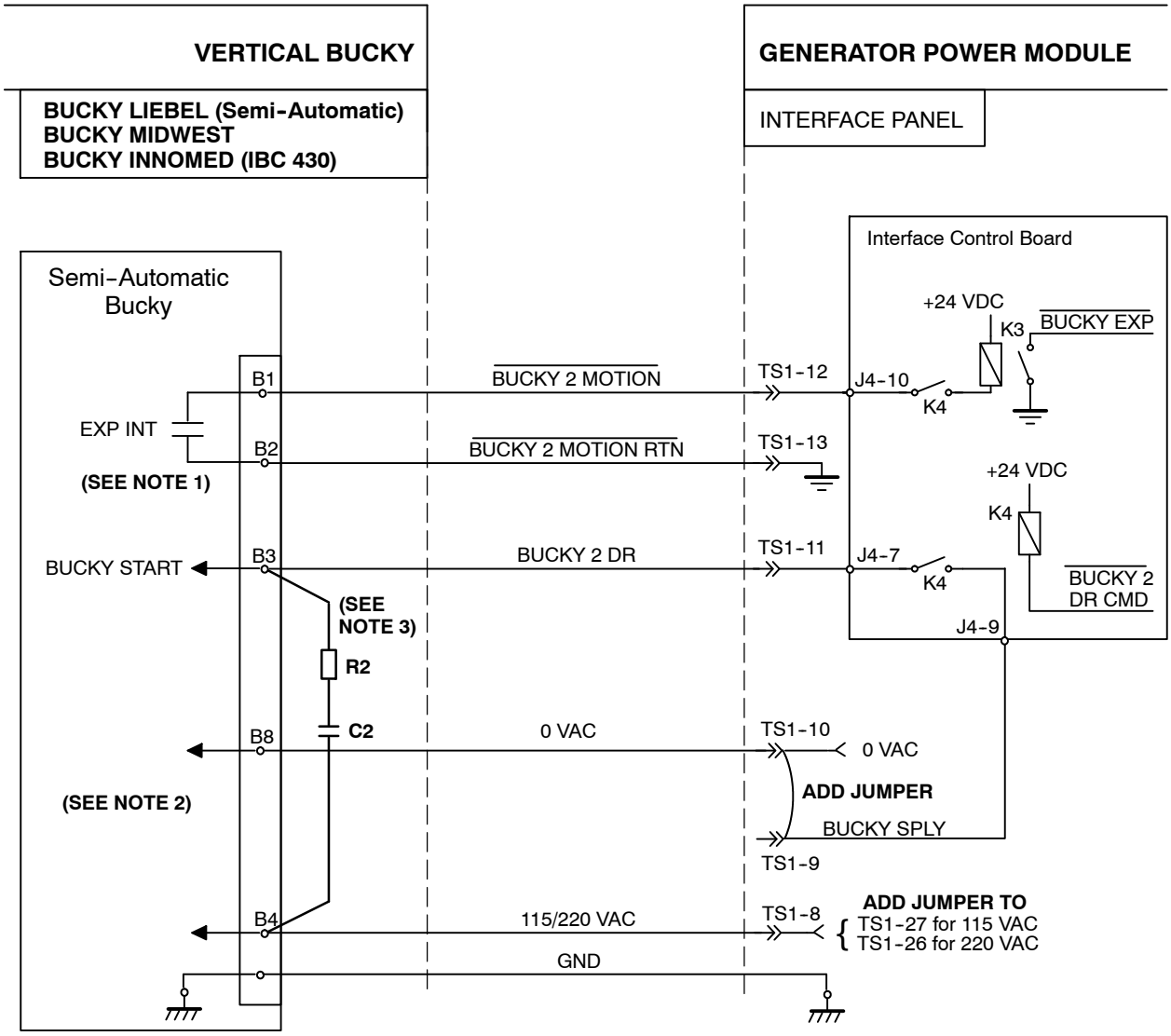
Interconnection Cable
Cable de Inerconexión

I/F-001

8 7 REV

TABLE BUCKY INTERFACE

INTERFAZ BUCKY MESA



NOTE 1: Be sure that B2 terminal is not connected to B3 terminal.

NOTE 2: Select correct voltage in the bucky according to AC input

NOTE 3: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.
Don't add that R2-C2 for Liebel-Flarsheim 8000 Series Bucky, and remove resistor R36 and R37 in the INTERFACE CONTROL board.

NOTA 1: Asegurarse que el terminal B2 no está conectado al B3.

NOTA 2: Seleccionar la tensión del bucky según la entrada AC

NOTA 3: En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra.
Para Bucky Liebel-Flarsheim Series 8000, no añadir esa R2-C2, y quitar las resistencias R36 y R37 en la tarjeta INTERFACE CONTROL.

REV	DESCRIPTION	ISSUED BY	DATE
8	Interf board revised	F. GARCIA	14/03/08
7	Innomed added	F. GARCIA	09/09/02

	NAME	DATE	SHEET / OF
DRAWING	F. GARCIA	15/03/95	
REVISED	A. DIAZ	15/03/95	

SEDECAL

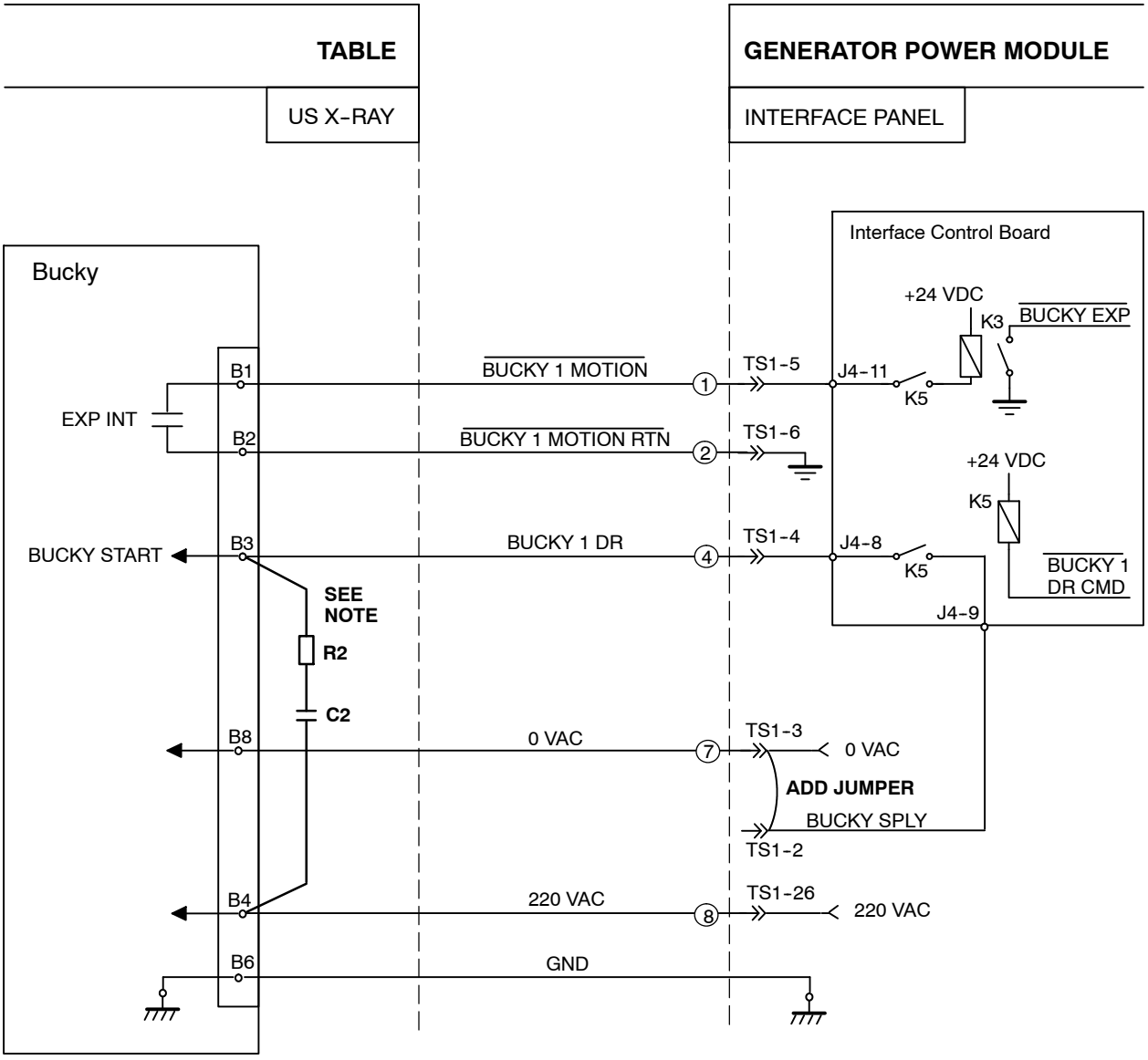
Interconnection Cable
Cable de Inerconexión

I/F-002

8 7 REV

VERTICAL BUCKY INTERFACE

INTERFAZ BUCKY VERTICAL



NOTE : In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

NOTA : En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra.

REV	DESCRIPTION	ISSUED BY	DATE
A	Interf bd. revised	F. García	14/03/08

	NAME	DATE	SHEET / OF
DRAWING	F. GARCIA	08/08/01	1 / 2
REVISED	A. DIAZ	08/08/01	

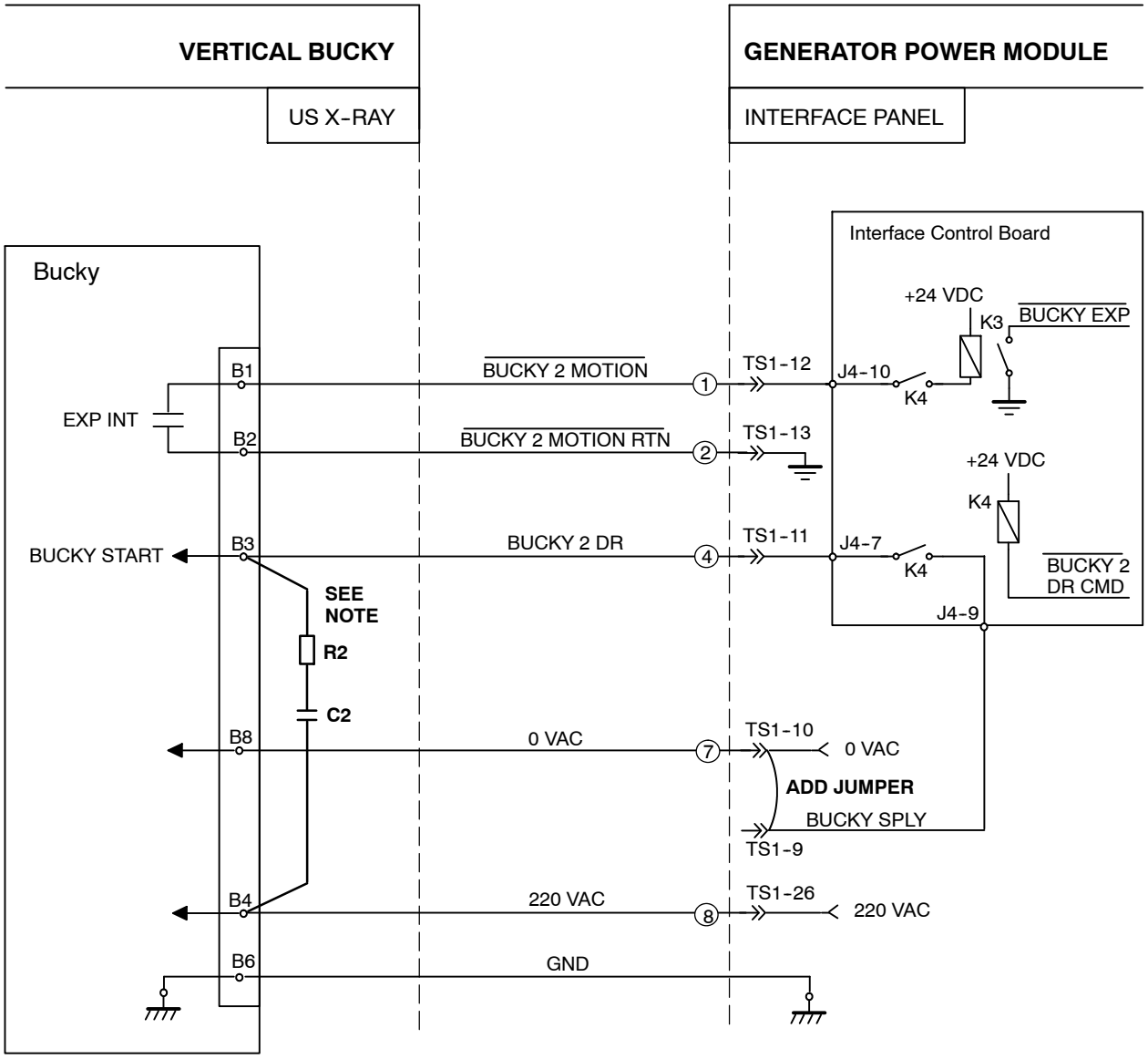
SEDECAL

Interconnection Cable
Cable de Inerconexión

I/F-045

A REV

US X-RAY BUCKY INTERFACE



NOTE : In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

NOTA : En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra.

REV	DESCRIPTION	ISSUED BY	DATE
A	Interf bd. revised	F. García	14/03/08

	NAME	DATE	SHEET / OF
DRAWING	F. GARCIA	08/08/01	2 / 2
REVISED	A. DIAZ	08/08/01	

SEDECAL

Interconnection Cable
Cable de Inerconexión

I/F-045

A ◄ REV

US X-RAY BUCKY INTERFACE

OPTIMA UNIVERSAL

AEC ADAPTATION Board

Connector IC could be J1, J2, J3or J5 depending on the Ion Chamber selected.

ADAPT

1
2
3
4
5
6
7
8
9

Note.- In case the AEC ADAPTATION Boad is not required, the ION CHAMBER CABLE A3234-02 should be used (refer to drawing I/F-003)

URS IC CABLE (A6721-01)

- FLD1 DR (LEFT)
- FLD2 DR (CENTER)
- STRT DR (RESET)
- IC OUTPUT
- FLD3 DR (RIGHT)
- -12 VDC
- +12 VDC
- GND
- Shield

DETECTOR ASSEMBLY

J2

1
2
3
4
5
6
7
8
9

ION CHAMBER

IC

1
2
3
4
5
6
7
8
9

GENERATOR CABINET

Connections ( ) for Bucky #2

TS1

5(12)
6(13)
4(11)
1(8)
3(10)
7(14)
2(9)
26
27

26 **See Note**

BUCKY CABLE (A3343-XX)

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

J1

1
2
3
4
5
6

Optima Bucky CABLE (A3342-01)

BUCKY

1 B1
2 B2
3 B3
4 B4
8 B8
6 B6

GND Stud

GND CABLE

GND Stud (Column)

Note.-Connect wire 26 to TS1-26 for 220 VAC, or to TS1-27 for 115 VAC

REV	DESCRIPTION	ISSUED BY	DATE

	NAME	DATE
DRAWING	F.GARCIA	05/05/05
REVISED	A.DIAZ	05/05/05

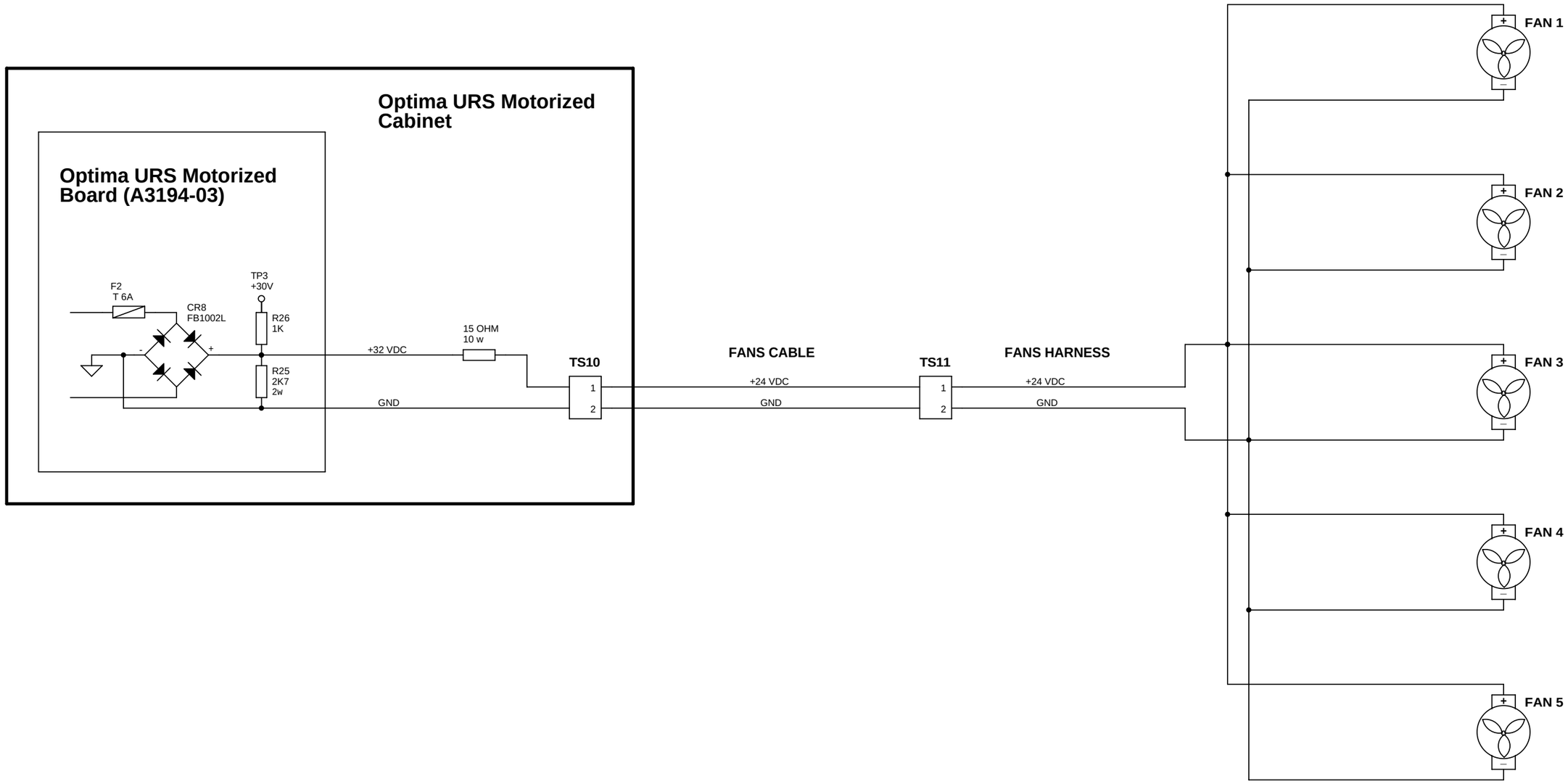
SHEET / OF: 1/1

SEDECAL

IM - 363

REV

AEC Interconnection for URS



REV	DESCRIPTION	ISSUED BY	DATE

	NAME	DATE
DRAWING	F.GARCIA	09/09/05
REVISED	A.DIAZ	09/09/05

SHEET / OF: 1/1

SEDECAL

IM - 366

REV

URS/Fans Adaptation