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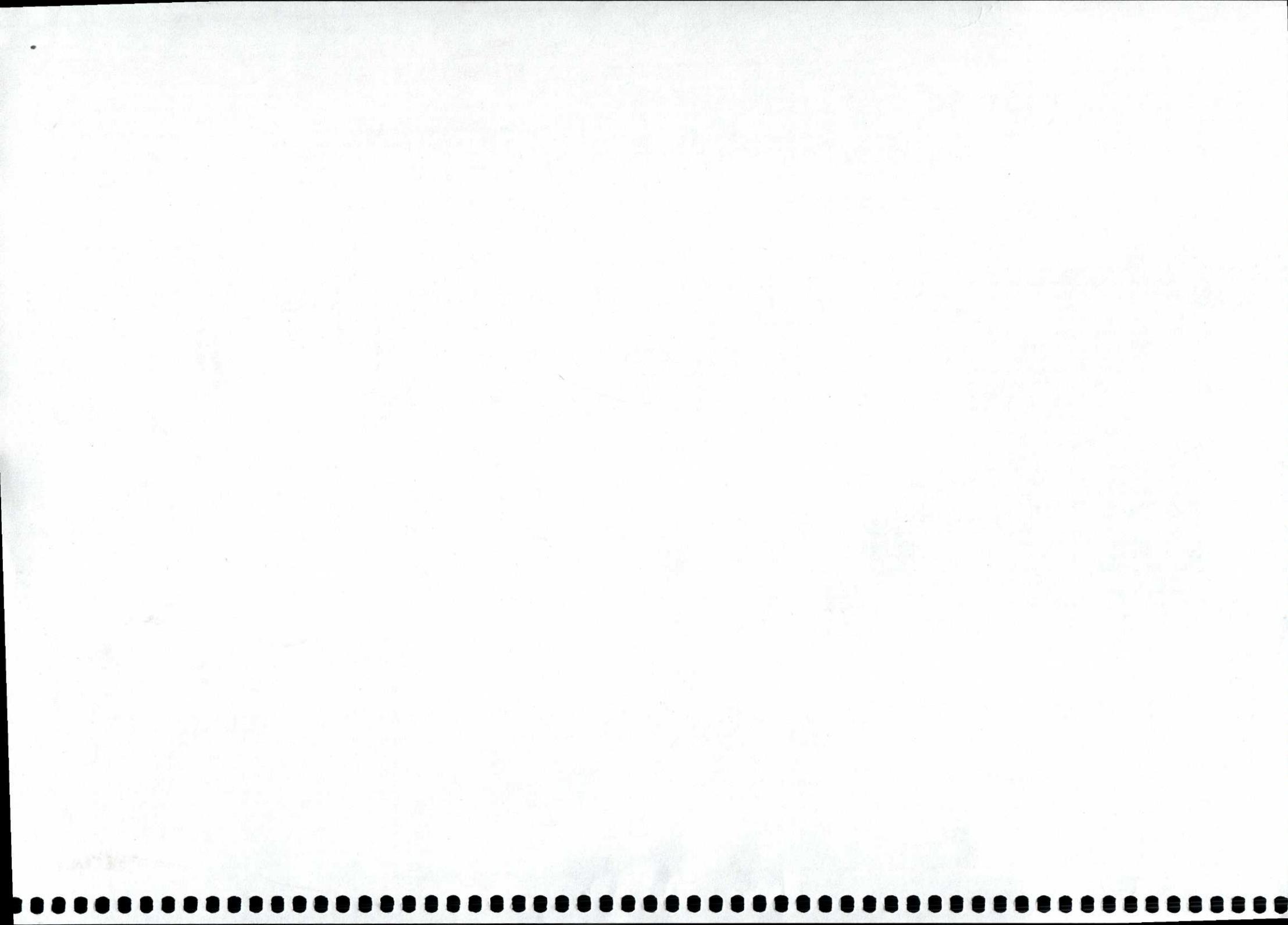


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1 Introduction

1.1 General

Orthopantomograph® OP200 D is a software controlled diagnostic panoramic dental x-ray equipment for producing high quality digital images of dentition and TM-joints. Orthoceph® OC200 D is a more equipped x-ray panoramic unit with cephalometric exposure option.

A minimum complete system contains the X-ray unit itself (with all of its accessories) and the modality workstation (PC) that is connected to the unit. However note that where as the rest of the system is installed to the patient environment, the modality workstation or any other PC may have restrictions to the place of installation referenced to that environment.

This manual covers the installation of panoramic unit, cephalostat option, PC system PCI board and optical link between PC and OP200 D unit. For information about how to use the OP200 D unit and Cliniview software please refer to the appropriate manuals.

Following manuals are shipped with the OP200 D:

- OP200 D Installation & Adjustments Manual
- OP200 D User Manual & Technical Specifications
- Installation and User Manual for Cliniview software

These manuals and future updates are available on request from Instrumentarium Dental.

In order to maintain safe and correct operation of the OP200 D unit, read and follow carefully instructions provided in this manual during the unit installation process.

Use only approved cables and plugs.

Mains connector types:

- NEMA 6-15P or similar Hospital grade (US/230 V)
- NEMA 5-20P or similar Hospital grade (US/110 V)
- HBL8215C or similar Hospital grade (JAPAN)

Power supply cord:

- For UL-countries: S or SO, AWG 14x3
- H05VV-F3G 10-16A 250V (CE)

WARNING! This product itself complies IEC601-1-1 medical safety standard but in order to the system incorporating also a PC to comply the standard, EITHER the PC has to be a medical PC OR the PC has to be located over 1,5 meters apart from the OP/OC200 D unit. The installer and the user of the system shall confirm that at least one of the above requirements is fulfilled. A PC is a medical one if it complies IEC 601-1 standard and that is indicated in the accompanying documents of the PC.

WARNING! SERVICING AND INSTALLING THIS UNIT WITHOUT ADEQUATE EXPERTISE IS EXTREMELY DANGEROUS. Instrumentarium Dental recommends that all service operations are performed by Instrumentarium Dental authorized service personnel!

WARNING! Prevent unauthorized access to unit during the unit installation process. Some internal parts of the unit contain dangerous voltage, which can be reached during the installation, when the unit covers have been removed.

WARNING! The mains filter and connected cables are still energized even when the unit is switched off (see wiring diagram in chapter 4.4.1 Mains voltage connection). The mains power cord must be unplugged from the wall socket when the mirror plate is removed during the unit installation.

WARNING! Some installation procedures instructed in this manual require X-radiation exposures. Follow the local regulations with radiation safety issues.



1.2 Graphics symbols

The following symbols are used in the OP200 D.



Radiographic control



Protective earth (ground)



Type B equipment



GOST-R A certification that the products qualifies for safety requirements in Russia



Dangerous voltage



On (Power)



Off (Power)



Attention, consult accompanying documents



If the unit has CE-marking it is CE-marked according to the Medical Device Directive 93/42/EEC.



If the unit has UL-marking, it is UL-marked according to UL60601-1 and CAN/CSA C22.2 No.601.1



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 for information concerning the decommissioning of your equipment.

The following abbreviations are used in this manual.

PC	Personal computer
HD	Hard disk
Hz	Hertz; cycles per second
MHz	Millions of hertz
CPU	Central processing unit (computer)
RAM	Random access memory
MB	Mega bytes
GB	Giga bytes
CCD	Charge-coupled device
CD-R	Compact disc (read)
CD-RW	Compact disc (read and write)
DVD-RW	Digital Versatile Disc (read and write)
HDD	High density drive
PCI	Peripheral Component Interconnect
LAN	Local Area Network

1.3 Type and version

The type and version of the OP200 D is defined in the unit main label. It is located on the vertical carriage bottom plate next to the power on/off switch or in the column label. The unit is class I, type B and has IP-20 protection.



Fig 1.1. Location of main label and CE mark

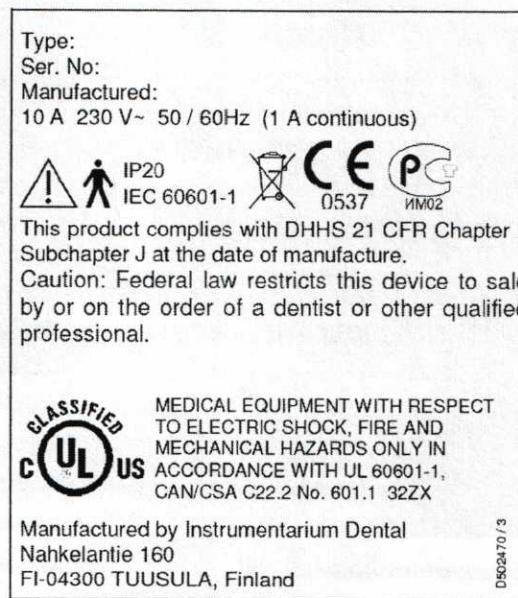


Fig 1.2. Main label and CE mark (230 V)

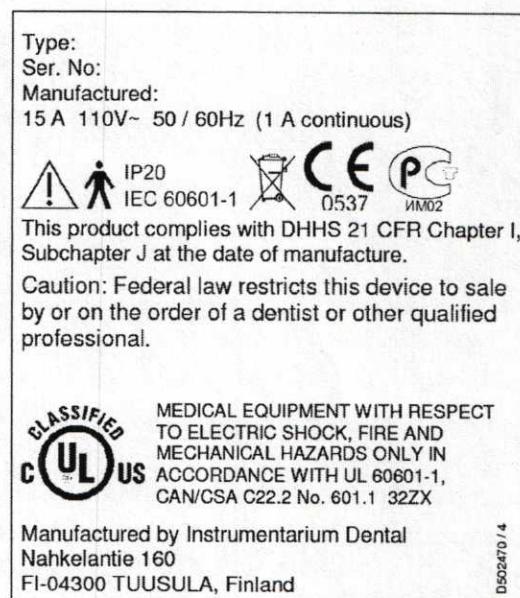


Fig 1.2. Main label and CE mark (110 V)

The type numbers appear in the following form:
OP200 D-a-bc-d-S.

TYPE AND VERSION	
OP200 D	short form for ORTHOPANTOMOGRAPH® OP200 D
OC200 D	short form for ORTHOCEPH® OC200 D
a	type of the x-ray tube insert which is originally utilized: 1 = Toshiba D-051S
bc	the type of Panoramic camera (b) and Cephalostat camera (c): 0 = No camera = No type number 1 = PAN camera, fixed 2 = PAN camera, removable 3 = CEPH camera, fixed 4 = PAN / CEPH camera, removable NOTE: Number can be for example "24" meaning both PAN camera and PAN/CEPH camera.
d	version number: 1 = OP200 models starting from s/n 100 000
s	indication of a "Special" version, marked only in products which have a non-standard configuration

For example, OP200 D-1-4-1 is:

(OP200 D) Orthopantomograph® OP200 D

(-1) with Toshiba D-051S tube

(-4) Removable combined panoramic and cephalostat camera

(-1) first version of OP200.

NOTE! In order to maintain safe and correct functioning of OP200 D, only the approved accessories may be used.

1.4 Radiation protection guidelines

X-ray equipment may cause injury if used improperly. The instructions contained in this manual must be read and followed with the Orthopantomograph® OP200 D. All government and local regulations pertaining to radiation safety must be observed.

NOTE! *For USA: Many provisions of these regulations are based on recommendations of the National Council on Radiation Protection and Measurements. Recommendations for dental x-ray protection are published in NCRP Report #35 available from NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, MD 20814.*

Personal radiation monitoring and protective devices are available and recommended for staff members. It is also recommended to provide the patient with a protective apron. Consult a physician before taking images of pregnant patients.

OP200 D is equipped with radiation protection in accordance with IEC601-1-3:1994.

CAUTION! *Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.*

1.4.1 Protection by distance

In all examinations the user of the x-ray equipment should wear protective clothing. The operator does not need to be close to the patient during normal use. The protection against stray radiation can be achieved by using the hand switch not less than 2 m (7 ft) from the focal spot and the x-ray beam. Operator should maintain visible contact with the patient and technique factors. This allows immediate termination of radiation by the release of the exposure button in the event of a malfunction or disturbance.

Caution information on control panel:

CAUTION X-RAYS
ATTENTION
RAYONS X
WARNING:

This x-ray unit may be dangerous to patient and operator unless safe exposure factors, operating instructions and maintenance schedules are observed.

1.4.2 Control from a protected environment

The operator does not need to be close to the patient during normal use. Control panel hand switch or optional remote hand switch can be used from an environment protected from the x-ray beam. The fully extended spiral cable length of the control panel hand switch is approx. 4 m (13 ft). The cable length of the remote hand switch (part no. 69961) is approx. 10 m (32 ft).

1.5 Laser lights

1. FH-light
2. Midsagittal light
3. cephalostat light
4. Layer light

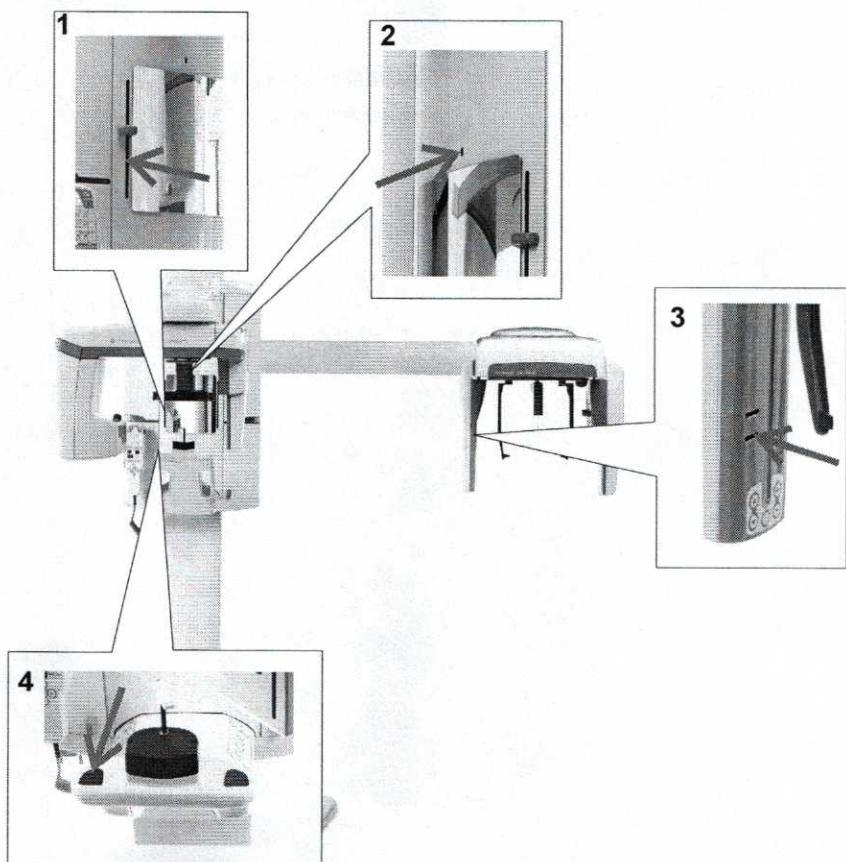


Fig 1.3. Laser light (CLASS 1 LASER PRODUCT). Max output 100 μ W.

1.6 Emergency Stop Switch

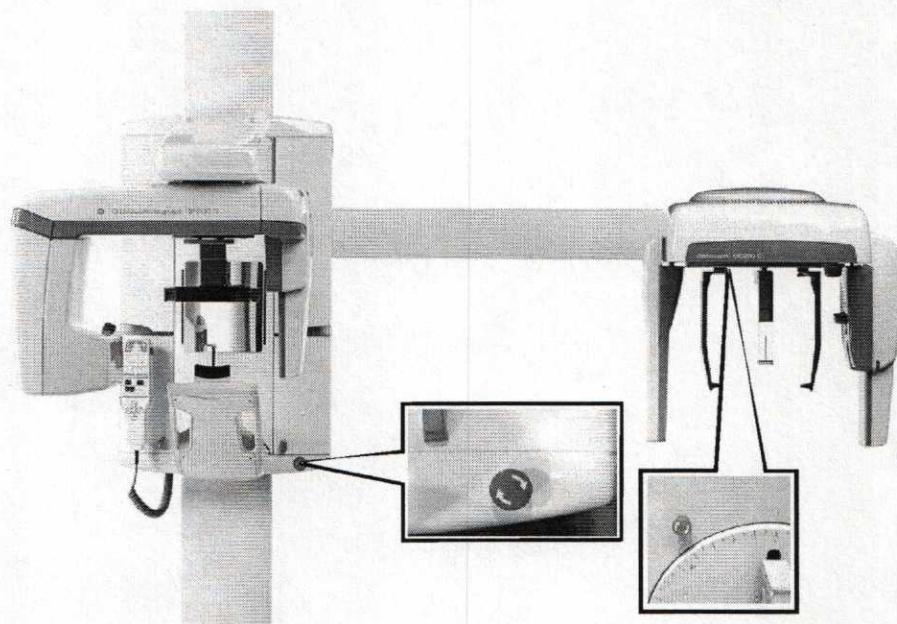
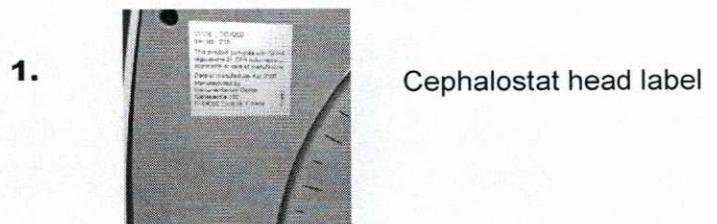
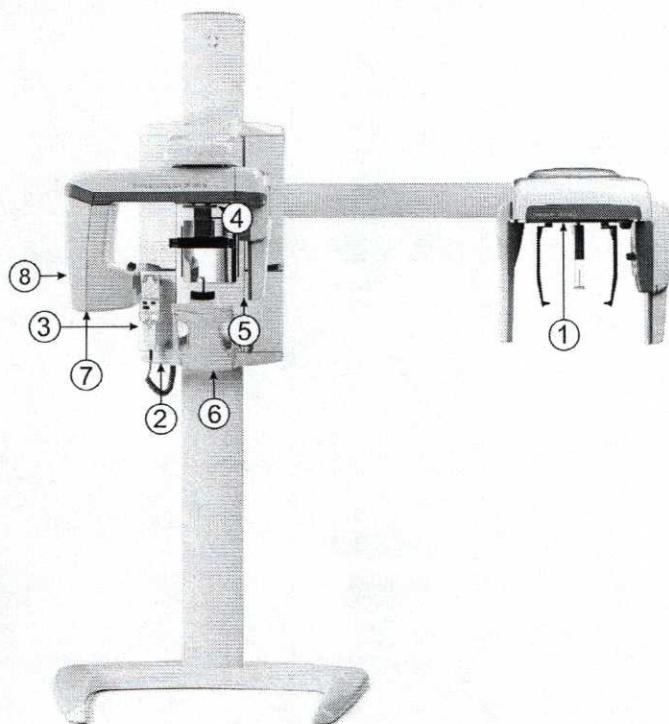


Fig 1.4.

An emergency stop switch is provided on the right side of the unit carriage and on the bottom of the cephalostat head so that the patient can reach either of them. If the emergency stop switch is pressed during an exposure, the exposure is terminated immediately and the x-ray unit is completely stopped. An exposure cannot be continued later, but has to be retaken from the beginning.

NOTE! Before switching the unit on ensure that the emergency stop switches are released.

1.7 Unit identification labels



1. Cephalostat head label



2. Main Label

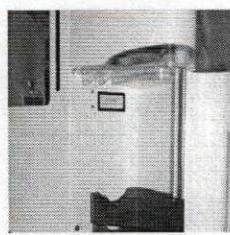


3. Unit serial number and type label



4. Midsagittal and FH-light laser label

5.



Laser light warning label

6.

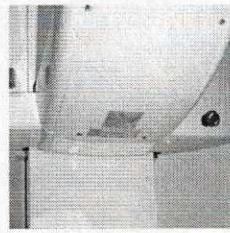
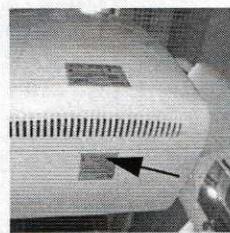


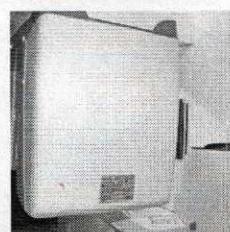
Image layer laser light label

7.



Collimator type label

8.



X-ray generator and tubehead label

NOTE! Some labels listed above are related to some options and may not be included in all countries.

1.8 Manufacturer's liability

As manufacturer we can only assume liability of safe and reliable operation of this unit when

- Installation was performed according to the OP200 D Installation & Adjustments Manual
- The unit is used according to the OP200 D User Manual
- CliniView PC software was installed according to the Installation Manual for CliniView software
- CliniView software is used according to User Manual for CliniView software
- Maintenance and repairs are performed by a qualified Orthopantomograph® Dealer
- Original or authorized spare parts are used

In order to guarantee maximal image quality for entire life time of this high performance imaging system, we suggest that the quality assurance procedure *) and optional digital test tool kit designed for image quality assurance purposes are used (part no. 68795). Also we recommend a qualified serviceman to check the unit to be in its original condition regarding electrical, radiation and mechanical safety according to our maintenance program described in more details in maintenance manual (part no. 61049) every year or after 2000 images. For more information please contact your local dealer.

*) According EN61223-3-4 and DIN 6868-151

If service on the unit is performed, a work order describing the type and extent of repair must be provided by the service technician. This must contain information of changes of nominal data or work range performed. The work order must furthermore indicate the date of repair, the name of the company concerned and a valid signature. The user should keep this work order for future references.

NOTE! *For PC system: Some PC hardware or software may be incompatible with OP PCI board or CliniView software. Instrumentarium Dental can guarantee OP200 D PCI board and CliniView software compatibility with certain PC hardware and software only if that configuration has been tested by Instrumentarium. Any later changes to the hardware or software may void this test.*

1.9 Disposal

Follow the local regulations on disposal of waste parts. OP200 D has at least the following parts that should be regarded as non-environmental friendly waste products:

- X-ray source assembly
- All electronic circuits
- Column counter weight (Pb).

2 Installation requirements and dimensions

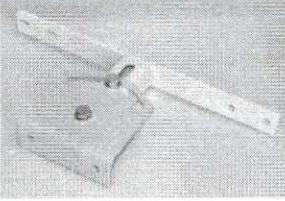
WARNING! Orthopantomograph® OP200 D must not be installed and used in rooms where an explosion hazard exists. Equipment not suitable for use in the presence of flammable mixtures.

CAUTION! Orthopantomograph® OP200 D and Orthoceph® OC200 D units are designed for fixed installation. Mobile installation is not allowed.

2.1 Column options

AVAILABLE COLUMN	COLUMN HEIGHT	ROOM HEIGHT
Standard	2250 mm	Min 2350 mm
Long	2450 mm	Min 2550 mm

2.2 Column mounting options

Floor mounting	Column bottom plate	Main purpose	Wall mounting
Standard floor mounting (Standard delivery)	Standard column bottom plate	Clinical use	<ul style="list-style-type: none"> ■ Must use the wall mount bracket 
Fork stand (Optional)	Column bottom plate for fork stand (supplied with fork stand)	Clinical and exhibition use	<ul style="list-style-type: none"> ■ Exhibition unit: not required. ■ Clinical PAN unit: highly recommended. ■ Clinical CEPH unit: must use.
Flat exhibition plate (Optional)	Standard column bottom plate	Exhibitions and show room use	<ul style="list-style-type: none"> ■ Exhibition PAN unit: highly recommended. ■ Exhibition CEPH unit: must use. ■ Clinical unit: must use.

NOTE! *Install the wall mount bracket in addition to the free standing base plate options to reach the maximum stability.*

2.3 OP/OC200 D recommended minimum installation dimensions

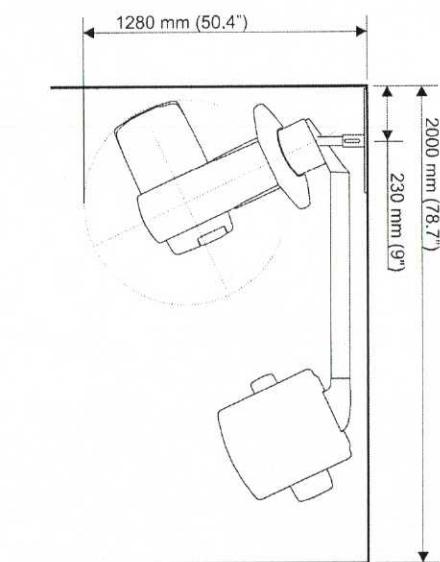
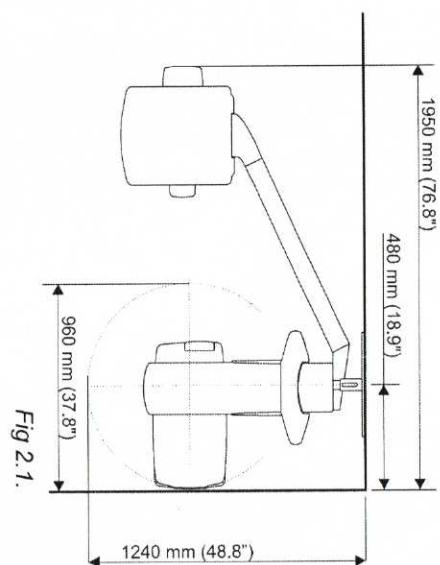
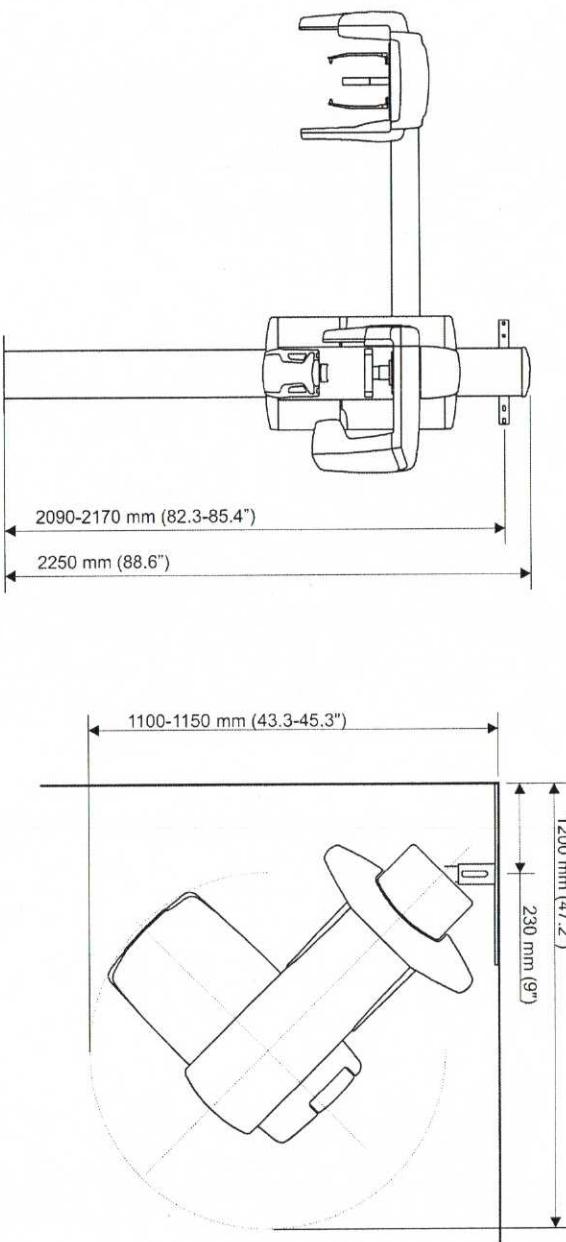
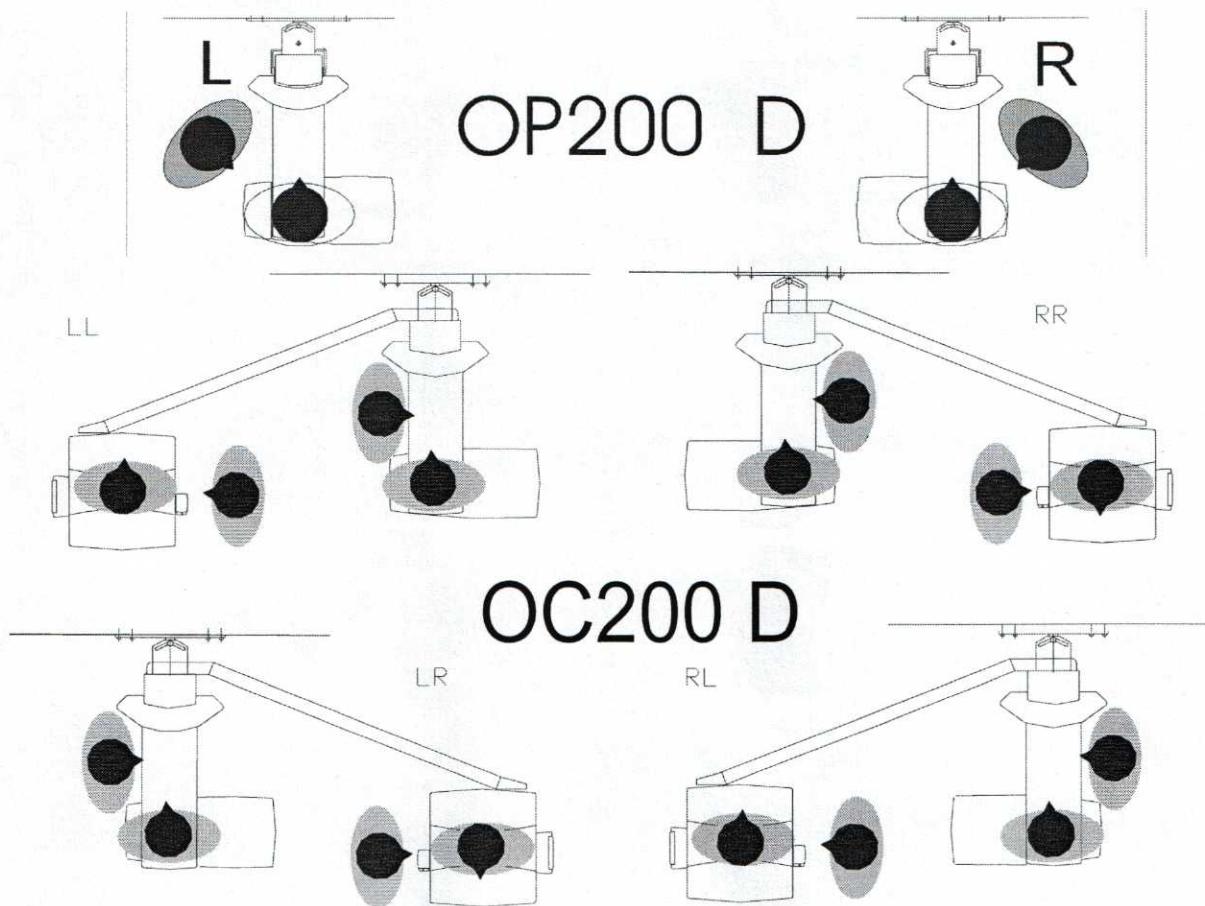


Fig 2.1.

2.4 Unit orientation options

OP200 D is designed to be universal, i.e. every model can be operated from the left or from the right side of the unit; the side for patient positioning and operation can be changed at any time during and after the installation. This also applies to the field upgrades.



NOTE! Controls and cephalostat arm can be reversed any later date.

LL	Controls on the left side of unit. Left sided operator's view for panoramic patient positioning. Cephalostat arm on the left.
RR	Controls on the right side of unit. Right sided operator's view for panoramic patient positioning. Cephalostat arm on the right.
LR	Controls on the left side of unit. Left side operator's view for panoramic patient positioning, cephalostat arm on the right.
RL	Controls on the right side of unit. Right side operator's view for panoramic patient positioning, cephalostat arm on the left.

2.5 Site requirements and dimensions

2.5.1 Radiation shielding

Follow governmental and local regulations for radiation shielding of the x-ray room.

2.5.2 Radiation Safety

During exposure the operator must use a radiation shielded protective wall or use other means for personal protection and stay at least 2 meters (7 ft.) from the radiation source yet maintaining visible contact with the patient and the technique factors in use.

2.5.3 Package dimensions

OP200 D Packages	COLUMN (Card board)	CARRIAGE (Card board)	Cephalostat package
Size (LxWxH):	230 x 33 x 42 cm	100 x 100 x 70 cm	120 x 70 x 71 cm
Gross weight approx.:	105 kg/225 lbs (OP) 115 kg/254 lbs (OC)	98 kg/216 lbs (OP) 101 kg/223 lbs (OC)	51 kg/112 lbs
Net weight approx.:	90 kg/198 lbs (OP) 102 kg/225 lbs (OC)	85 kg/187 lbs (OP)/ 85 kg/187 lbs (OC)	40 kg/88 lbs

The Orthopantomograph® OP200 D shipment consists of 2 packages.

The Orthoceph® OC200 D shipment consists of 3 packages.

2.5.4 Door width

A minimum door width of 80 cm (32 inches) is required to bring OP200 D crates and boxes into the installation room.

2.5.5 Patient Access Area

OP200 D should have a minimum clearance of 203 cm (80 inches wide) and 155 cm (61 inches) for comfortable patient entry, patient positioning and for servicing the unit.

2.5.6 Location

OP200 D unit must be installed next to a wall. The unit may be operated either from left or right side. The swivel joint of the wall bracket allows the unit to be installed at an angle, e.g. in a corner when space is limited. The PC may be located anywhere at a safe distance from the patient, as long as it can be reached by the 10 or 20 m long fibre optic cable used for connecting it to the OP200 D unit.

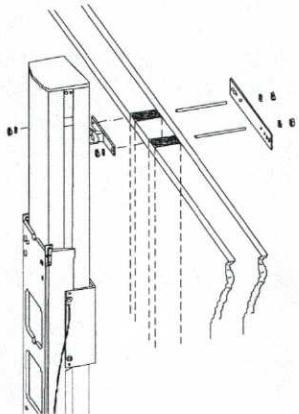


Fig 2.2. Support plate mounted behind the wall

CAUTION! Do not locate a non-medical grade PC hardware closer than 1,5 meters from the OP200 D unit otherwise patient could have a possibility to touch the PC hardware during exposure.

2.5.7 Unit mounting

The wall and mounting hardware must sustain a pull of 1500N (350 lbs.) from each wall bracket bolt. If the wall is constructed from metal, an optional support plate (part no. 9955) may be used to help support this style of construction. Wall brackets are predrilled at 406 mm and 305 mm (16 inch and 12 inch) centers.

2.5.8 Floor

The floor must withstand a minimum of 500kg/ m² (120 lbs/sqft).



2.5.9 Remote exposure button (optional)

Some local building codes may require a remote exposure button. If needed, order part no. 69961 Remote Exposure Button. The control panel and coiled cord can also be remote mounted on the wall with an additional holder (part no. 61228, not included).

NOTE! OP200 D can be programmed so that the exposure can be initiated only from the remote exposure button, except in Test (T) mode. See OP200 D Service Program Manual for details.

2.5.10 Mains connection

Verify that correct mains voltage is available (3 wire: single-phase, 110 VAC or 230 VAC with protective ground).

Voltage	Voltage range:
230 VAC line	207 - 253 VAC
110 VAC line	99 - 121 VAC

Verify that the OP200 D power is supplied through a circuit breaker with current rating of max. 16 A slow blow.

Voltage:	fuse:
230 VAC line	10 A Slow blow 326 Littelfuse
110 VAC line	15 A Slow blow Bussman MDA-15

NOTE! Some countries may have regulations on fault current protection. Such regulations must be observed.

2.5.11 Protective ground

Verify that protective ground is available.

2.6 Tools and hardware

NOTE! All screws, bolts, nuts and washers used in OP200 D are metric sizes!

The following tools are required during the installation:

- Metric Allen wrench set
- Electric drill, drill bits (8 mm & 10 mm or equal)
- Mounting hardware for wall bracket
- Spirit level
- Flat screw drivers
- Pozidrive or phillips screwdrivers (PZD-1 and PZD-2) (Phillips PH-1 and PH-2)
- Pliers
- Wrenches, 13 mm and 19 mm
- Tape measure
- Ball & pin phantom, product no. 68799
- Fluorescent tool OP200 D no. 68662
- Torque wrench

NOTE! Make sure that all needed tools and items are available before the installation is started!

3 Preparing for the installation

3.1 Checking the shipment

3.1.1 Checking the boxes

NOTE! Check that the serial numbers printed on the transport packages are matching before unpacking to avoid unnecessary work during the installation e.g. additional counter weight balancing.

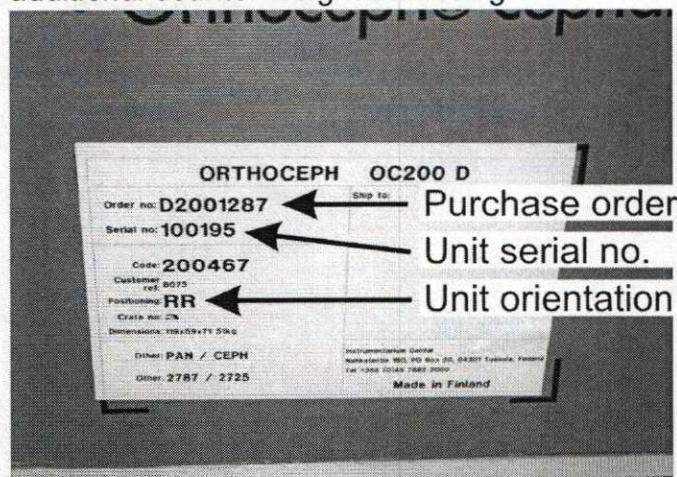


Fig 3.1.

3.2 Opening the boxes

3.2.1 Unpacking the column

NOTE! Use assistance when lifting the packages.

1. The column is packed front side up and supported with cardboard plates.
2. Move the cardboard box near the mounting location and cut the straps.
3. Open the cover of the package. Remove the top transport support material and use it as support under the column.
4. Lift the column and place it front side upwards over the transport support material plates.

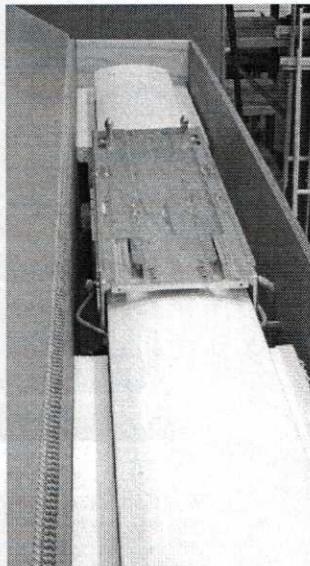


Fig 3.2.

NOTE! Do not place the transport support material under the column to the place, where the counter weight transport locking plate is located. Used support material should be high enough to prevent the mains cable to be damaged between the column and floor.



Fig 3.3. Transport support material under the column



Fig 3.4.

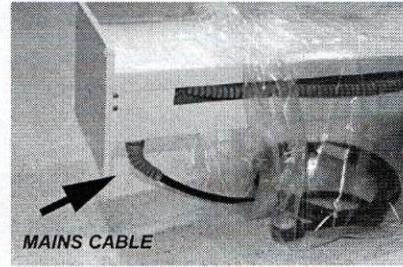


Fig 3.5.

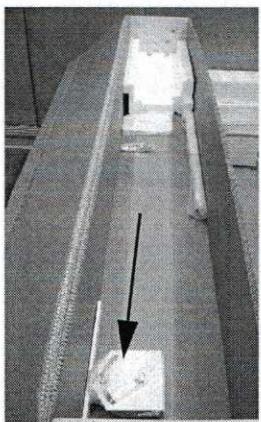


Fig 3.6. Wall mount bracket



Fig 3.7. Trim panels and screws

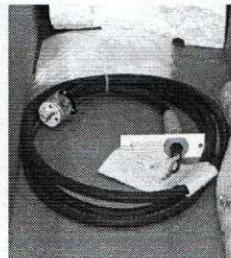


Fig 3.8. Mains cable



Fig 3.9. Wall bracket mounting screws

5. Locate the wall mount bracket, trim panels, main cable and wall mounting screws in the package.

3.2.2 Unpacking the carriage

The complete vertical carriage, the CCD camera (option) and the accessories are contained in a Cardboard box on a pallet.

1. Move the crate near the installation site and cut the tie straps. Move or lift the crate aside from the wooden pallet.

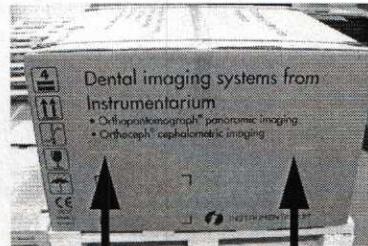


Fig 3.10.

2. Remove the crate top by removing the staples only from the sides and lifting the top away.

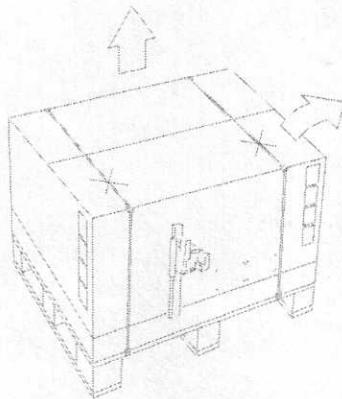


Fig 3.11.

NOTE! Certain parts of the equipment are covered with protective film to prevent scratches during transportation and installation. Remove all protective films before handing over the unit.

3. Locate and collect all accessories (fig 3.12), check them against packing list enclosed and set them aside.

Pay attention to the CCD camera (option), which is located in the carriage package (fig 3.13). Check the status of the camera's shock sensors (fig 3.14). Red colour means that the sensor has not been triggered. Black colour means that the carton has been dropped and the sensor may have been damaged. If the status of the shock sensors is black, contact the manufacturer.

CAUTION! Do not lift or otherwise apply force on the CCD camera! Damage to the unit and/or degradation of image quality may occur!

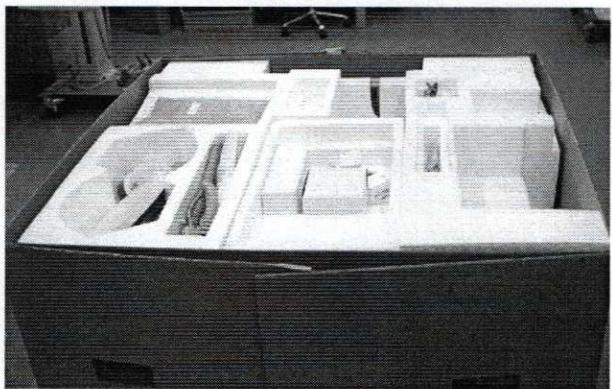


Fig 3.12.

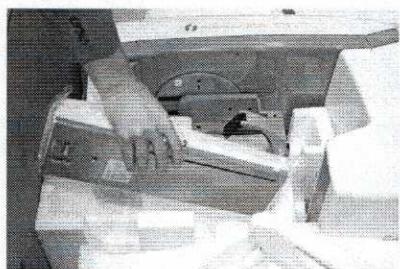


Fig 3.13.

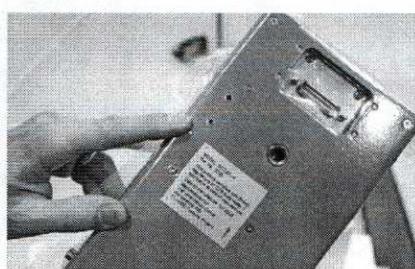


Fig 3.14.

4. Remove the staples holding the card board bottom flaps. Unfold the flaps.

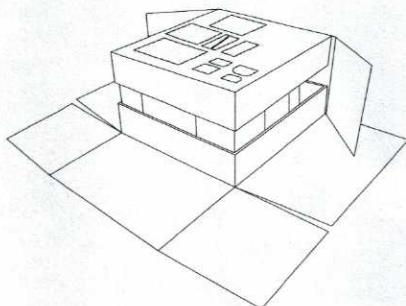
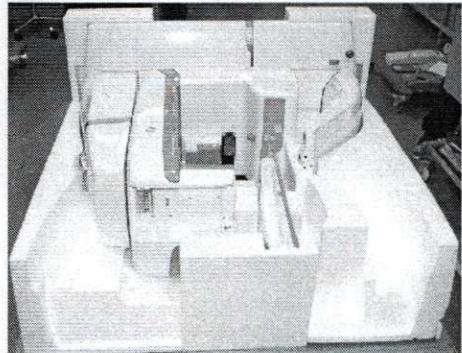


Fig 3.15.

5. Remove the styrofoam transport support material located on top of the carriage.



4 Hardware installation

WARNING! *The mains filter and connected cables are still energized even when the unit is switched off (see wiring diagram in chapter 4.4.1 Mains voltage connection). The mains power cord must be unplugged from the wall socket when the mirror plate is removed during the unit installation.*

NOTE! *The OP200 D unit contains numerous bolts, screws and other small parts, that are easily mixed or lost during installation. Pay attention to logical and careful storing of all the small parts that you extract from the unit during installation.*

NOTE! *During the installation process some covers have to be opened or removed. Access to energized internal parts may cause danger. Whenever possible, it is recommended to close or fasten covers to avoid injury.*

NOTE! *Before installing the unit ensure that all prerequisites for the installation site are fulfilled, see chapter 2 Installation requirements and dimensions.*

4.1 Column installation

NOTE! *OP200 installation requires two persons. Some assistance may be needed when lifting the column from its crate.*

NOTE! *Unit floor mounting with standard column bottom plate always requires the wall mounting bracket.*

4.1.1 Wall mount bracket

1. Before mounting the wall bracket, check from which side the patients are to be positioned to ensure enough space around the unit. Use two 8x75 mm bolts for mounting the wall bracket.

WARNING! *If there is any doubt that the wall will not withstand the pull, use anchor plates or also optional base plate.*

2. If the unit is the OC200 D, it requires a minimum distance of 480 mm (18.9") on the panoramic side and 1460 mm (57.4") on the cephalostat side measured from the wall bracket center point.

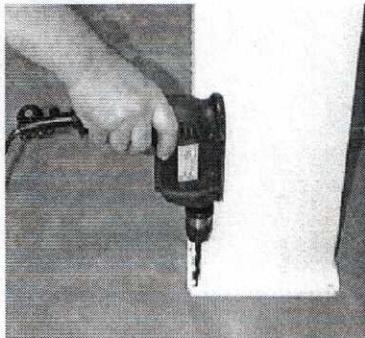


Fig 4.1. Floor mounting

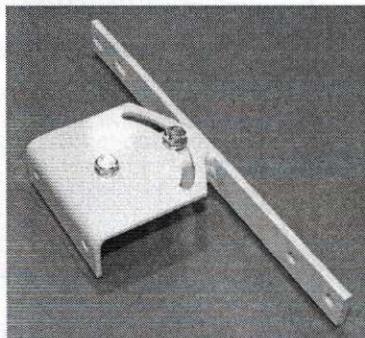


Fig 4.2. Wall mount bracket

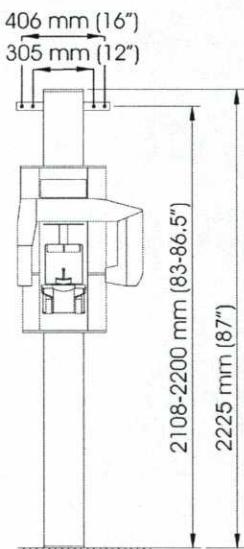


Fig 4.3.

- 3.** The wall bracket should be mounted between 2090 mm (82.3") and 2170 mm (85.4") measured from the floor, if normal height (2250 mm (88.6")) column is used.

Mark on the same height two holes 406 mm (16") (or 305 mm (12") center distances) apart from each other.

There is no need to erect the column for marking the holes. Try to locate the strongest place of the wall between the limits.

NOTE! *OP200 D can be installed in a corner. The wall bracket has a swivel joint that allows mounting on either wall. The wall bracket also has a distance adjustment, which can be used when installing the optional cephalostat arm in parallel with the wall.*

- 4.** Drill suitable holes according to mounting hardware. Insert plugs if necessary.

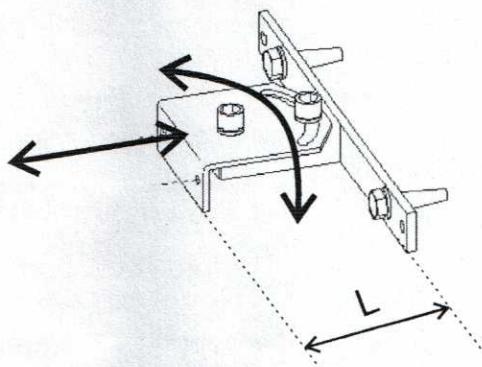
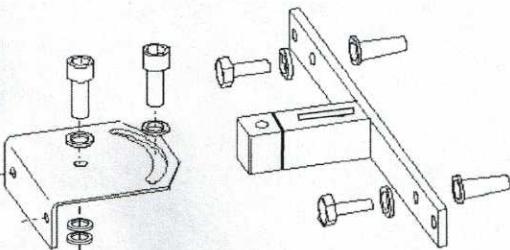


Fig 4.4. The distance L between wall and column can be adjusted within the limits 160-210 mm.

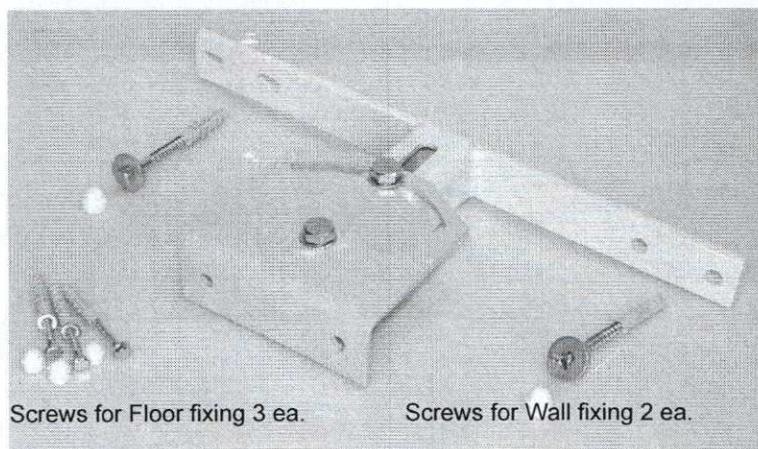


Fig 4.5. Column bracket

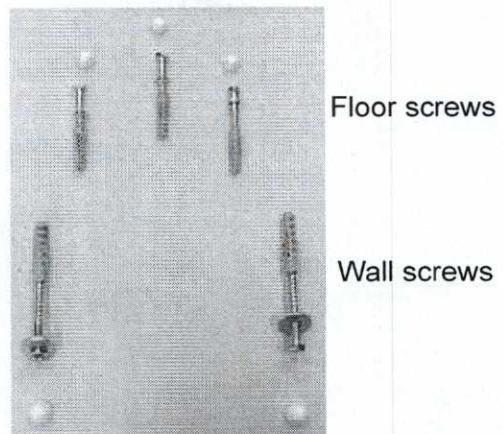


Fig 4.6. Screws and plugs

5. Drill through to outermost holes in the Wall Mount Bracket for a normal installation (drill diameter 10 mm).

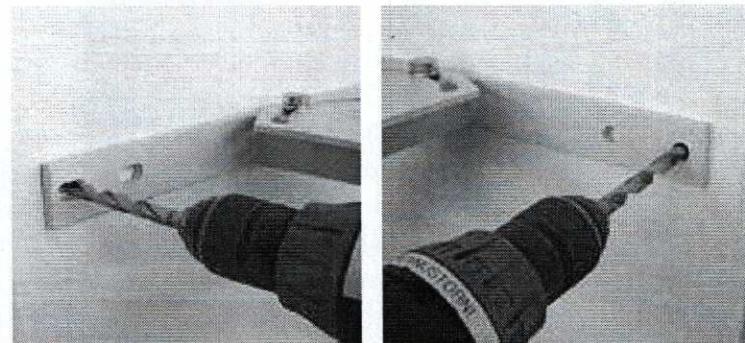


Fig 4.7. Drilling wall holes

6. If there is any doubt that the wall cannot withstand the pull, use an optional support plate (part no. 9955) or other strong support on the other side of the wall. The support has to be fixed with threaded fasteners.

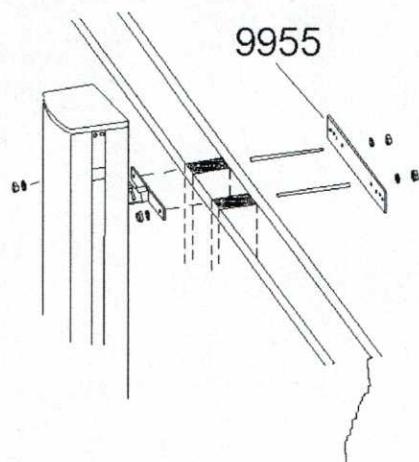


Fig 4.8. Wall bracket

7. Install the wall bracket and tighten the wall bolts.

4.1.2 Optional fork stand installation

NOTE! Fork stand installation to the cephalostat unit for clinical use always requires wall mount bracket. For panoramic unit this is highly recommended.

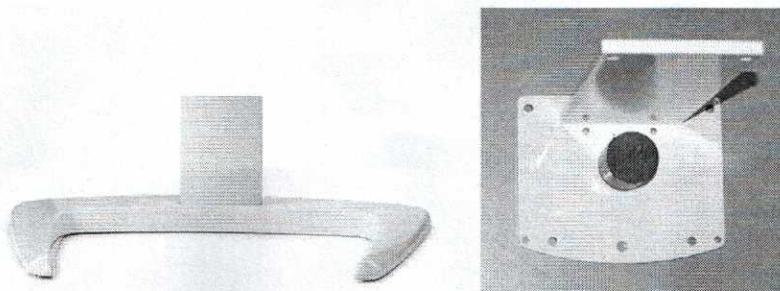


Fig 4.9. Fork stand and compatible column bottom plate

NOTE! The column is factory assembled with column bottom plate A. The bottom plate has to be changed when fork stand is used.

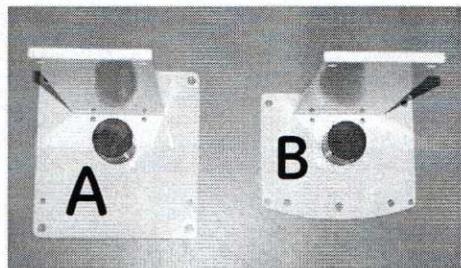


Fig 4.10.

A Column bottom plate for standard floor mounting and optional flat exhibition plate.

B Column bottom plate for fork stand installation. Not suitable for floor mounting. Shipped as a part of optional fork stand delivery.

1. When the column is laying on the floor, remove the column bottom plate A and replace it with B from the fork stand crate.
2. Lift the fork stand base plate from the crate and hold it forks up on the floor.

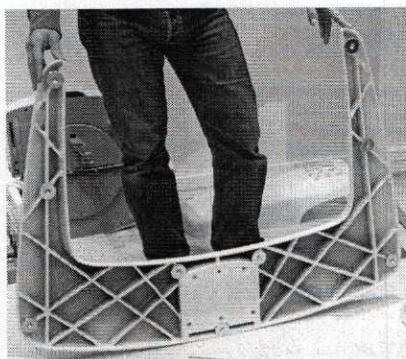


Fig 4.11.

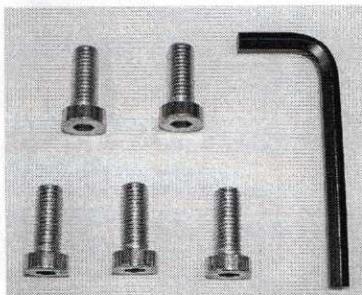


Fig 4.12.

3. Locate the column mounting holes in all four corners and in the rear center.
4. Insert M8 x 20 mm bolts and washers provided to fasten the column to the fork stand base plate. Insert washers with each bolt. Tighten the bolts firmly. If necessary, use the accompanying special 7 mm allen key for tightening.

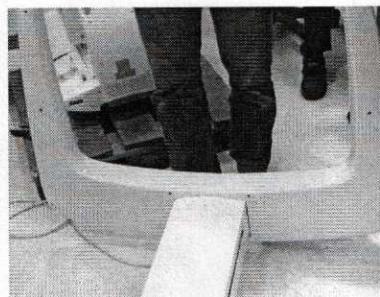


Fig 4.13.

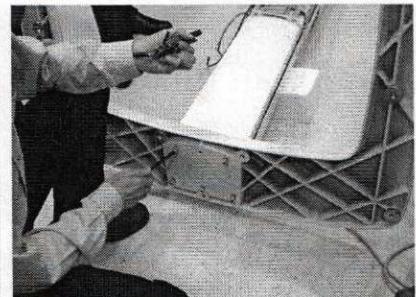


Fig 4.14.

5. Erect the column. Insert the trim cover around the column, if equipped.

NOTE! Avoid damaging the floor finish, while transferring or erecting the column during the installation.

6. Use spirit level to check that the column unit is vertical. Fork stand base plate can be leveled by turning the adjustment screws located in the fork stand base plate.

NOTE! When leveled, adjust all remaining adjustment screws against the floor to reach maximum stability.

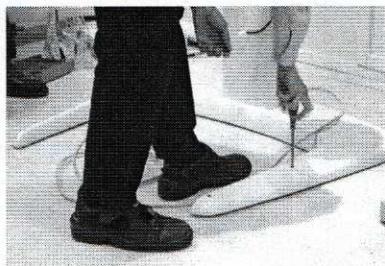


Fig 4.15.

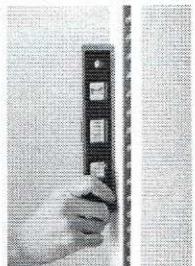


Fig 4.16.

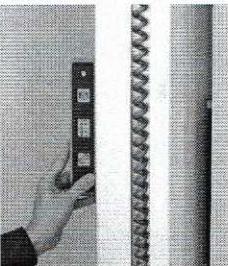


Fig 4.17.



Fig 4.18.

4.1.3 Erecting the column

1. Remove the 2 nuts and 6 washers (**A**) from the rear column top so that the column bracket bolts can slide up and down in the grooves of the column.

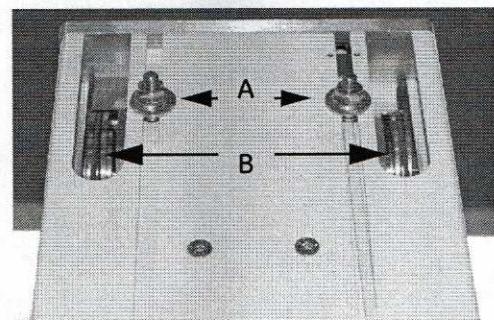


Fig 4.19.

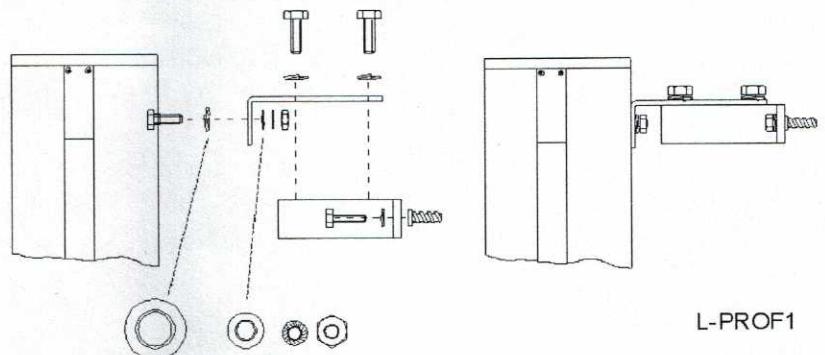


Fig 4.20.

2. Erect the column next to the wall bracket. Insert big washers first, then match bolts to the column bracket and insert remaining 2 washers and nuts. Tighten the nuts by hand. Avoid moving the column unit on the floor, as this may damage the floor finish.
3. Visually check from the rear that the steel cables are in the grooves of the pulleys (**B**).
4. Use spirit level to check that the column unit is vertical in all directions. Adjust if needed by moving the bottom of the column on the floor.

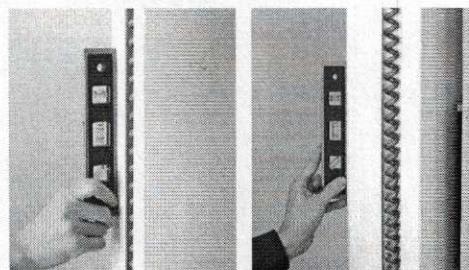


Fig 4.21.

Fig 4.22.

5. Tighten the mounting nuts (**A**). Do not overtighten!

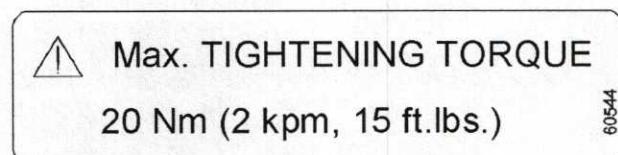


Fig 4.23.

WARNING! Maximum torque for the wall bracket mounting nuts (**A**) is 20 Nm/15 ft. lbs. Do not overtighten!
Use torque wrench!

6. Check the tightness of the swivel joint bolt and the swivel securing bolt.

Locate five mounting holes in the column base. Drill a hole in the floor through the rear center hole. Attach the anchor plug to the floor. Insert and secure the column with a M6 x 45 mm bolt.

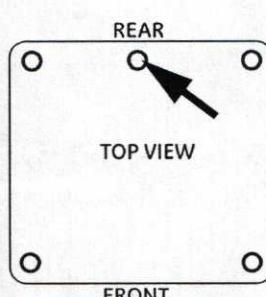


Fig 4.24.

4.2 Vertical carriage installation

4.2.1 Lifting and fastening the carriage

1. Move the carriage next to the column.
2. Remove the styrofoam transport support material located on top of the carriage.

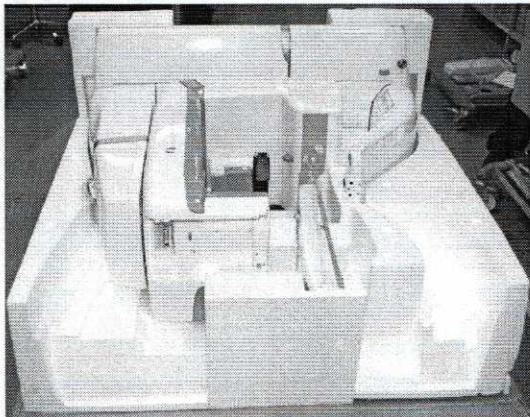
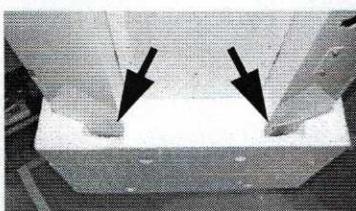


Fig 4.25.

3. Tilt the carriage assembly and the styrofoam bottom so that it is firmly standing on its back. Support the carriage assembly if necessary. Remove the transportation support material, except two pieces under the carriage.



NOTE! While tilting the carriage assembly, do not harm the connection cables, which are located between the carriage and the transportation support material.

Fig 4.26.

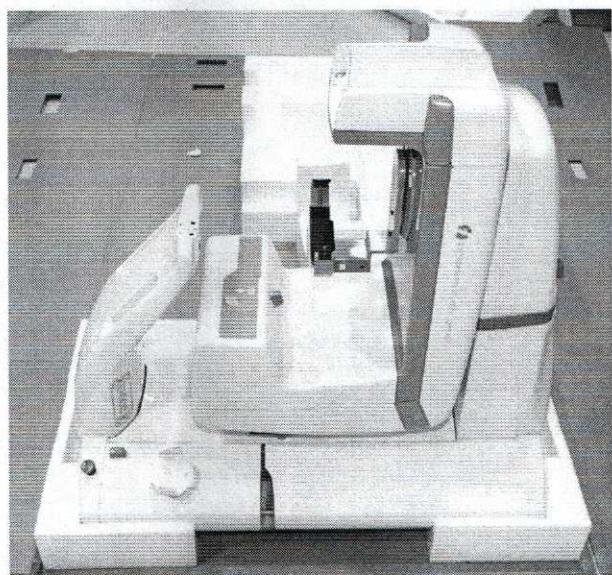


Fig 4.27.

4. Remove the lower shelf cover by opening six allen key screws (2 mm allen key).

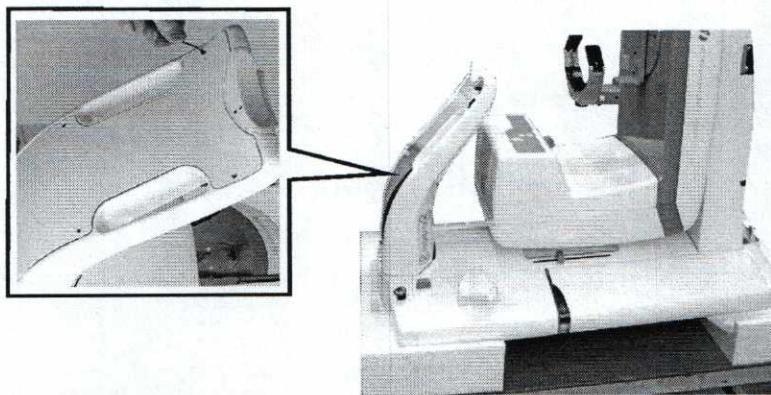


Fig 4.28.

5. Remove the main support cover by unfastening the red colored clamp, which is holding the cover during the transportation. Lift the main support cover with both hands and place it aside to avoid any damage.

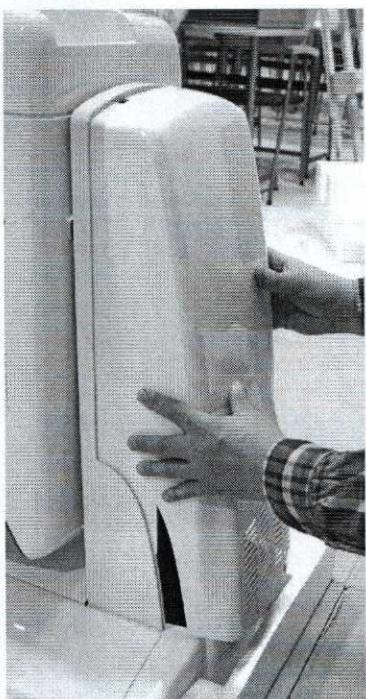


Fig 4.29.

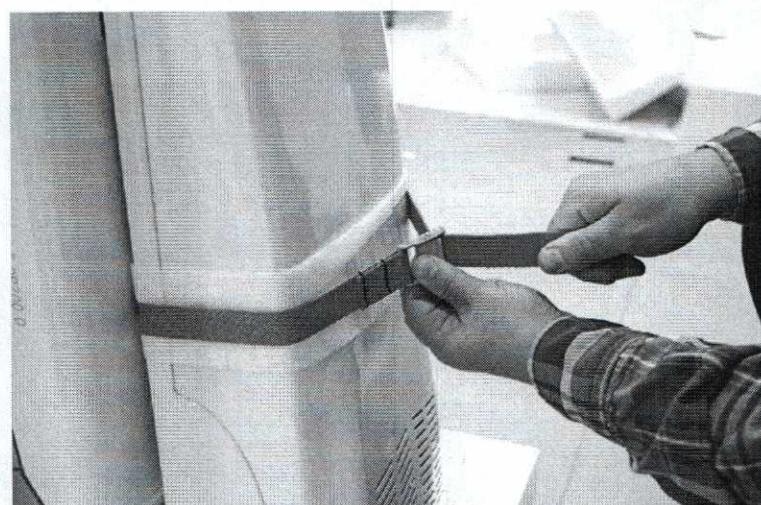


Fig 4.30.

NOTE! *Do not fasten the carriage top and bottom covers until instructed.*

6. Locate two pins on the column sliding carriage and corresponding holes on the carriage.

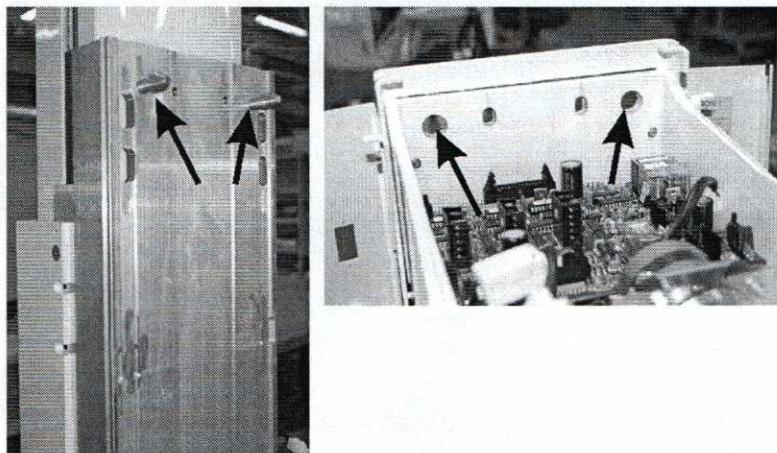


Fig 4.31.

7. Locate the lifting and supporting places on the carriage.

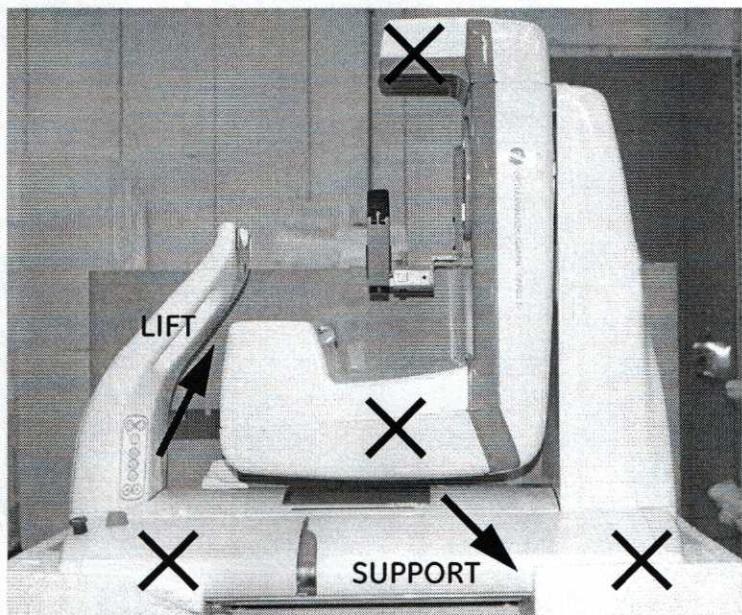


Fig 4.32. Do not lift from parts marked "X"!

CAUTION! Do not lift or otherwise apply force on the CCD camera or the tubehead (X)! Damage to unit and/or degradation of image quality may occur!

NOTE! The carriage is heavy. Lifting assistance may be needed.

8. Lift the vertical carriage against the column and make sure the column pins are in the corresponding holes of the carriage before releasing the vertical carriage.

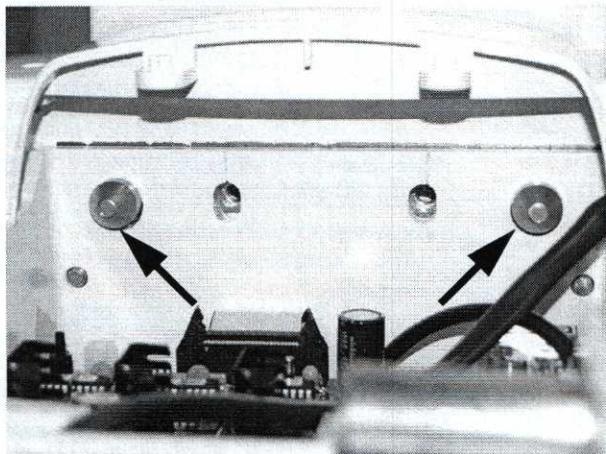


Fig 4.33.

NOTE! Do not harm the cables when lifting the carriage.

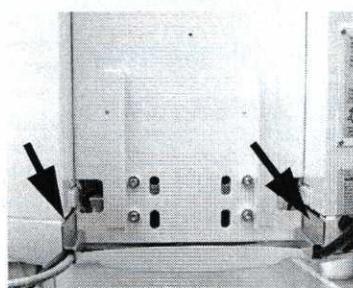


Fig 4.34.

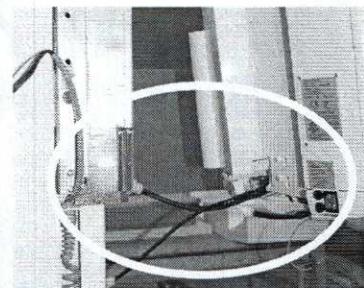


Fig 4.35.

9. Insert 2 pcs of M8 x 25 bolts with washers through the carriage fastening holes located near the column pins and tighten the bolts firmly.



Fig 4.36.

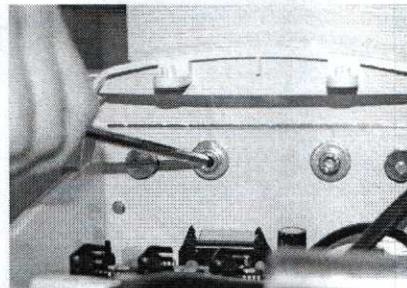


Fig 4.37.

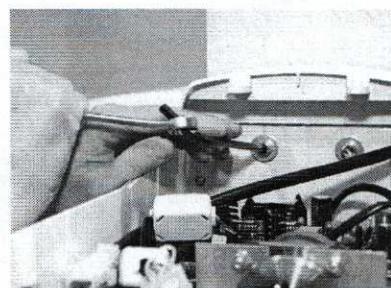


Fig 4.38.

- 10.** Insert 4 pcs of M8 x 25 bolts with washers through the lower shelf cast to column and tighten the bolts firmly.

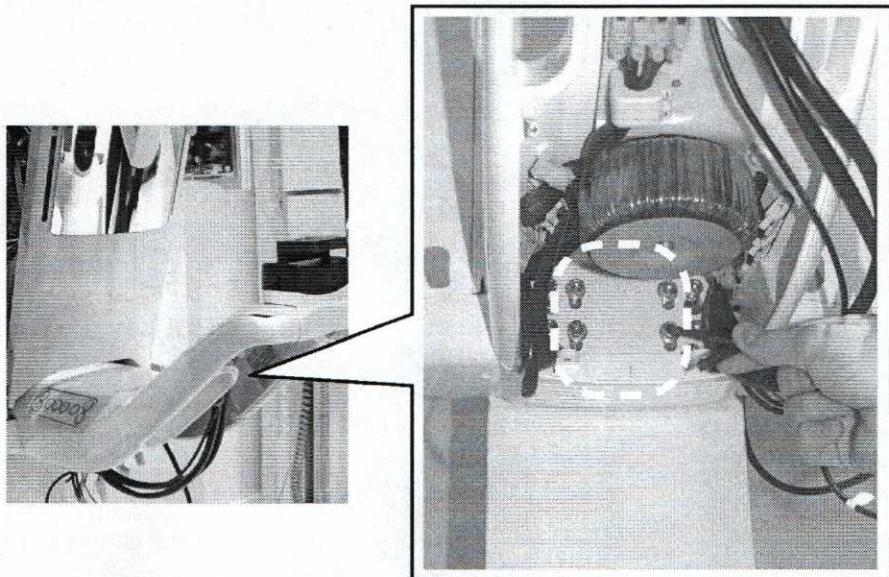


Fig 4.39. Carriage mounting bolts (bottom)

CAUTION! All six carriage mounting bolts must be installed and tightened.

NOTE! Do not unintentionally adjust the lower shelf tilt screws while installing and fastening the carriage mounting bolts. Adjusting the lower shelf tilt screws affect to the unit adjustments (e.g. chin rest position).

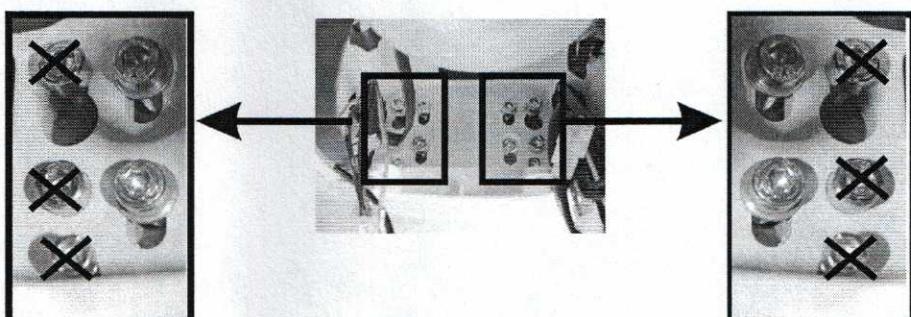


Fig 4.40.

4.2.2 Adjusting and fastening the unit

1. If needed, loosen the wall mount swivel bolts and set the column to the desired angle, $\pm 45^\circ$ in reference to the wall. Retighten the wall mount swivel.
2. Check that the unit is still vertically straight by using the spirit level. If necessary, loosen already fastened base plate rear center bolt and adjust by moving the lower end of the column (or by adjusting the base plate, if used). Retighten the bolt.

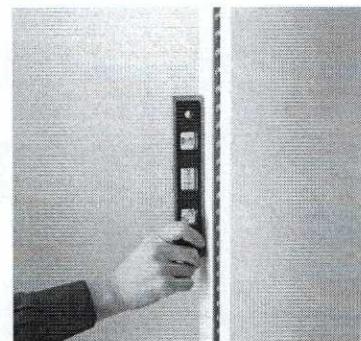


Fig 4.41. Spirit Level on the column

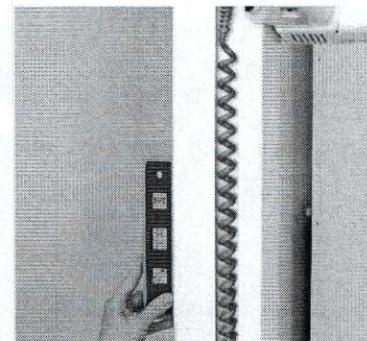


Fig 4.42. Spirit Level on back of the column

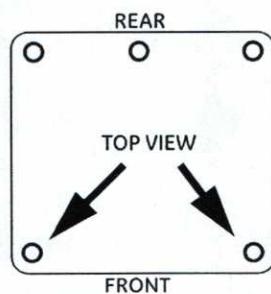


Fig 4.43.

- 3.** Locate 5 mounting holes in the column base. Drill holes in the floor through the two front holes of the base plate (drill diameter 8 mm). Install the anchor plugs.

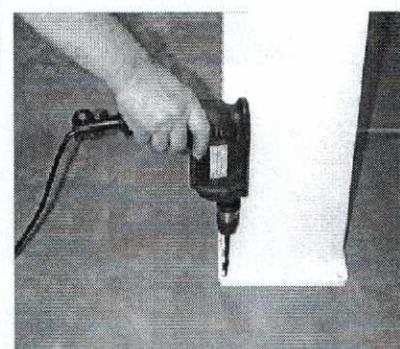
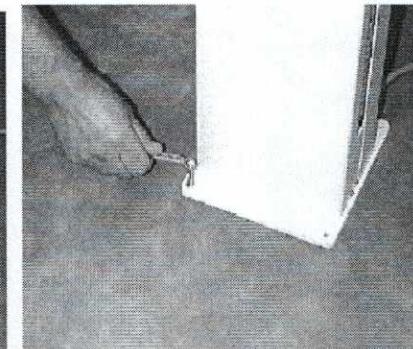


Fig 4.44. Drilling floor holes and securing floor bolts.



- 4.** Insert the 6 x 45 mm bolts and secure them.

4.2.3 Electrical connections

WARNING! Do not connect to the mains line voltage until instructed.

1. Right side:

- Connect X117 connectors together
- Connect X101 connectors together
- Connect protective ground connectors together



Fig 4.45.

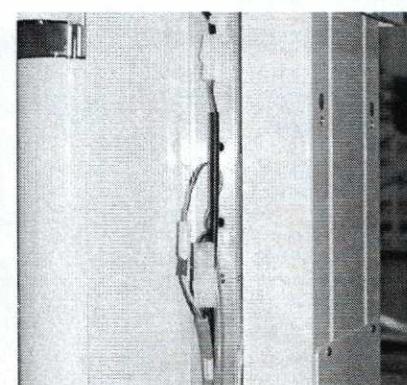


Fig 4.46.

2. Left side:

- Connect X102 connectors together
- Connect protective ground connectors together

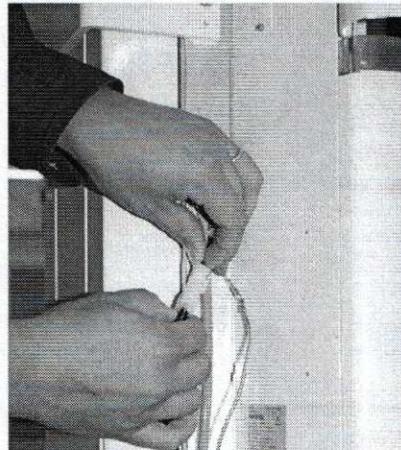


Fig 4.47.

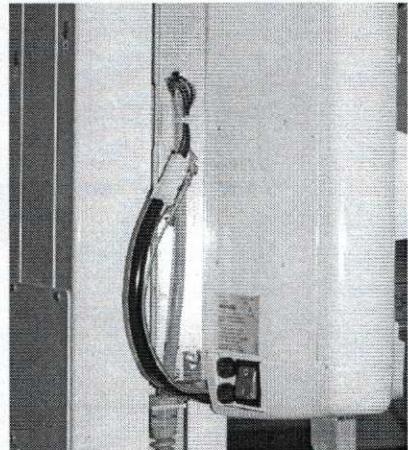


Fig 4.48.

3. Insert both trim covers and tighten 6 pcs M4 screws.

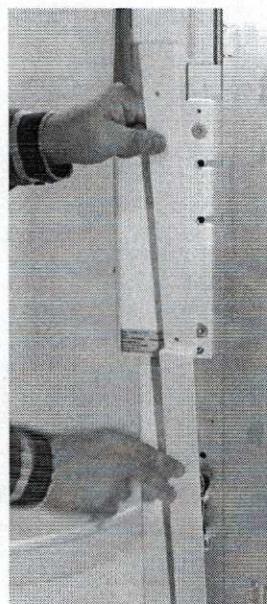
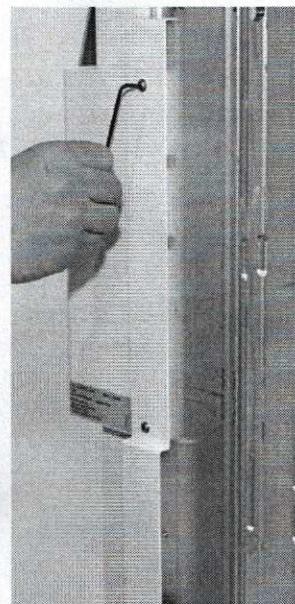


Fig 4.49. Trim panels



4. Install the lower shelf cover and tighten the screws.

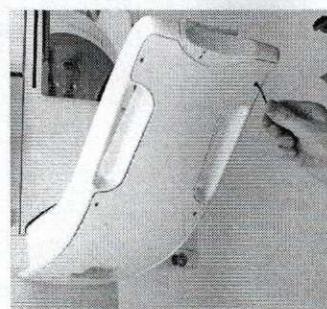


Fig 4.50. Lower shelf cover installation

4.2.4 Rotation lock removal

1. Locate the transport security bolt.

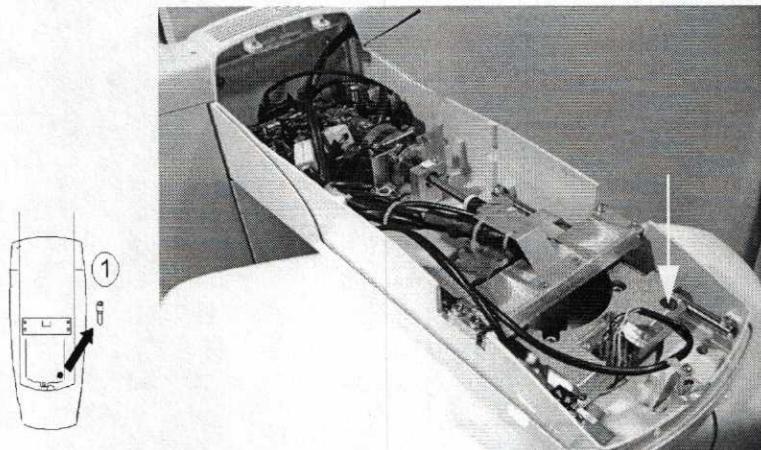


Fig 4.51. Fig 4.52. Rotation lock

2. Remove the **painted** transportation security bolt to release linear movement and rotation.

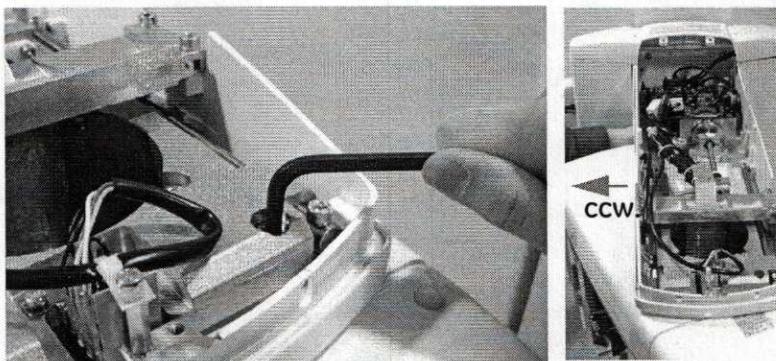


Fig 4.53.

Fig 4.54. Rotating
counterclockwise

3. Turn the rotating unit counterclockwise (ccw.) Verify that the tube head is not touching the mirror while rotating the unit. When a "click" is heard from the rotation microswitch, the rotation limiters have been set.

CAUTION! *Do not try to turn the rotating unit clockwise, as this will twist the cables and will cause damage to the rotating unit.*

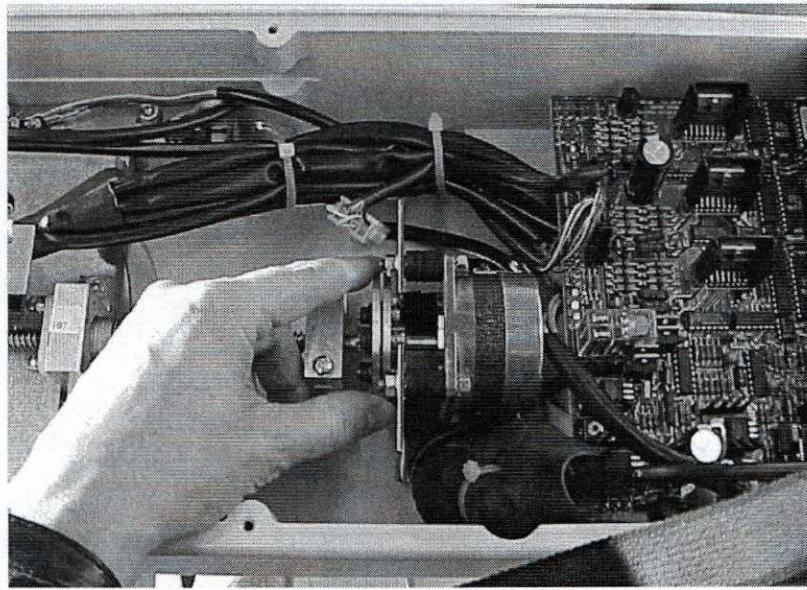


Fig 4.55. Fly wheel for linear movement

4. Move the linear movement towards the column about 50 mm (2 inches) to avoid collision of the CCD camera and the head support. While turning, make sure that the CCD camera is not touching the head support. Move the head support away if needed.
5. Store the transport rotation security bolt in a safe place for possible future use.

4.2.5 Carriage locking plate removal

NOTE! Do not remove the counter weight security bolt until instructed in chapter "Finalizing the installation".

1. Remove the sliding carriage locking plate (A) by opening the 3 pcs M8 bolts securing it.

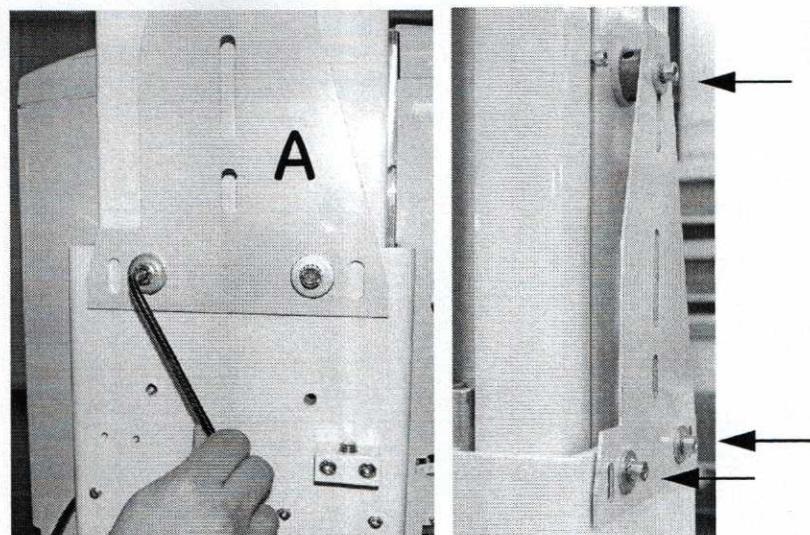


Fig 4.56.

NOTE! While removing the sliding carriage locking plate (A), store all the parts, as they are needed if the unit has to be relocated later.

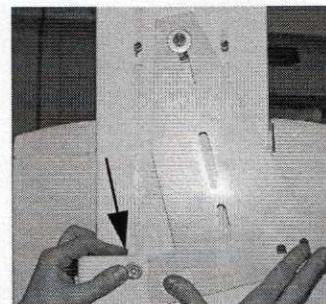


Fig 4.57. Locking plate (A)

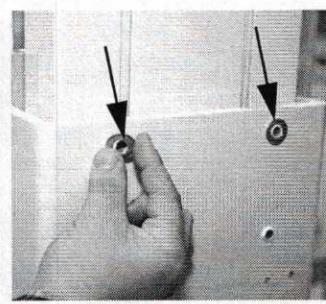


Fig 4.58. Washers

NOTE! Remove also the washers under the sliding carriage locking plate.

2. Remove 4 pcs M6 screws (B) securing the counter weight from the back of the column. The matching nut plates inside the column grooves can be left there.

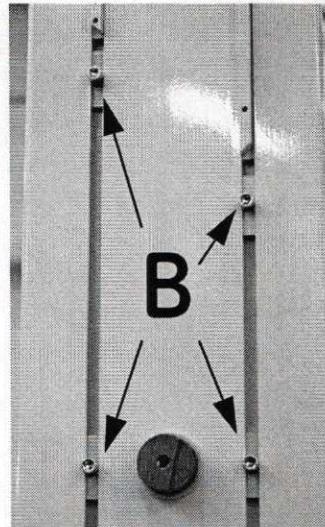


Fig 4.59. Counter weight M6 screws

4.3 Digital Cephalostat installation (optional)

NOTE! This chapter covers the installation of right-handed cephalostat OC200 D unit. Process is similar with the left-handed installation, but mirror-imaged. If the cephalostat side has to be changed during the installation, see appendix B.

CAUTION! Some steps of this process may require two service persons.

4.3.1 Preparing the unit for cephalostat installation

1. Open the carriage top cover by releasing two allen key screws. Remove the carriage top cover.
2. Release two screws securing the carriage left side cover. One is located under the carriage top cover and one in the roof of the left accessory cabin.



Fig 4.60.

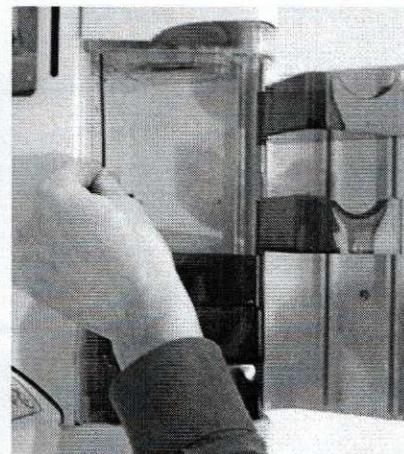


Fig 4.61.

3. Open the carriage left side cover.

4.3.2 Unpacking the cephalostat

NOTE! Certain parts of the equipment are covered with protective film to prevent scratches during transportation and installation. Remove all protective films before handing over the unit.

1. The cephalostat is transported in one package including cephalostat head, cephalostat arm, CCD camera (option) and accessories.

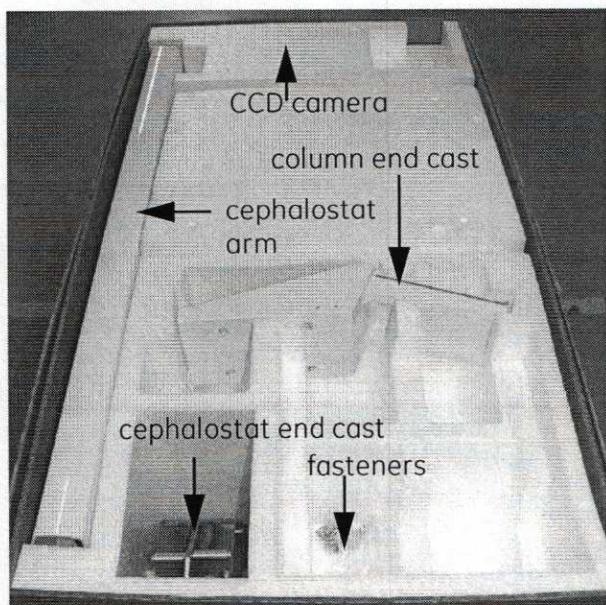


Fig 4.62.

2. Locate and collect all accessories, check them against packing list enclosed and set them aside. Pay attention to the CCD camera (option), which is located in the carriage package.

Check the status of the camera's shock sensors. Red colour means that the sensor has not been triggered. Black colour means that the carton has been dropped and the sensor may have been damaged. If the status of the shock sensors is black, contact the manufacturer.

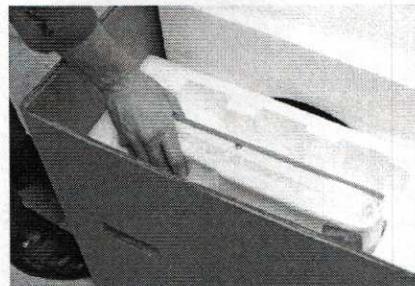


Fig 4.63.

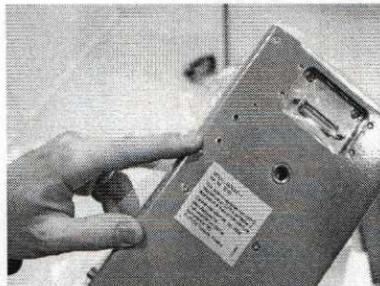


Fig 4.64.

NOTE! While unpacking the cephalostat head pay attention to the CCD camera as it is located in the same packing as the cephalostat head.

NOTE! Do not drop the CCD camera while unpacking the cephalostat head.

4.3.3 Cephalostat arm mounting

1. Lift the cephalostat head carefully out of the package and place it on the floor so that the cephalostat end cast can be mounted to the cephalostat head (end cast towards the roof). Use upper protective packing material as a flooring for the cephalostat head.

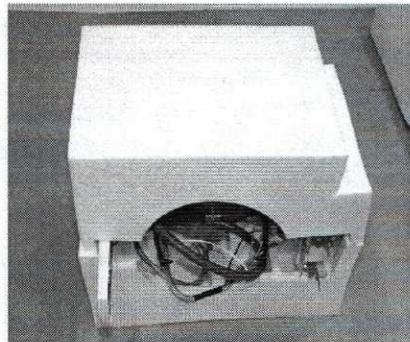


Fig 4.65.

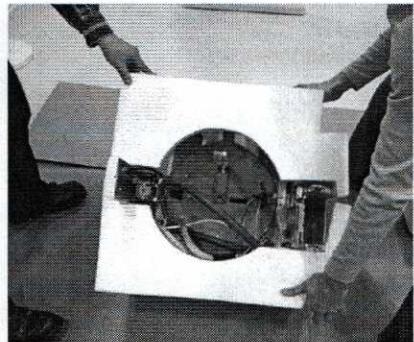


Fig 4.66.

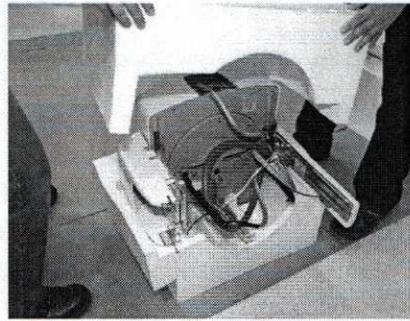


Fig 4.67.

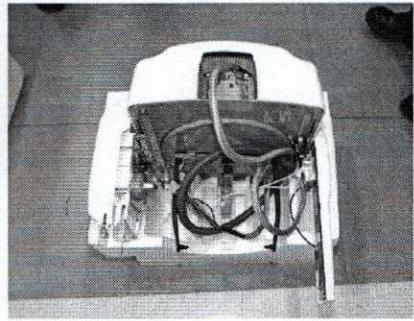


Fig 4.68.

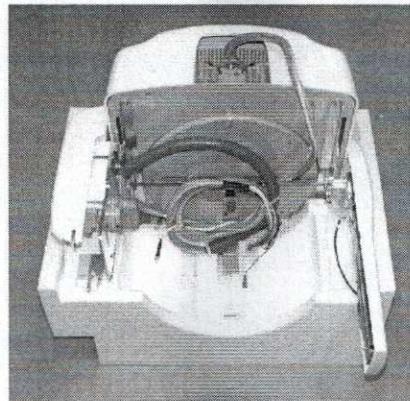


Fig 4.69. cephalostat head ready for cephalostat arm installation

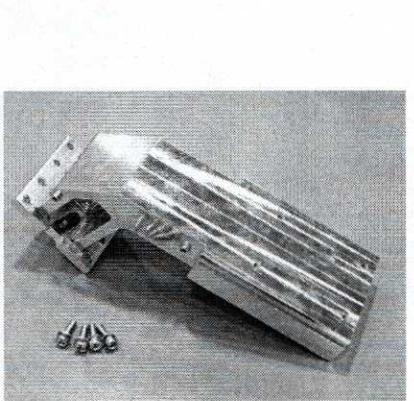


Fig 4.70. Cephalo end cast

2. Install the cephalostat end cast. Use 4 pcs M6 x 20 mm allen key screws (DIN912) with washers. Tighten the screws.



Fig 4.71.

NOTE! Max. tightening torque 10 Nm//7 ft. lbs.
Use torque wrench!

3. Route the cable through the arm. Do not harm the cables when routing them.

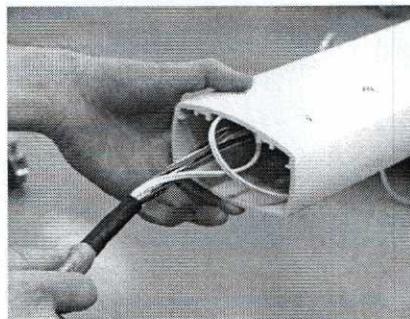


Fig 4.72.

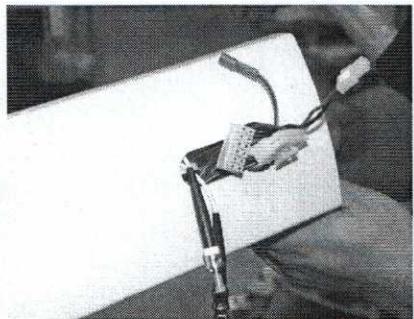


Fig 4.73.

4. Attach the cephalostat arm to the cephalostat end cast. Use 4 pcs M6 x 16 mm allen key screws (DIN7991). Tighten the screws.

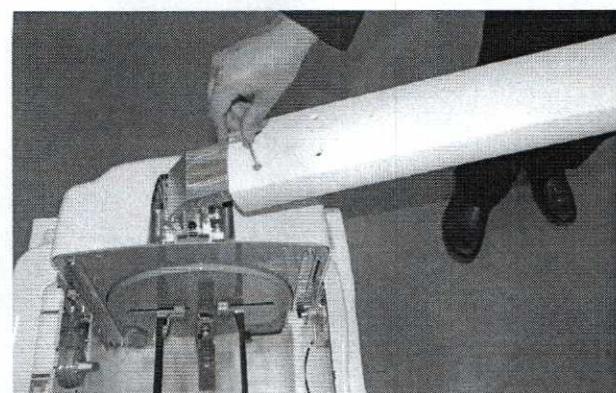


Fig 4.74.

NOTE! Max. tightening torque 10 Nm/7 ft. lbs.
Use torque wrench!

5. Check that the cables going through the cephalostat arm are routed correctly before mounting the cephalostat head assembly to the unit.

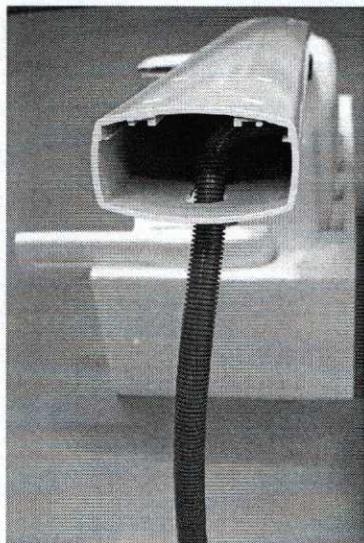


Fig 4.75.

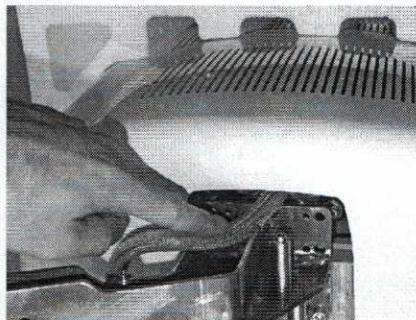


Fig 4.76.

6. Install the column end cast at the back of the unit. Use 4 pcs M8 x 25 mm allen key screws with washers. Before installing, verify that the re-inforcement plate used for cephalostat arm adjustment is installed to the right side of the column end cast.

Right-handed ceph unit

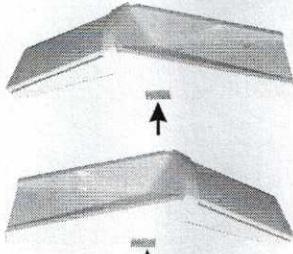


Fig 4.77.



Fig 4.78.

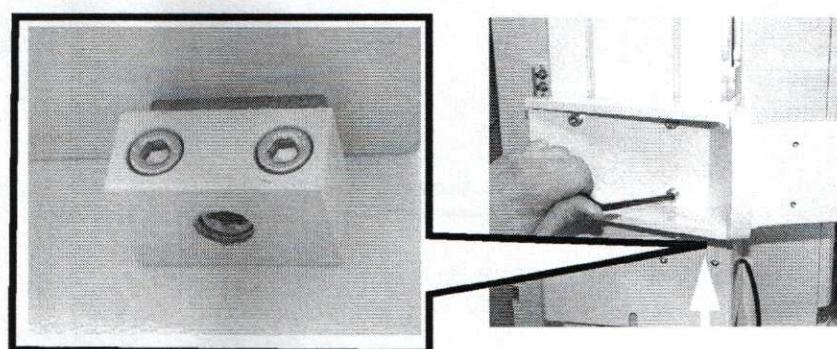


Fig 4.79. Check that cephalostat arm adjustment screw is located on the correct side depending on the unit cephalostat side.

7. Lift and slide the cephalostat head assembly with arm to the column end cast. Do not harm the cephalostat cable.

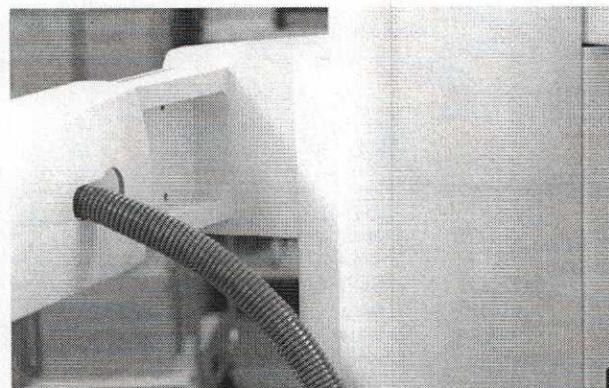


Fig 4.80.

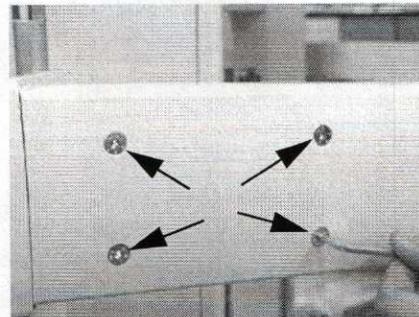


Fig 4.81.

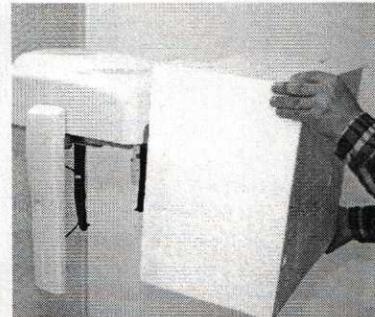


Fig 4.82.

NOTE! Max. tightening torque 10 Nm/7 ft. lbs.
Use torque wrench!

8. Route the cephalostat cables to the carriage left side cabin. Tighten the cable strain relief.

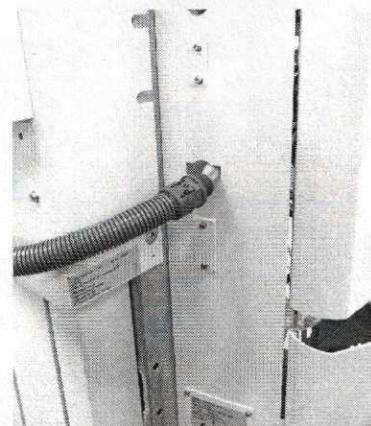


Fig 4.83.

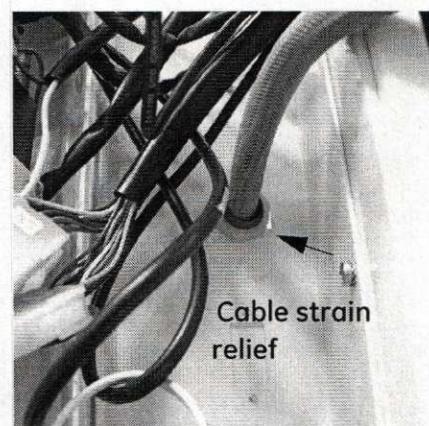


Fig 4.84.

4.3.4 Cephalostat electrical connections

1. Remove the cable between connectors X236/1 and X236/2. Connect cephalostat head cables (connectors X236/1, X236/2, X237/1) and protective ground cable to the corresponding connectors in the unit.

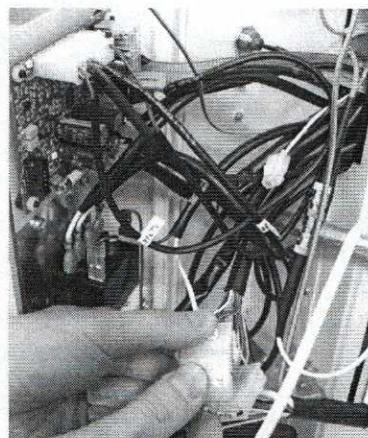


Fig 4.85.

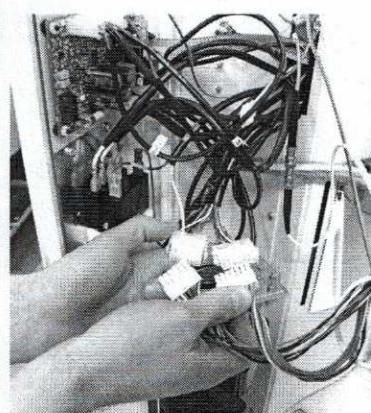


Fig 4.86.

2. Disconnect the lower fibre optic cable from its connector on the back cover of the unit. Connect it to the corresponding connector of the cephalostat head. Connect the other fibre optic cable of the cephalostat head to the connector located on the back cover of the unit.

NOTE! Route the fibre optics cables avoiding tight curves.

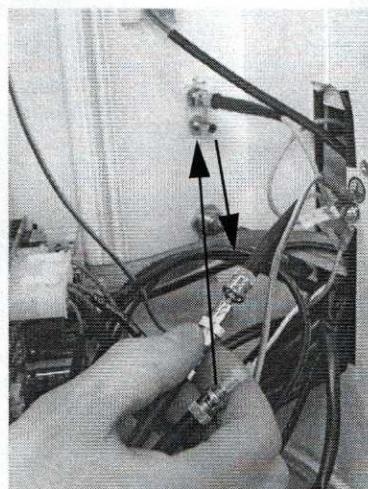


Fig 4.87.

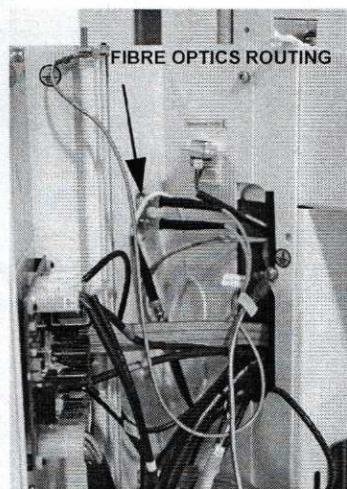


Fig 4.88.

3. Close the carriage left side cover and fasten the screws. Before closing the cover verify that the cables inside the box are properly routed.

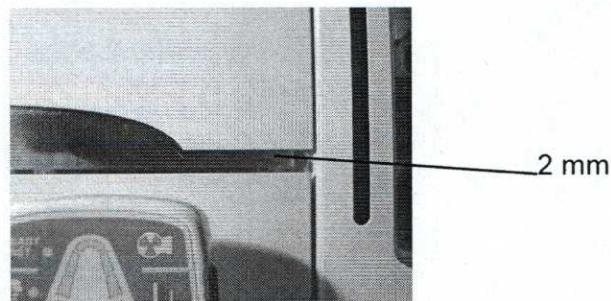


Fig 4.89. Carriage side covers (left and right) should leave 2 mm gap after closing the screws

4.3.5 Cephalostat head mechanical adjustments

1. Remove the cephalostat head cover by opening four allen key screws. The screws are located on the cephalostat head bottom cover.

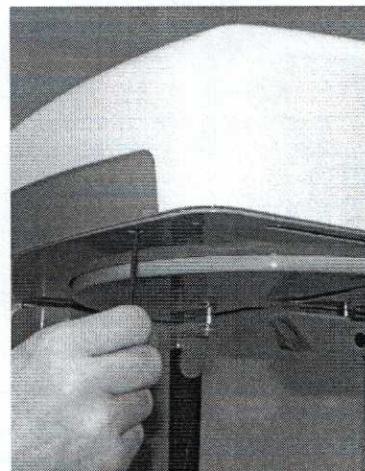


Fig 4.90.

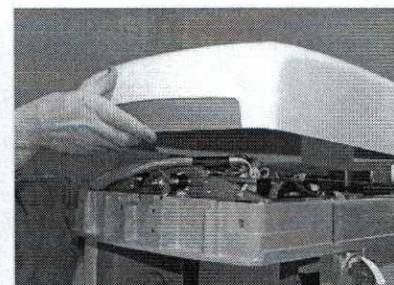


Fig 4.91.

2. Remove the CCD camera and secondary collimator transport supports below the cephalostat head. Store them for possible later use.



Fig 4.92.

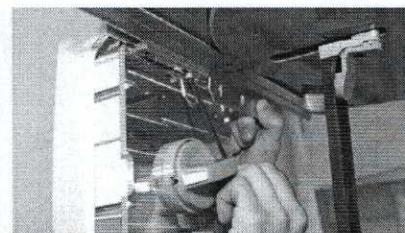


Fig 4.93.

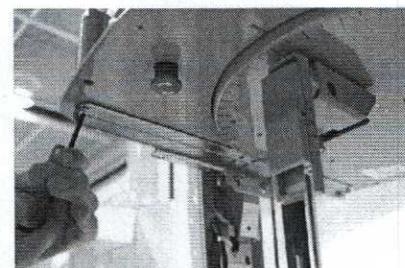


Fig 4.94.



Fig 4.95.

WARNING! Do not scratch the unit when removing the cephalostat head transport supports. Do not drop the supports when removing them.

3. Fasten the camera holder. Attach first the camera holder cover from the rear side with 5 screws. Rotate the handle to have access to all screws.

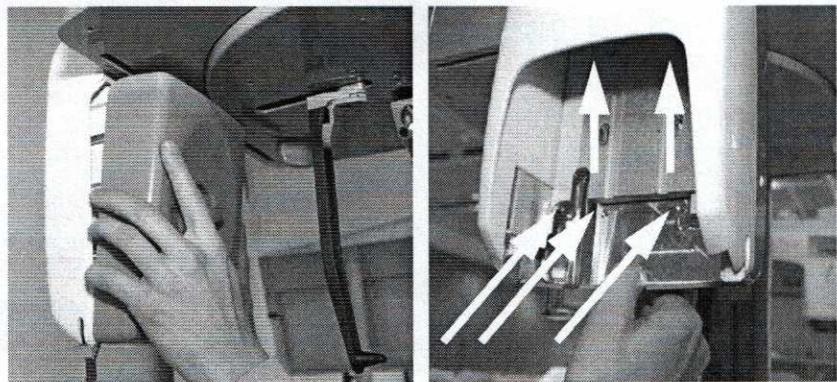


Fig 4.96. Fasten the cover to the camera holder with 5 screws. Rotate the blue handle to have access to all screws.

4. Tighten from above the 2 screws holding the camera holder to the cephalostat head.

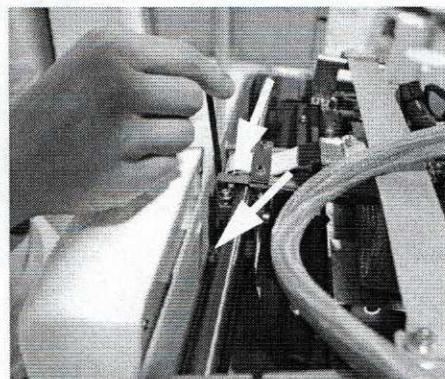


Fig 4.97.

5. Tighten also the 2 screws holding the secondary collimator.

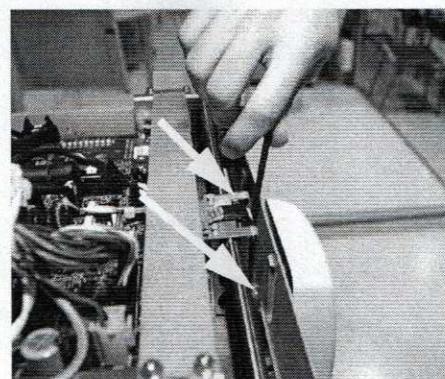


Fig 4.98.

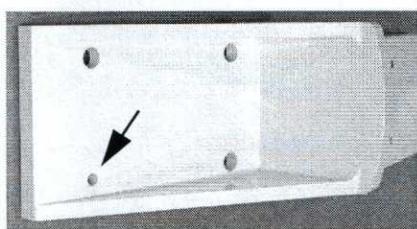


Fig 4.99. Pivot point of the column end cast

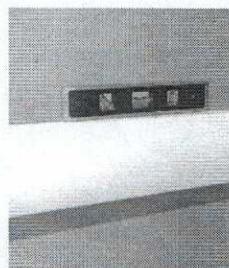


Fig 4.100.

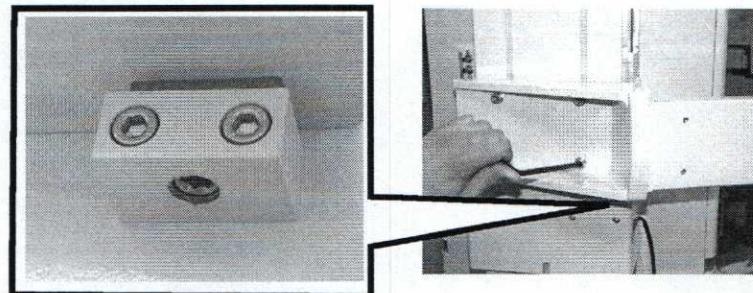


Fig 4.101.

6. Check with a spirit level that the cephalostat arm is in horizontal position. Adjust if needed by using the adjustment screw located under the column end cast. Loosen the fastening of the column end cast before the adjustment. Tighten all screws after adjustment is done.

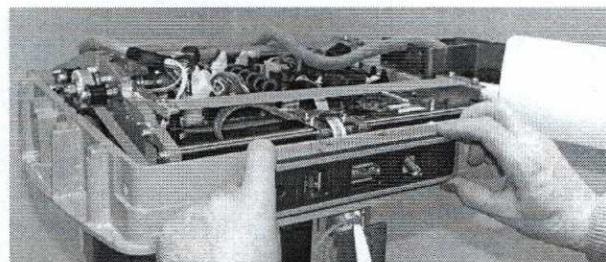


Fig 4.102.



Fig 4.103.

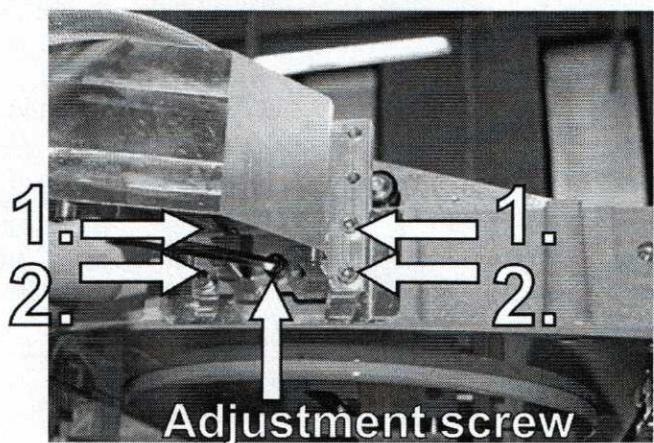


Fig 4.104.

NOTE! Tighten always first the upper fastening screws (no. 1) while leveling the cephalostat head.

8. Insert the cephalostat arm lower trim cover by pressing it into the arm end grooves in the direction. Check that the cephalostat arm cable is properly routed, and tighten the two screws. Repeat the process for the upper trim cover.

4.4 Finalizing the hardware installation

WARNING! Before connecting the mains voltage to the unit, check that the installation environment's temperature and humidity complies with allowed operating conditions for the unit. See the unit's technical specification for details on allowed operating conditions.

4.4.1 Mains voltage connection

WARNING! Only an authorized technician is allowed to perform 110 V kit installation (changing unit from 230 V configuration to 110 V).

WARNING! Do not connect the line voltage until instructed.

NOTE! OP200 units are delivered from factory with 230 line voltage settings. If you have 110 V mains voltage, read the chapter 4.4.2 Changing the mains voltage from 230 V to 110 V.

- Make sure that the power line meets the requirements set by the OP200 unit manufacturer. More details are found in the OP200 D User Manual chapter *OP200 D technical specifications*. The chapter 2. *Installation*

requirements and dimensions in this manual also provides additional information.

- Make sure that the excess length of the power cord is properly placed or shortened as necessary.
- Verify that protective ground is good in the unit.
- If the power cord plug has to be changed, follow local regulations to change and wire the plug.

COLOR CODES OF THE POWER CABLE		
110 V (US)	GREEN WHITE BLACK	GND N L
230 V (US)	GREEN BLACK BLACK	GND L1 L2
230 V (EU)	GREEN/YELLOW BLUE BROWN	GND N L

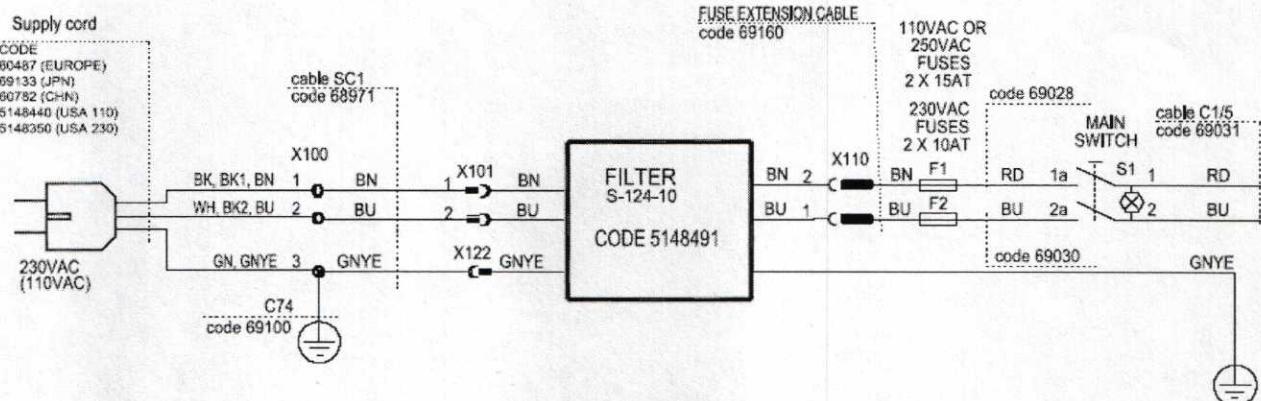


Fig 4.105.

NOTE! If changing the voltage selection is not needed, continue at chapter Removing counter weight transport security bolt.

4.4.2 Changing the mains voltage from 230 V to 110 V

1. Remove the screws from the carriage top cover and under the right side cover of the vertical carriage. Open the carriage right side cover.

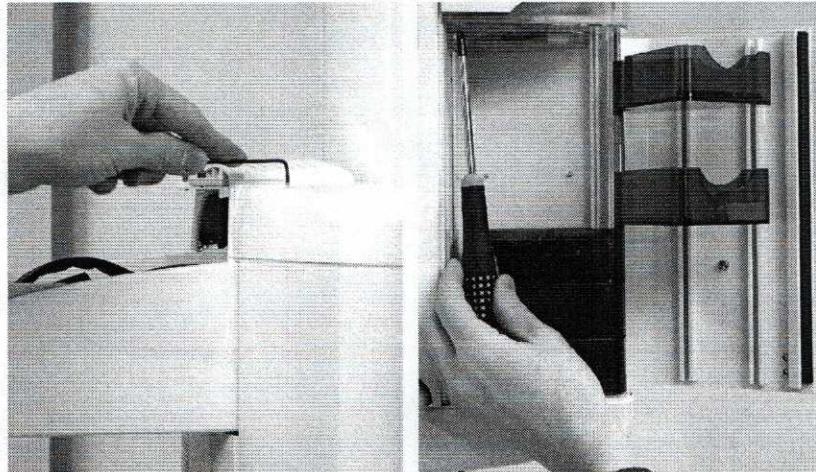


Fig 4.106. The screws are on the carriage top cover and under the carriage right side cover.

2. Locate the Power Supply Board.

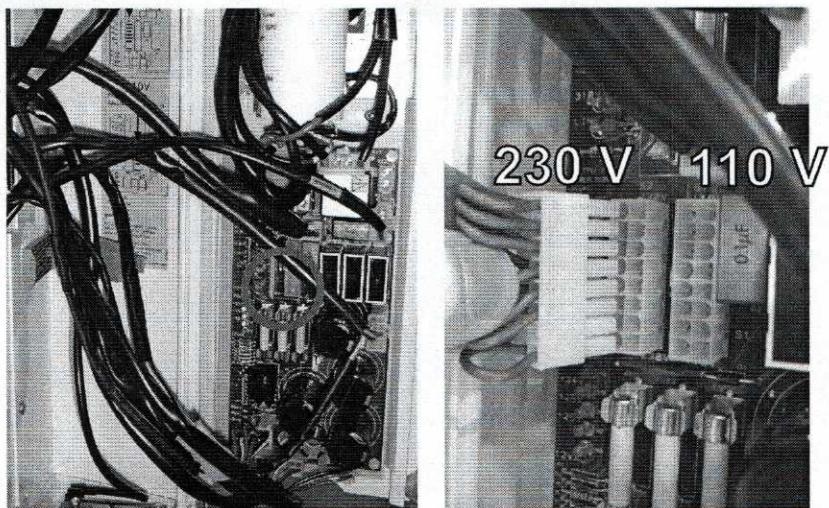


Fig 4.107. Power Supply Board and Jumper for the Line Voltage Selection

3. There is a jumper for line voltage selection available. Remove the jumper from the 230 V position and place it to the 110 V position.

4. Remove connector X22/230 from position X22 and replace it with connector X22/110.

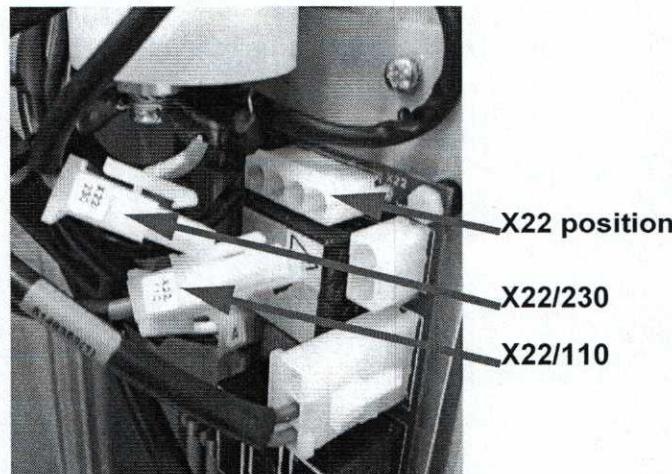


Fig 4.108. X22/230, X22/110 connectors and X22 position.

5. Close the carriage right side cover and fasten the screws. Before closing the cover verify that the cables inside the box are properly routed.

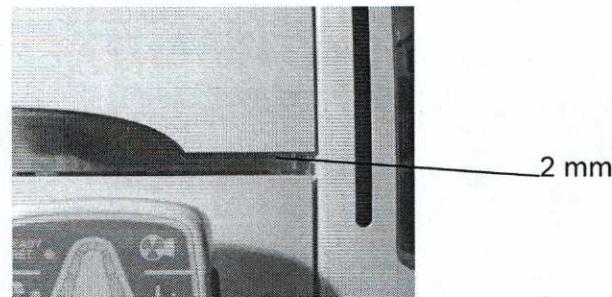


Fig 4.109. Carriage side covers (left and right) should leave 2 mm gap after closing the screws

6. Remove the 230 V mains power cord. Install the 110 V mains power cord (part no. 5148440) instead. Connect the black wire to pin 1 at connector 100, the white wire to pin 2 and the green wire to pin 3 (ground).

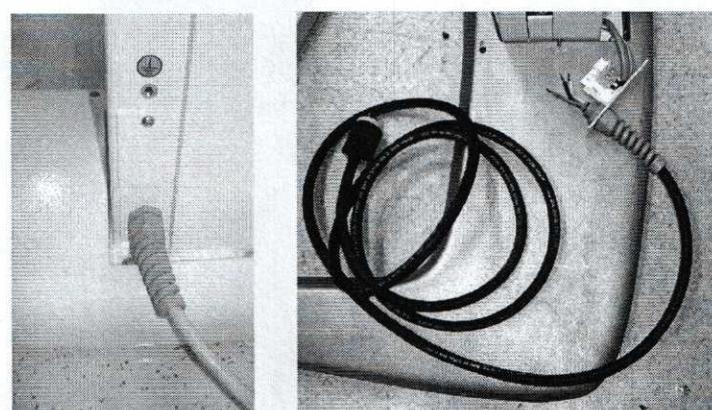


Fig 4.110. Power Cord 230 V and Power Cord 110 V.

7. Turn the main label around to 110 V position.

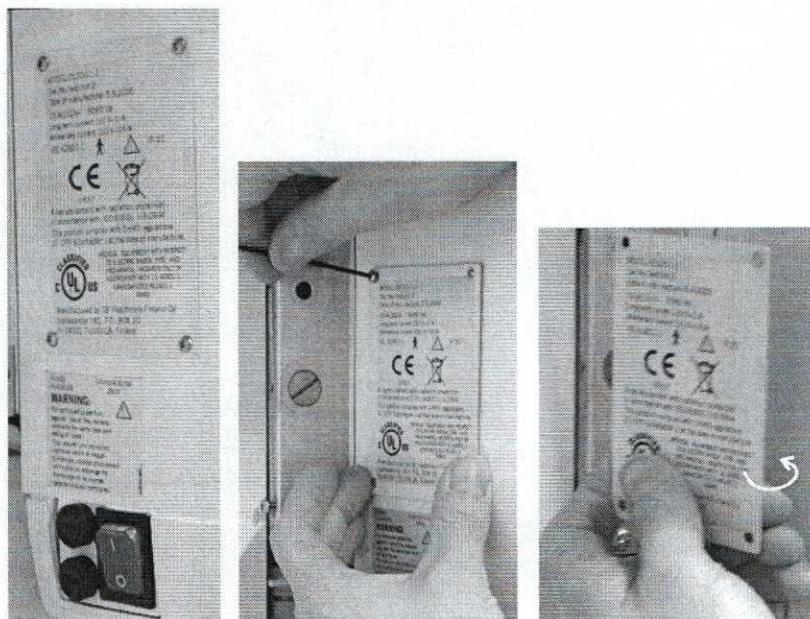


Fig 4.111. Label from 230 V to 110 V position

8. Change the fuses to 110 VAC 15A (Bussman MDA-15 A slow blow type).

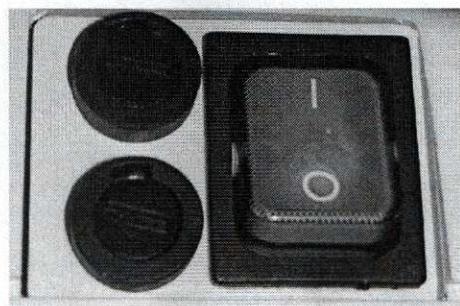


Fig 4.112. Fuses are on the left side of the main power switch.

4.4.3 Removing counterweight transport security bolts

9. Remove the counter weight security bolt (C). The bolt is located above or below the rear support assembly depending on the column type. Store this bolt and the locking plate for future use.

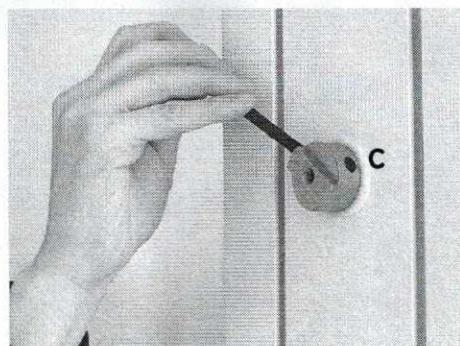


Fig 4.113. Counter weight security bolt removal.

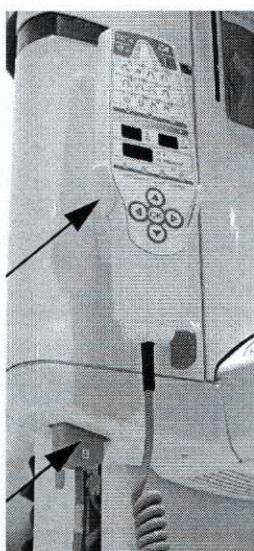


Fig 4.114.

4.4.4 Control panel

1. Connect the control panel cable to the connector on the bottom plate of the vertical carriage. Tighten the two connector screws using your fingers. Insert the control panel into the holder on the side accessory cabinet door.

4.4.5 Remote exposure button (optional)

1. Use the remote exposure button holder for marking its place to the wall. Drill the holes to the wall and install plugs if necessary. Mount the holder with the two screws provided.



Fig 4.115.

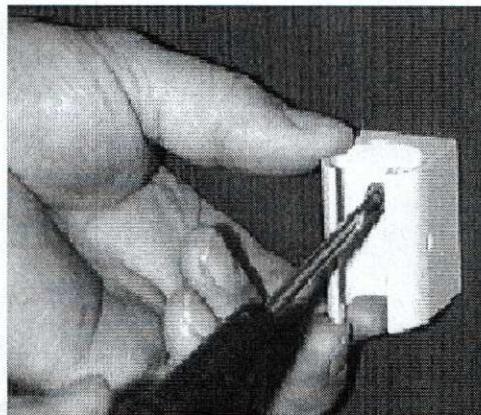


Fig 4.116.

2. Route the remote exposure button cable out of the way at the wall or on the floor.
3. Remove the hatch at the lower rear of the column by undoing two M4 screws. Locate the terminal strip connector X103.

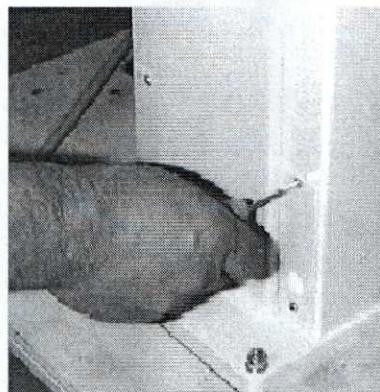


Fig 4.117.

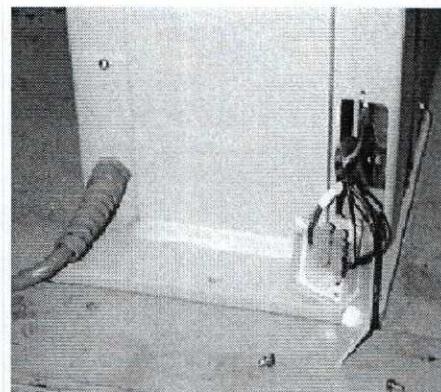
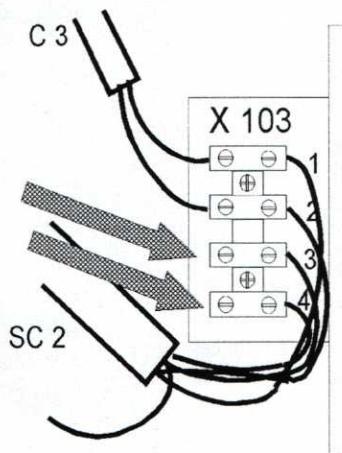


Fig 4.118.

4. Remove the plastic cap on the hatch hole. Feed the cable through the strain relief, then through the hatch hole. Fix the strain relief to the hatch.



5. Cut the excess length of the cable away. Remove some insulation from the cable ends. Connect the cable ends to the connector terminals. Tighten the strain relief. Refit the hatch to the column.

6. Place the exposure button in the holder.

4.4.6 Installing the unit covers

1. Install the carriage top cover and the main support cover.

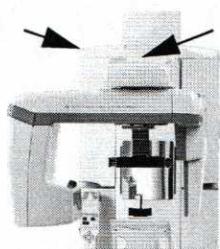


Fig 4.119. Carriage top cover and main support cover

4.4.7 PCI-board and fiber-optic cable installation

1. Check that the unit packing contains the following parts:
 - FIBRE OPTIC CABLES
 - PCI BOARD

Before installing the PCI board and optical fibres:

 - Ensure that you have an acceptable computer as described in OP200 D User Manual & Technical Specifications and ClinView Installation Manual.
 - Refer to the PC manufacturer manuals supplied with the PC for more detailed instructions concerning the PC hardware and on how to install additional hardware (e.g. PCI board) to the computer.
2. Switch off the power from the PC (CPU) and disconnect it from the power supply line.
3. Open the cover of the PC according to the manuals supplied with the PC.

CAUTION! Touch the metal on the back of your computer with one hand to discharge any static electricity. With your other hand, handle the PCI board by the metal bracket or edges and remove it from the antistatic bag.

4. Locate the Peripheral Component Interconnect (PCI) bus inside the computer.
5. Insert the PCI board into the PCI bus. Refer to the manuals supplied with the PC.

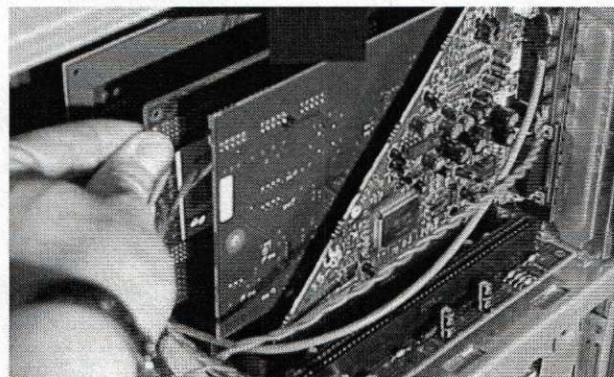


Fig 4.120. Insert the PCI board into the PCI bus

6. Tighten the screws connecting the board to the computer.
7. Close the PC cover.
8. Connect the PC to the power supply line and switch the power on.
9. Install the PCI card driver from the CliniView CD as instructed in CliniView installation manual.

4.4.8 Connecting the CCD camera

1. A OC200 D unit can be equipped with one or two cameras. If the unit is equipped with a cephalostat camera the same camera can be used for panoramic and cephalostat imaging. Another possibility is to use separate cameras. In this case the unit is equipped with both panoramic and cephalostat cameras.
2. To install the panoramic CCD camera, place the camera knobs against the corresponding counterparts. Push the camera slightly forward so that it reaches end position. Push the camera handle so that the camera is locked.

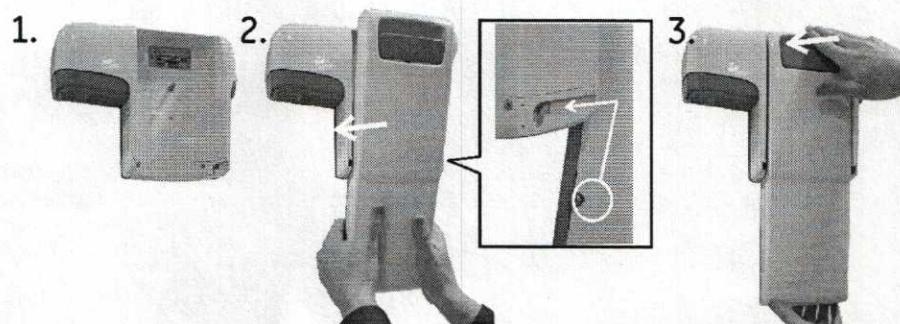


Fig 4.121. Placement of the panoramic CCD camera

NOTE! Take care not to drop the camera while installing. Make sure that the camera is properly locked to its final position.

3. To install the cephalostat CCD camera to the cephalostat head, push the camera knobs against the corresponding counterparts. Push the camera slightly upward so that it reaches first lock position and is locked. Press the white button on the round handle and rotate the handle 180° clockwise until the cephalostat camera is locked to its end position. Release the white button.

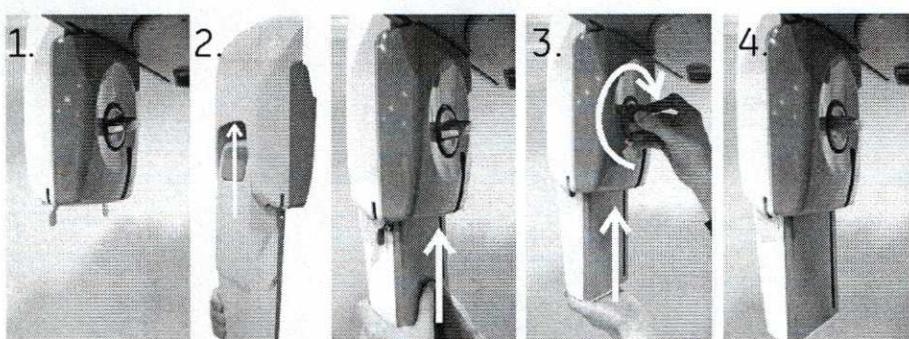


Fig 4.122. Placement of the cephalostat CCD camera

CAUTION! The camera must not be dropped or exposed to impacts.

4.4.9 Application software installation

1. Refer to Cliniview Installation and User Manuals for installation instructions of Cliniview application.

4.4.10 Powering up the unit for the first time

WARNING! Some steps of this process require x-ray exposures.

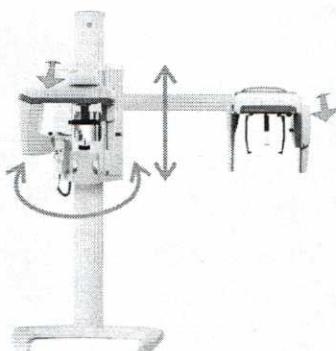


Fig 4.123.

1. Verify that there is enough room for the unit movements.
2. Connect the unit to the mains.
3. Switch on the unit.
4. Verify the unit type and software version information, which are displayed on the unit control panel during the boot up procedure.
5. Verify that no error messages appear on the control panel.
6. Connect both optical fibre connectors to the optical fibre terminals in the OP200 D unit.

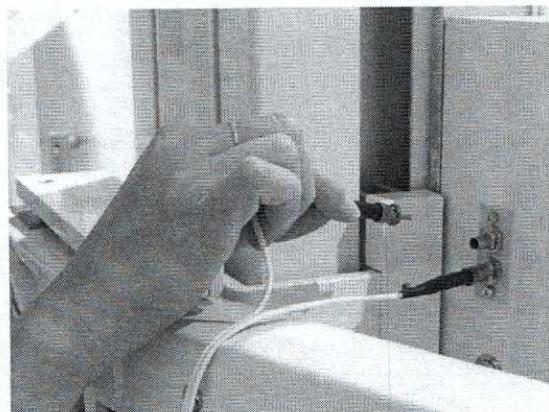


Fig 4.124.

7. Switch off the PC and connect the fibre optic cable to the PC. Connect the receiver end of the optical fibre to the transmitter terminal of the PC, and transmitter end of the optical fibre to the receiver terminal of the PC. The transmitter terminal is the one emitting red light. The receiver terminal receives light and is thus dark.

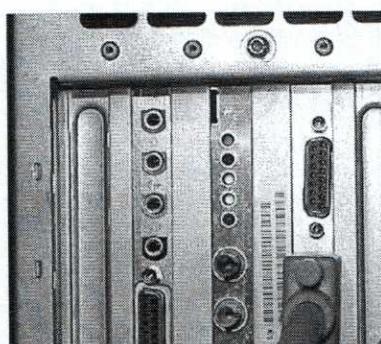
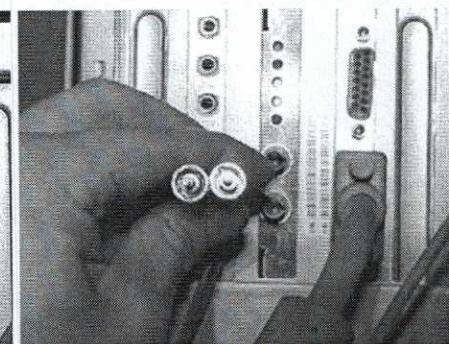
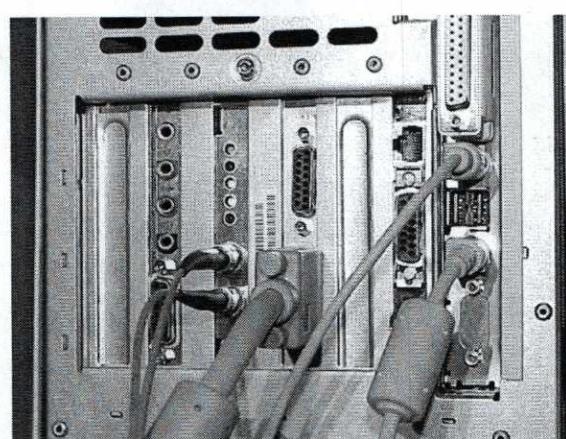
Fig 4.125. Locate the PCI board
optical fibre connectors on the back
of the computer.Fig 4.126. Locate the receivers and
transmitters

Fig. 4.127. Connect optical fibre connectors to the PCI board terminals

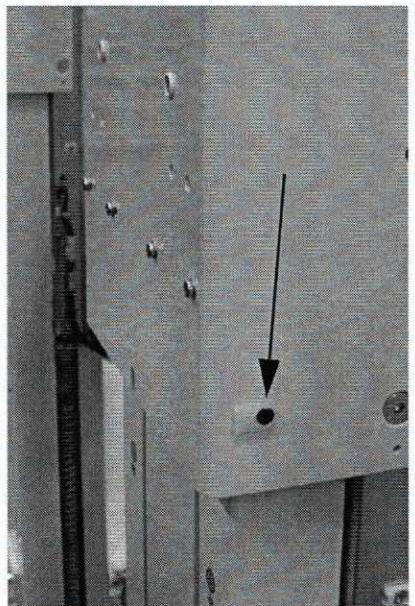


Fig 4.128.

NOTE! The optical fibre cable is very sensitive for mechanical damages. Route the optics cable through the cable holder (fig 4.128) properly so that all possible damages are avoided. Make sure that enough free cable is left for the unit's up and down movements.

8. Check that all movements are working properly and that all cables are in correct positions (especially the fibre optic cable). The following movements can be tested in test mode (T) without X-rays.
 - up and down movement
 - rotation movement
 - linear movement
 - cephalostat head movements (camera and secondary collimator)

NOTE! If up and down movement is not running smoothly in both directions, the counter weight needs to be balanced.

9. Check that all control buttons (control panel and patient positioning panel buttons) are working properly.
10. Check that patient positioning laser lights are working properly.
11. Perform tubehead warm-up procedure by using Sr 76 PUP: tube warm-up. For more information see OP200 Service Program Manual.

During the tubehead warm-up procedure check that the radiation safety indicators are working properly.

- light indicators are visible during exposure
 - tone indicator is audible during exposure
12. Switch on the PC, launch Cliniview and check that the communication link between the CCD camera and PC is working. Cliniview - Help - System Information.
 13. Check that the emergency stop switches are working properly.

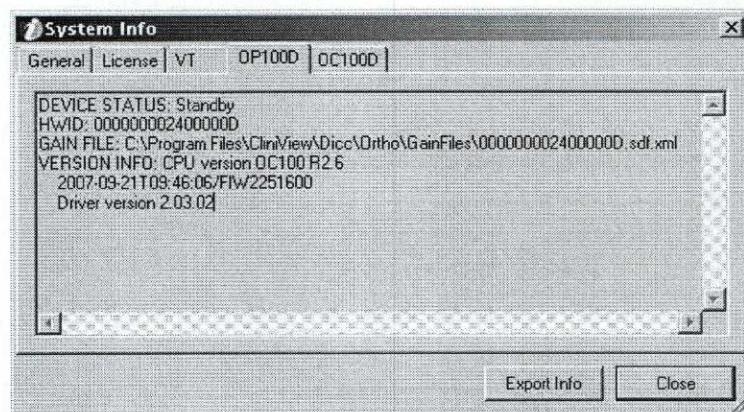


Fig 4.129. Communication link between CCD camera and PC is working.

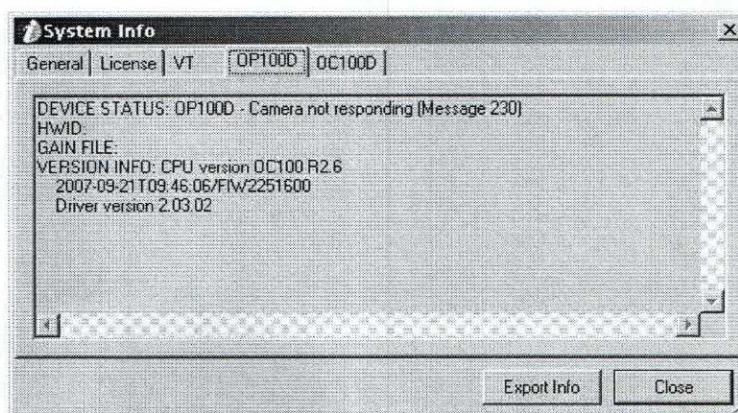


Fig 4.130. Communication link between CCD camera and PC is not working.

