

GE Healthcare

Orthopantomograph® OP100 D Orthoceph® OC100 D

User & Technical Manual



imagination at work 

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1 Introduction

1.1 General

Orthopantomograph® OP100 D is software controlled diagnostic panoramic dental x-ray equipment for producing high quality digital images of dentition, TM-joints and skull. In order to take images with OP100 D you need a suitable PC hardware connected to the OP100 D unit and Cliniview software to handle images.

Orthopantomograph® OP100 D can perform the following procedures:

- Standard panoramic exposure
- Pediatric panoramic exposure
- Ortho Zone panoramic exposure or
- Wide layer panoramic exposure (optional)
- Orthogonal panoramic exposure
- Maxillary sinus
- TMJ, lateral projection or
- Ortho TMJ axial corrected lateral projection (optional)
- TMJ, PA projection

Orthoceph® OC100 D is a more equipped x-ray unit with cephalometric exposure option. In addition to the OP100 D functions OC100 D can perform the following cephalometric procedures:

- lateral view
- posterior-anterior (PA) and anterior-posterior (AP) views

The basic OP100 D can be upgraded later to the Orthoceph® OC100 D.

As the manufacturer we strongly recommend that you read this manual before taking the unit into use.



NOTE!

OP100 D Must be installed according to the OP100 D installation & Adjustments manual by a qualified technician. Only trained personnel should be allowed to operate OP100D.

1.2 Markings and graphics symbols

The following markings are used in this manual:



NOTE!

Contains useful information for the reader about the unit and its use.



CAUTION!

Contains important instructions. If these instructions are not observed, malfunction of the unit or damage to the unit or other property may occur.



WARNING!

Contains warnings and instructions about the safety of the unit. If these warnings are not respected, serious risks and injury may be caused to the patient and operator.

The following symbols are used in the OP100 D.



Radiographic control



Protective earth (ground)



Type B equipment



Dangerous voltage



On (Power)



Off (Power)



Attention, consult accompanying documents



0537 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 UL 2601-1 and CAN/CSA C22.2 No.601.1

1.3 Type and version

The type and version of the OP100 D is defined in the main label of the unit located on the vertical carriage bottom plate next to the power on/off switch or in the column label of the unit located on the column. The unit is class I, type B and with IP-20 protection.

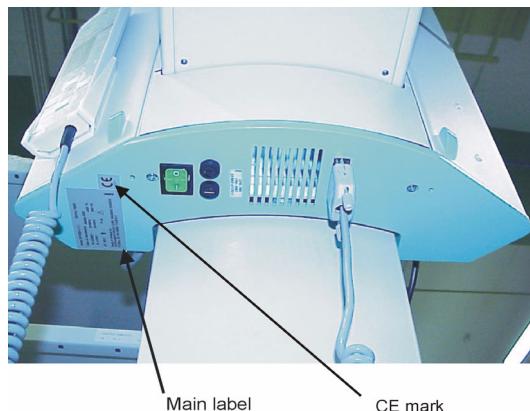


Fig 1.1. Location of main label and CE mark



Fig 1.2. Main label and CE mark

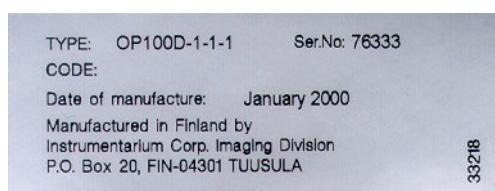


Fig 1.3. Column label

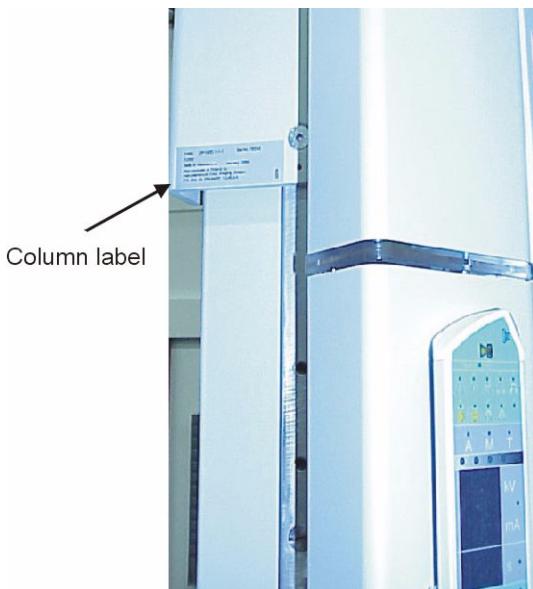


Fig 1.4. Location of column label

The type and version of the unit can be read from the main label or column label codes. The type numbers appear in the following form:
OP100 D-a-bc-d-S.

TYPE AND VERSION	
OP100 D	short form for ORTHOPANTOMOGRAPH OP100 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
d	version number: 1 = OP100 D models
S	indication of a "Special" version, marked only in products which have a non-standard modification

For example, OP100 D-1-4-1 is Orthopantomograph® OP100 D with Toshiba D-051S -tube Removable combined panoramic and cephalostat camera, Version 1.

1.4 Software version

This manual covers the features of the OP100 D software version 1.4.10 or higher. Software version is displayed for few seconds on control panel display after switching the unit on.

1.5 Options, accessories and manuals

The options are listed in the appendices. The accessories are listed in sections 2.4 and 2.5. All standard items and approved accessories are suitable for use within the patient environment.



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/OC100 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 601-1standard and that is indicated in the accompanying documents of the PC.



NOTE!

In order to maintain safe and correct functioning of OP100 D, only the approved accessories may be used.



CAUTION!

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

Following manuals and documents are shipped with the OP100 D:

- OP100 D Installation & Adjustments Manual
- OP100 D User Manual
- OP100 D User Program Manual
- Installation & User Manual for Cliniview software

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

1.6 Radiation protection guidelines

X-ray equipment may cause injury if used improperly. The instructions contained in this manual must be read and followed when operating the Orthopantomograph® OP100 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 the physician before taking images of pregnant patients.



WARNING!

Orthopantomograph® OP 100 D must not be used in rooms where an explosion hazard exists.

OP100 D with radiation protection in accordance with IEC 601-1-3:1994.

1.6.1 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.



Fig 1.5. Caution information on Control panel

1.6.2 Control from a protected area

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 a protected area from the focal spot and the x-ray beam. The full extended spiral cable length of the control panel hand switch is approx. 4 m / 13 ft. The cable length of the optional remote hand switch (part #69961) is approx. 10 m / 32 ft.

1.7 Manufacturer's liability

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

- OP100 D unit installation was performed according to the OP100 D Installation & Adjustments Manual and
- OP100 D Unit is used according to the OP100 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 and
- Original or authorized spare parts are used

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. User should keep this work order for future references.



NOTE!

For PC system: Instrumentarium Imaging can guarantee OP100 D PCI board and CliniView software compatibility with other PC hardware and software only if that configuration has been tested by Instrumentarium Imaging. Any later changes to the hardware and software may void this test.

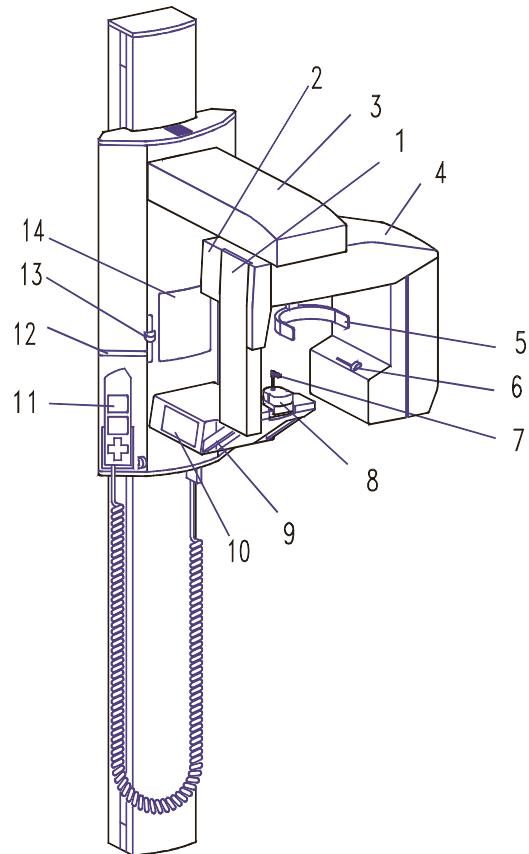
1.8 Disposal

Follow the local regulations on disposal of waste parts. OP100 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 OP100 D controls

2.1 Main parts



- 1 CCD camera
- 2 CCD camera holder
- 3 Main support
- 4 Rotating unit
- 5 Head and Temple support
- 6 Primary collimator
- 7 Bite fork with rod
- 8 Chin rest
- 9 Handles
- 10 Positioning panel
- 11 Control panel
- 12 Exposure indicator lights
- 13 FH light height adjustment
- 14 Mirror
- 15 PC equipment
- 16 Exposure Button with cable and holder (optional in some markets)

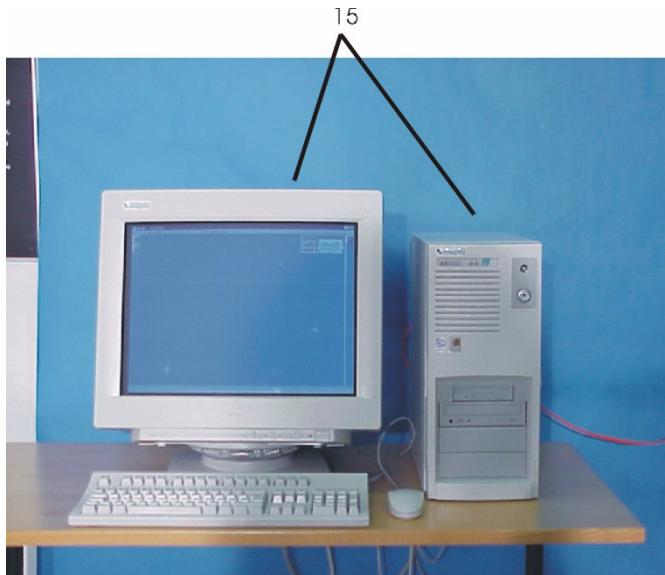


Fig 2.1. PC equipment

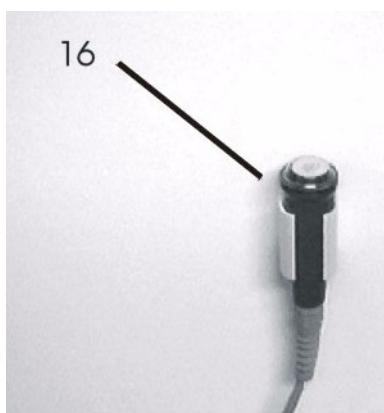


Fig 2.2. Remote exposure button



Fig 2.3. Carriage bottom plate



Fig 2.4. Optical fibre connectors in OP100 D

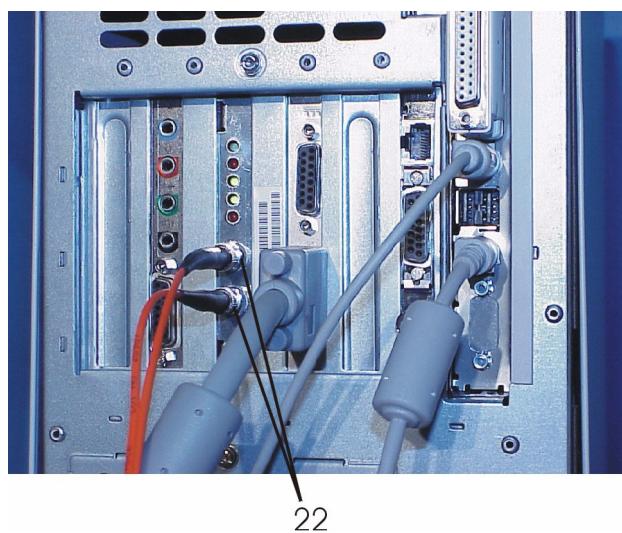


Fig 2.5. Optical fibre connectors in PC

- 17 Main label
- 18 Power ON / OFF switch with an indicator
- 19 Main fuses with label
- 20 Connector for Control panel
- 21 Connectors (2) for optical link in OP100 D unit (2 optical fibres)
- 22 Connectors (2) for optical link in PC (2 optical fibres)
- 23 Service connector

2.2 Control panel

Exposure Control



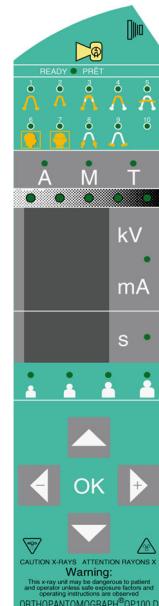
Exposure Button



Exposure Indicator Light



“Ready” Indicator Light



Imaging Procedures P1-P9 with Indicator lights



Standard Panoramic (P1)



Pediatric Panoramic (P2)

Ortho Zone Panoramic (P3) or
Wide Layer Panoramic (P3
Optional)

Orthogonal Panoramic (P4)



Maxillary Sinus Procedure (P5)

Cephalostat, lateral projection
(P6) or Cephalostat mode (P5, if
OC100 attached)Cephalostat, PA/AP projection
(P7)Lateral TMJ View (P86) or Ortho
TMJ Axial Corrected Lateral TMJ
View (P8P6 Optional)

TMJ, PA Projection (P9)



(P10) Not in use

Exposure Modes with Indicator lights



Automatic Exposure Control



Test Mode



Manual Exposure Control

Automatic Exposure Density Scale (nine steps)



kVp display



mA display



Exposure time display / Exposure counter value display

Icons for Preprogrammed Technique Factors with Indicator lights



Child



Juvenile



Adult



Heavy adult

Function Selection Keys (25 - 29):



Move the flashing indicator left or right / decrease or increase the value on display



Move the flashing indicator up or down to the next selection row.

P1-P9: Show Exposure counter value

**NOTE!**

This key has special functions in the Program mode. See *User Program Manual* for details.

OK

Radiation warning



2.3 Positioning panels

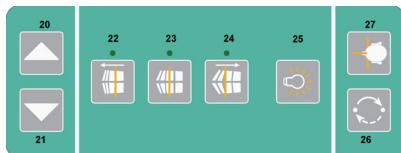


Fig 2.6. Positioning panel, located at left side.



Fig 2.7. Positioning panel, located at right side.

Positioning Panel Keys		
Key	Panoramic(P1-P4)	Maxillary Sinus(P5)
20	Carriage vertical movement up	
21	Carriage vertical movement down	
22	moves the image layer during exposure 3 mm anterior	moves the image layer during exposure 10 mm anterior from nominal position
23	normal occlusion/reset position	nominal position
24	moves the image layer during exposure 3 mm posterior	moves the image layer during exposure 10 mm posterior from reset position
25	Positioning lights on/off	
26	Rotating unit movement: Start position	
27	Rotating unit movement: Patient position	

Positioning Panel Keys		
Key	Cephalometric (P6-P7)	TMJ (P8-P9)
20	Carriage vertical movement up	
21	Carriage vertical movement down	
22	No functioning	moves image layer anterior
23	No functioning	reset to middle
24	No functioning	moves image layer posterior

Positioning Panel Keys	
25	Positioning lights on / off
26	Rotating unit movement: Start position
27	Rotating unit movement: Patient position

2.4 Patient positioning accessories

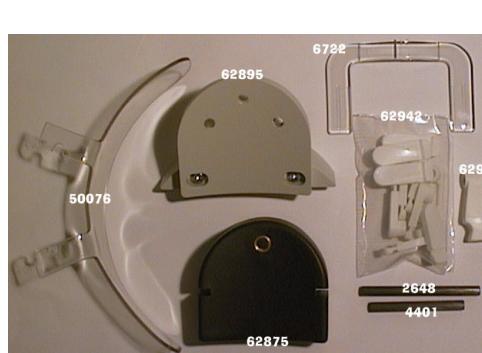


Fig 2.8. Panoramic patient positioning accessories

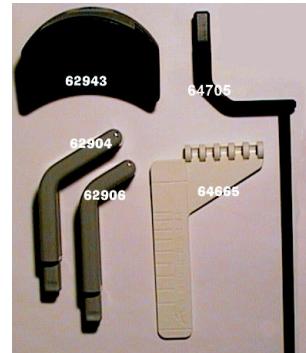
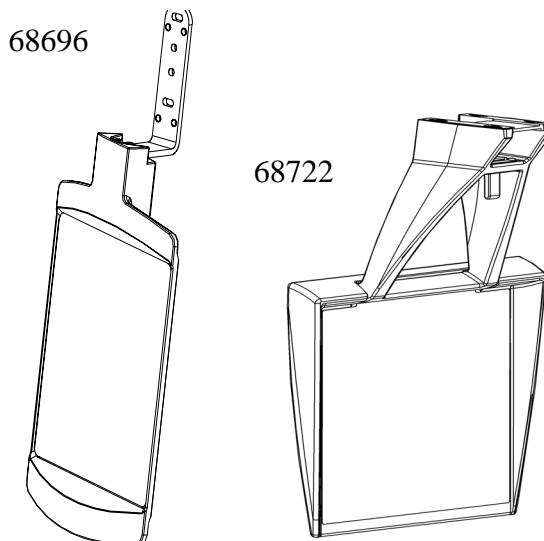


Fig 2.9. TMJ patient positioning accessories



Part code:	Part description:	Part code:	Part description:
62875	Chin rest	62904*	Nose support, long
62895	Sinus rest	62906*	Nose support, short
62942*	Bite block 10pcs	60477	TMJ pointer
62985*	Bite fork, short 56 mm	64665	TMJ angle indicator (Ortho TMJ option)
62988*	Bite fork 71 mm	62943	TMJ chin rest (Ortho TMJ option)

Part code:	Part description:	Part code:	Part description:
62958*	Bite fork, long 80 mm, optional (not shown)		
50076	Child adaptor		
6722	Chin support		
62965	Edentulous bite positioner, optional		
68696	Mirror assembly	68722	Carpus support

**NOTE!**

The parts marked with * are autoclavable.

Convenient bins for small accessories and disposables are located on the both sides of the vertical carriage.



Left and right cabins

2.5 Disposables & Service accessories

The following accessories, disposables and tools are available for the equipment:

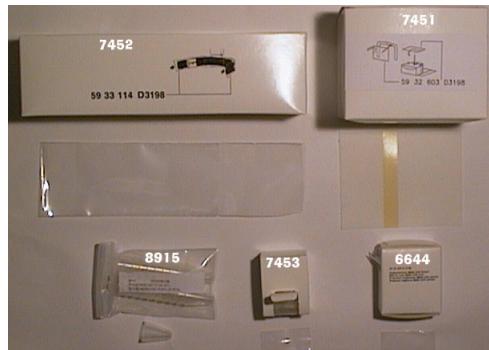


Fig 2.10. Disposables

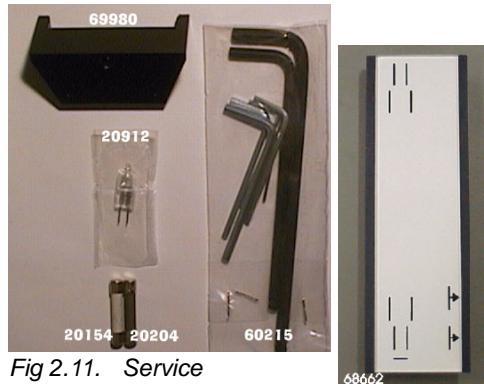
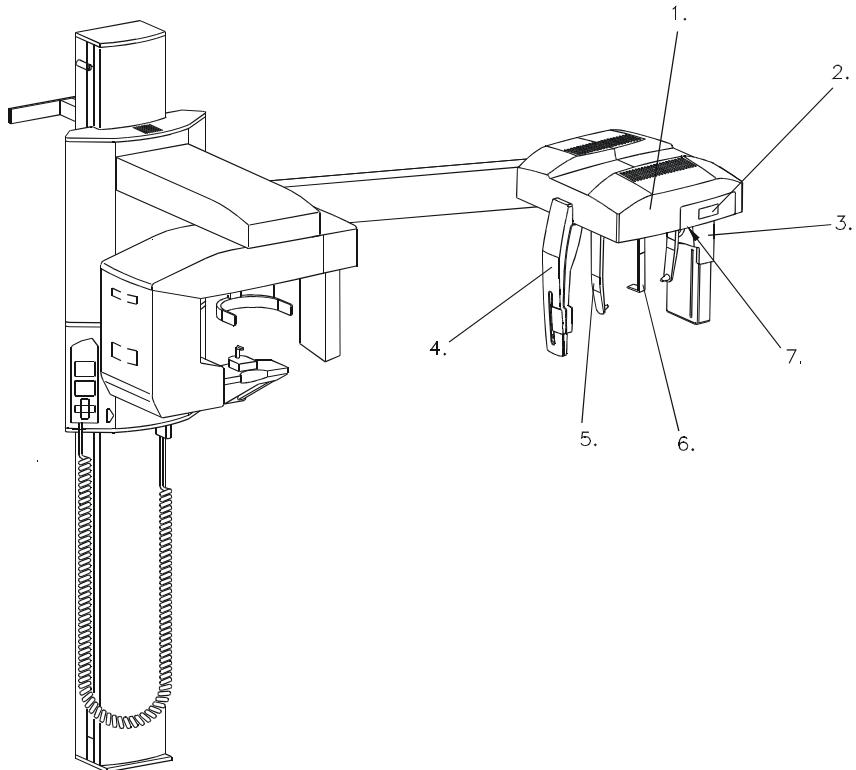


Fig 2.11. Service

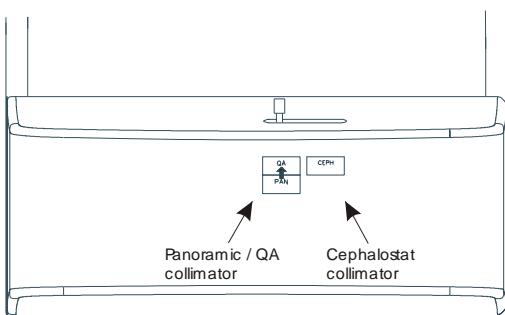
Part code:	Part description:	Part code:	Part description:
6644	Bite fork coat, 500 pcs	69980	Ball & pin phantom
7451	Chin rest coat, 100 pcs	60215	Allen wrenches (metric)
7452	Temple support coat, 200 pcs	20204	Fuse 15 A slow blow, for 110 V line voltage
7453	Nose support coat, 100 pcs	20154	Fuse 10 A slow blow, for 110 VAC line voltage
8915	Ear holder coat, 20 pcs	20912	Spare halogen lamp
		68662	Beam alignment tool

2.6 OC100 D Main parts



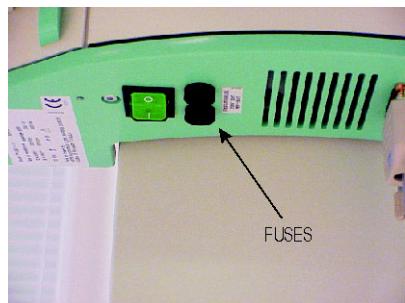
- 1 Cephalostat head
- 2 Control buttons
- 3 CCD camera
- 4 Secondary slot
- 5 Ear rod
- 6 Nasion support
- 7 Locking for ear holder rotation

Tube head



Slide the lever to choose the collimator. The right end is for cephalometric imaging and the left end is for the panoramic imaging. To make the QA image select first the panoramic position and then lift up the lever.

2.7 Changing the fuses



Push upward on the fuse base and twist it counter-clockwise with a screwdriver. The fuse with the base will come out.

Remove the fuse from the base and replace it with the new one. Repeat this with each fuse.

Fasten both fuses by pushing the base up and twisting it clockwise with a screwdriver.

Use only appropriate fuses:

326 Littelfuse 10A (slow blow) 230 VAC

326 Littelfuse 15A (slow blow) 115 VAC

3 Equipment preparations

3.1 Cleaning recommendations

The unit should be cleaned after every usage between the patients. Items and surfaces that are not given special instructions for cleaning, disinfecting and sterilizing, can be cleaned with soft cloth moistured with disinfective after every usage.



WARNING!

Always disconnect OP100 D from mains or switch off the power prior to cleaning or disinfecting the unit. do not allow any liquid to enter the unit interior.



CAUTION!

Do not allow water or other cleaning liquids to enter the unit interior since these may cause short-circuits or corrosion.

3.1.1 Cleaning

The purpose of cleaning and rinsing is to remove all adherent visible soil (eg. blood, protein substances and other debris), to reduce the number of particulate and micro-organisms, and to reduce the amount of pyrogenic and antigenic material.

Use a cloth moistened in cool-to-lukewarm, soapy water to clean the unit, and prevent coagulation and thus facilitate the removal of protein substances. Then wipe with a cloth moistened in clear water. Mild detergent solution can be used. Never use cleaners or solvents of any kind. If you are uncertain of the nature of cleaning agent, do not use it.

For example, the following cleaning agents are allowed (and not allowed) to clean the unit panels:

Allowed: Acetylene, Butylalcohol, Ethanol (ethyl alcohol) 96%, Methanol (methyl alcohol), Soap.

Not allowed: Benzene, Chlorine benzene, Acetone, Acetic ether

3.1.2 Disinfection

For example, use Ethanol 96% for disinfection of equipment. Wipe manually with clean cloth moistured in disinfectant solution. Never use corrosive or solvent disinfectants. All items and surfaces should be dried before next usage.



NOTE!

Wear gloves and other protective equipment during decontamination process.



WARNING!

Do not use any disinfecting sprays since the vapor could ignite causing injury.

Disinfecting techniques for both the unit and the room must comply with all laws and regulations that have jurisdiction of law within the jurisdiction on which the unit is.

3.1.3 Sterilization

Some removable parts in touch with the patient are sterilizable in autoclave. Such parts are:

Bite forks (4401, 2648, 62958), Bite block (62942) and Nose supports (62906, 62904).

3.1.3.1 Autoclave

Sterilizable parts can be autoclaved. If autoclaving is performed for these items, disinfection by immersing in disinfectant solution for 10 minutes is not needed.

3.1.3.2 Steam sterilization

Recommended parameters for sterilizable parts are:

Gravity-displacement steam sterilization

"Flash" sterilization:

Temperature: 270/F (132/ C)

Exposure time: 3 minutes

Prevacuum steam sterilization

"Flash" sterilization:

Temperature: 270/ F (132/ C)

Exposure time: 3 minutes

Steam-flush pressure-pulse steam sterilization

Temperature: 270/ F to 275/ F (132/ C to 135/ C)

Exposure time: 3 to 4 minutes

3.1.3.3 Ethylene oxide sterilization

Not recommended as sterilization process for OP100 D parts.

3.1.4 Other sterilization processes

3.1.4.1 Dry heat sterilization

Dry heat sterilization can only be used with the bite forks. Typical cycle parameters are:

Temperature: 338/ F (170/ C)

Exposure time: 60 minutes

Temperature: 375/ F (190/ C)

Exposure time: 6 minutes (unwrapped items) or 12 minutes (wrapped items)

3.1.4.2 Liquid chemical sterilant gases

Not recommended as sterilization process for OP100 D parts.

3.1.4.3 Chemical sterilant gases

Not recommended as sterilization process for OP100 D parts.

Testing

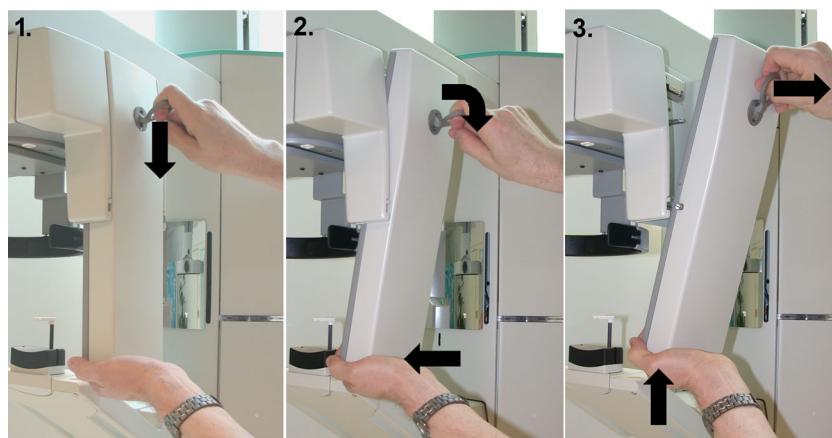
For example, a 2% hydrogen per-oxide solution can be used to verify removal of protein from the unit. Soluton bubbles if it comes in contact with blood or protein substances. If any bubbling is observed, the decontamination process must be performed again.

3.2 Connecting and disconnecting the CCD camera

OC100 D unit can be equipped with 1 or 2 cameras. If the unit is equipped with 1 cephalostat camera the same camera can be used for pan and ceph imaging. Another possibility is to use 2 cameras at the place all the time. In this case the unit is equipped with 1 pan and 1 ceph camera.

Panoramic camera

To **remove** the CCD camera from **rotating unit** pull the ring downwards (Figure 1). Push the camera slightly from below (Figure 2) so that it comes off from the top. Lift the camera a little and pull it away (Figure 3).



To install the camera back to the rotating unit proceed as stated above in reverse order. However instead of pulling the ring, push the top of the camera towards the rotating unit.



NOTE!

When installing the camera, make sure that the camera is properly connected by checking that it does not come off from the top when pushing from below.

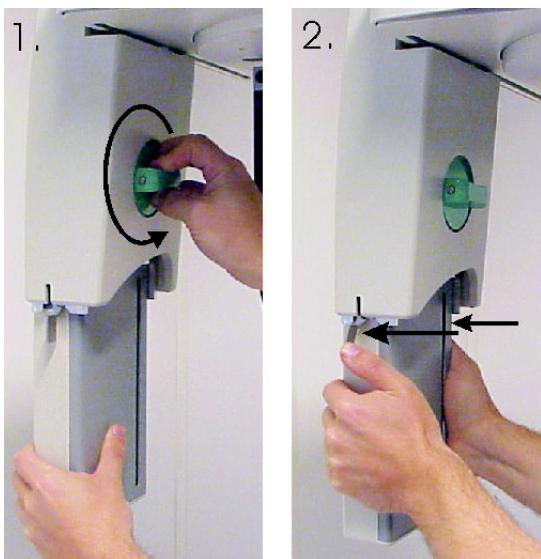
Cephalostat camera

To **remove** the CCD camera from the **cephalostat head** press the knob on the handle and turn it 360 degrees counter-clockwise (Figure 1). Press the clips on the both sides of the camera (Figure 2) and lower the camera.



CAUTION!

Hold the camera while pressing the clips in order that the camera won't fall. The camera must not be dropped or exposed to impacts.



To install the camera back to the cephalostat head lift the camera to holder until a click is heard. Then press the knob on the handle and turn it 360 degrees clockwise.



CAUTION!

The camera must not be dropped or exposed to impacts.

3.3 Preparation for panoramic image acquisition

- 1 Locate the power switch under the carriage. Turn the power switch to the "I" position. The green light will go on.
- 2 Set the CCD camera into the panoramic camera holder. See chapter *Connecting and disconnecting the CCD camera*.
- 3 Move the head support towards the mirror and select the panoramic collimator from the tube head. In OP100 D set the lever to the right. One of the panoramic programs will be selected automatically on the control panel.



Fig 3.1. Moving the head support towards the mirror

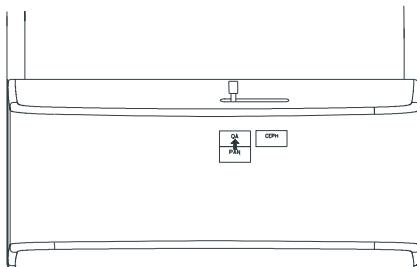


Fig 3.2. Selecting the panoramic collimator

4 Computer preparation:

- Switch on PC
- Start Windows software
- Start the Cliniview software. Refer to the *User manual for Cliniview software* to get instructions how to use the Cliniview software
- Open the patient database and select patient or type all the required patient details in order to take an image
- Press "Take PanImage" button to get ready for an exposure



NOTE!

Always maintain visible contact with the patient and technique factors during the exposure and stay within earshot to be able to hear the warning tone. This allows immediate termination of radiation by the release of the exposure button in the event of a malfunction or disturbance.

5 Proceed to the section *Panoramic procedures* for Panoramic imaging and to the section *Special imaging procedures* for Sinus and TMJ imaging.



CAUTION!

Handle the camera with care as instructed in this manual. The camera must not be dropped or exposed to impacts. A shock indicator inside the camera will show if the camera has been exposed to excess impact.



NOTE!

When using the system in an extremely high electromagnetic environment interferences may change image quality. If interference appears, contact your local dealer.

4 Panoramic procedures

4.1 P1: Standard panoramic exposure

- 1 Prepare the equipment per section 3.2.
- 2 Verify that the light under program "1" (**P1**) in the control panel is lit.
- 3 Press patient positioning button to rotate the rotating unit to the patient positioning position.



When the system is turned on it will automatically set itself to standard panoramic with AEC (Automatic exposure control) mode settings. You can also select different power up settings if you want. No other Control Panel settings are necessary.



NOTE!

If you wish to set the AEC density factors darker or lighter or wish to set the technique factors by patient size or manually, refer to section *Imaging technique*.

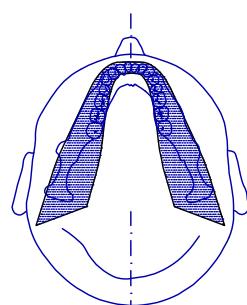


Fig 4.1. P1: Image

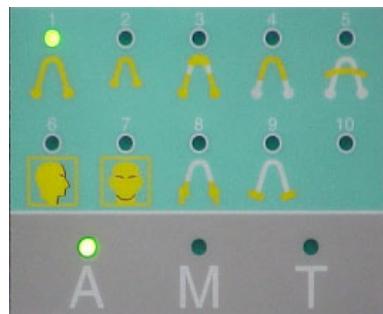


Fig 4.2. P1 & AEC mode

- 4 To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging technique* for more information.

Technique factors in standard panoramic imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	70kV/ 12mA
230 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	66kV/ 16mA
Note: Example with Pr 52 CCO Constant Contrast = 63kV, Density = 6				

- 5 Install the chin rest and bite fork with bite fork rod (adult or child) with hygienic covers. Open temple supports.

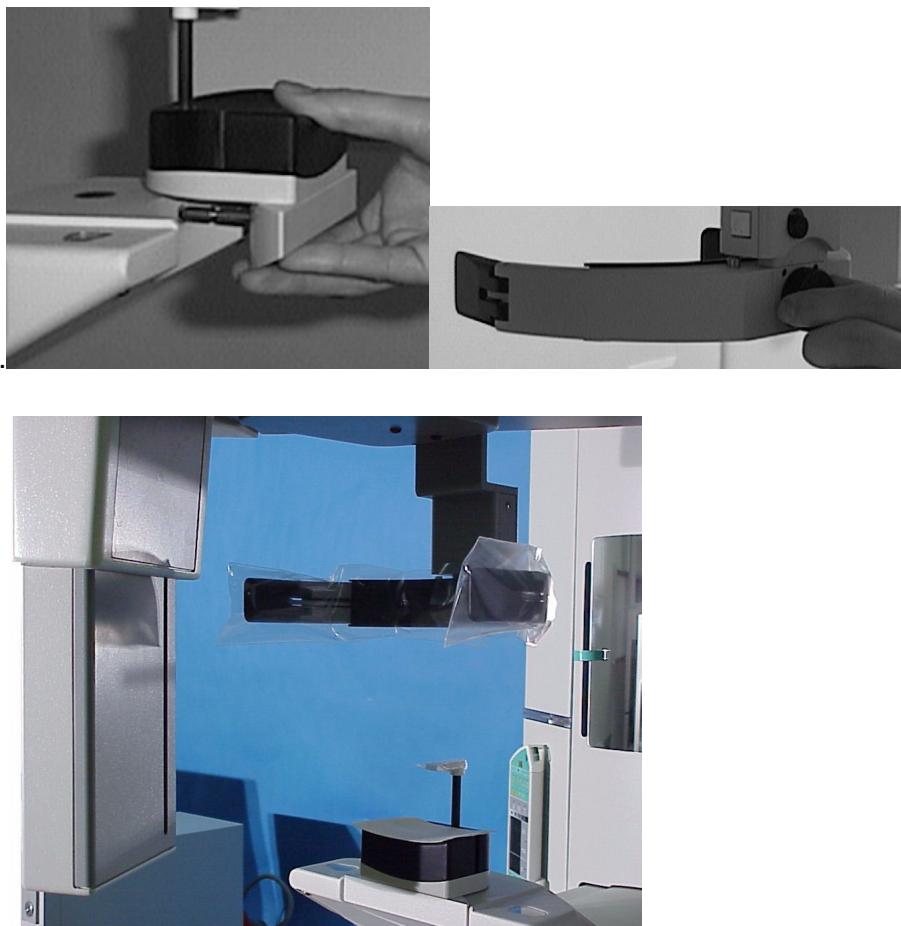


Fig 4.3. Standard patient positioning accessories installed

- 6 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc., from the head and neck area. Shadows caused by these opacities may obscure diagnosis.
- 7 It is strongly recommended to provide the patient with a lead apron for radiation protection.
- 8 Direct the patient to the unit and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles.

By pressing the up ▲ or down ▼ button on the Patient positioning panel adjust the carriage height so the chin rest is at the patient's height. Have patient place chin on the chin rest.

- 9 Show the patient the grooves in the bite fork and place the bite fork into patient's mouth.



Fig 4.4. Hands on the grips and chin on the chin rest.



NOTE!

The patient can either be standing, seated, or in a wheelchair.

If the bite fork cannot be used because the malocclusion or missing teeth, remove the bite fork with rod (A), reset the chin support (B), and use cotton rolls to separate the bite.

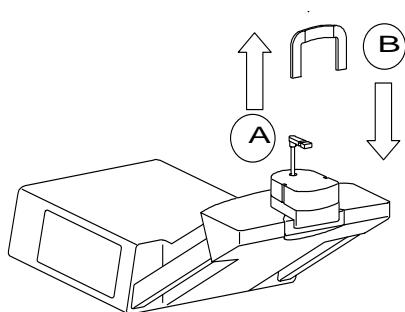


Fig 4.5. Chin support installation

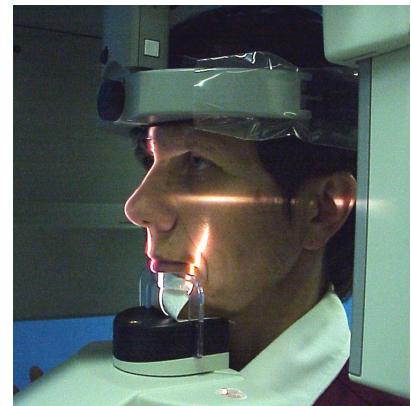


Fig 4.6. Using chin support



- 10 Positioning lights will switch on automatically when the carriage is moved. They stay on for 45 seconds or until exposure is initiated. If necessary, lights can also be switched on and off at the Positioning panel with light key.
- 11 Ask the patient to take a small step forward, to straighten the cervical vertebrae to minimize spinal shadow.
- 12 Patient's face and light lines can be seen in the curved mirror. Move the FH light to illuminate the patients' infra-orbital notch. By slightly raising or lowering the carriage, position the patient so that the Frankfort-Horizontal plane (FH) light passes over the ear opening and the infra-orbital notch. Be sure the patient does not slump if carriage is lowered. Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane.



Fig 4.7. FH-light

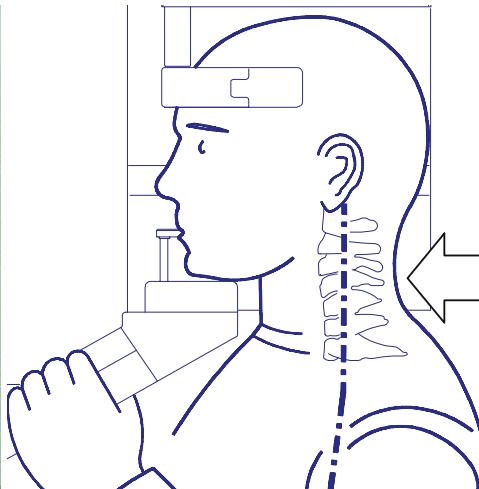


Fig 4.8. Straighten the cervical vertabreae

- 13 Adjust patient's head as necessary so that the front light coincides with the patient's mid sagittal plane.
- 14 Move the head support by pressing it from sides against the patient and close the temple supports.



Fig 4.9. Front light



Fig 4.10. Moving the head support

- 15 Confirm the position of the focal trough in reference to the occlusion. The image layer light should illuminate the buccal of the maxillary canine (or base of the nose if edentulous).

If not, then adjust the focal trough by pressing one of the occlusion correction keys. Press the key closest to mirror, if the patient has prognathia. Press the key closest to patient, if he has hypognathia.

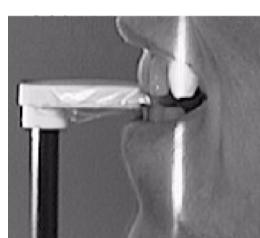


Fig 4.11. The image layer light

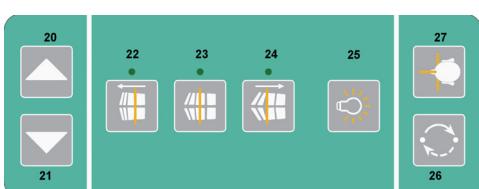


Fig 4.12. Positioning panel, located at left side. Occlusion adjustment keys: progenia (22), normal (23), prognatism (24).

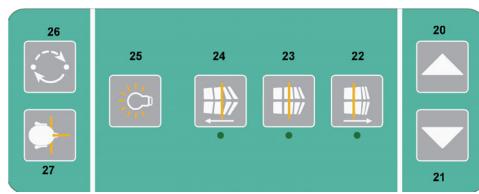


Fig 4.13. Positioning panel, located at right side. Occlusion adjustment keys: progenia (22), normal (23), prognatism (24)

This will adjust the unit during exposure. After the exposure, occlusion correction is automatically reset to center position.

- 16 Advise patient to close lips and swallow. This will raise the patient's tongue to the roof of the mouth and enhance image quality. Ask the patient to breathe through the nose and remain still during the exposure. Patient can be asked to close eyes.
- 17 After patient positioning press start button, and wait until the unit stops. Check that the patient positioning is not changed when the rotating unit is moved to its starting position.



WARNING!

During the exposure cycle radiation control guidelines must be observed.

- 18 Press Exposure button. Use remote exposure button or take the exposure control panel to a position at least 2 meters (7 ft.) from the patient or behind a shield. After verifying that the "Ready" light is on, press and hold the exposure button. The exposure button must be pressed until the end of the exposure cycle as indicated by a light and audible tone.

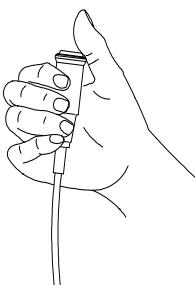


Fig 4.14. Remote exposure button

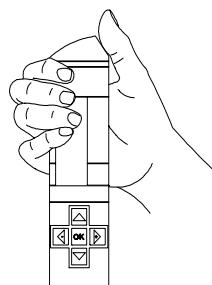


Fig 4.15. Control panel exposure button



NOTE!

Observe the patient and Cliniview real time image acquisition during the exposure. In case of a problem, such as patient movement or if the image acquisition does not succeed, the exposure can be terminated immediately upon release of the exposure switch. Retake the exposure.



NOTE!

If exposure cannot be initiated and an error code appears on the exposure control panel, refer to section *Failure Diagnostics* for explanation and correction.

- 19 At the end of the exposure, release temple supports and guide the patient away from the unit.
- 20 Remove disposable covers and disinfect the unit.
- 21 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

4.2 P2: Pediatric panoramic exposure

Pediatric patients can be imaged with less radiation dosage and shorter exposure time. Patients with narrow than average jaw can be exposed with this procedure, too.

- 1 Prepare the equipment and PC system per section *Preparation for panoramic image acquisition*.
- 2  Select the pediatric exposure program on the Control Panel. Press the right key to move the flashing light from the standard panoramic position to the pediatric position **P2**.

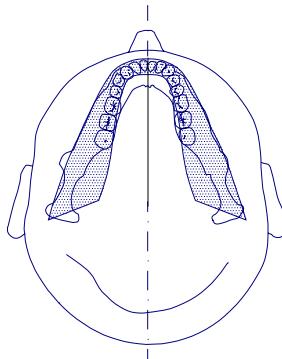


Fig 4.16. P2: Image layer

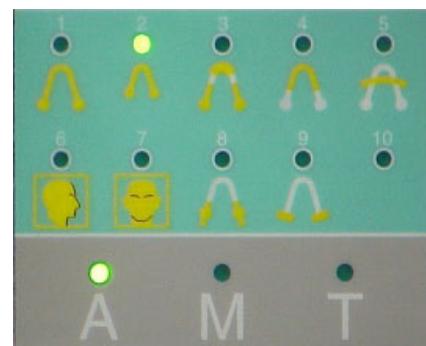
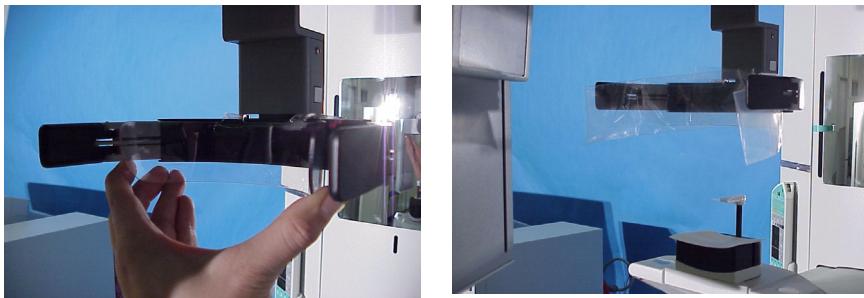


Fig 4.17. P2 & AEC mode

- 3 To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging Technique* for more information.

Technique factors in pediatric panoramic imaging				
	child	juvenile	adult	heavy adult
110 VAC	60kV/ 6,4mA	60kV/ 10mA	60kV/ 12mA	63kV/ 12mA
230 VAC	60kV/ 6,4mA	60kV/ 10mA	60kV/ 12mA	60kV/ 16mA
<i>Note: Example with Pr 52 CCO, Constant Contrast = 63kV, Density = 6</i>				

- 4  Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 5 Install the chin rest and bite fork with bite fork rod (child) with hygienic covers. Open temple supports. Insert a child adapter to the head support when needed. Press adapter ends towards each other with fingers, slide the adapter against the head support, and release. Pins will hold the adapter in place.



- 6 Position the patient and take exposure per steps 6 through 20 of the standard panoramic exposure procedure.
- 7 After the exposure return the system to the standard panoramic program by pressing the cursor keys to move the flashing light to the standard program position.
- 8 Proceed to the image handling. Refer to the *User Manual for CliniView software* to get instructions how to use CliniView software.

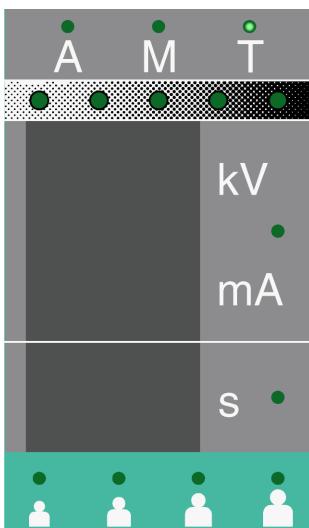


Fig 4.18. Test mode



NOTE!

The system can be operated without radiation to demonstrate the movement to the child by setting the system to the Test mode. To do this, press the down key to move the flashing light over the Manual mode (M). Then press the right key once to move the light over the Test mode (T). Pressing the exposure switch will now cause the system to cycle without radiation. To return to operational status, press the left key once to move the flashing light over the Manual mode (M).



4.3 P3: Ortho Zone enhanced panoramic exposure

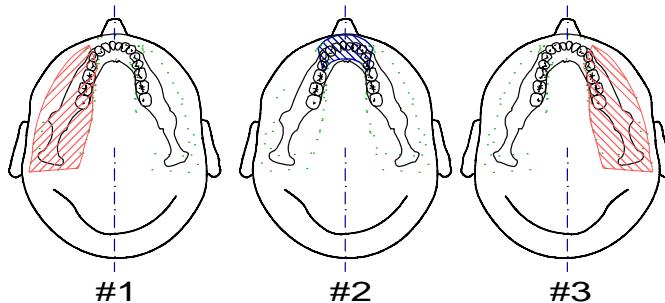


Fig 4.19. P3: Ortho Zone image layers

When used, this optional program replaces the Wide layer enhanced panoramic program P3 on the Control panel.

The Ortho Zone program produces two different scanning geometries combined on the same image.

The first geometry (#1 and #3 in the figure) starts with the rotation center much further posterior than in the normal panoramic views (eg. Programs P1 and P2).

The result of this scanning location will allow for views of the TM joint without redundant shadows from the opposite side obscuring the image. Patients with prosthetic condyles or other posterior radioopaque objects can have the opposite side successfully imaged.

The second view (#2 in the figure) produces an image of the anterior region with a very wide layer of focus (approx. 35 mm). This view may be helpful when diagnosing trauma, wired shut, severe class III and uncooperative patients.

- 1 Prepare the equipment and PC system per section *Preparation for panoramic image acquisition*.
- 2 Select the Ortho Zone program on the Exposure Control Panel. Press the right key twice to move the flashing light from the standard panoramic position to the Ortho Zone position **P3**.



Fig 4.20. P3 & AEC Mode

- 3 To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging Technique* for more information.

Technique factors in ortho zone imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	70kV/ 12mA
230 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	66kV/ 16mA
<i>Note: Example with Pr 52 CCO, Constant Contrast = 63kV, Density = 6</i>				

- 4 Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 5 Position the patient per steps 5 through 16 of the standard panoramic exposure procedure. Skip step 15.
- 6 Take the exposure per steps 17 through 20 of the standard panoramic exposure procedure.
- 7 After the exposure return the system to the standard panoramic program by pressing the cursor keys to move the flashing light to the standard program position.
- 8 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.



4.4 P3: Wide arch panoramic exposure (optional)

When used, this program replaces the Ortho Zone enhanced panoramic program P3 on the Control panel.

When the patient has a wider than normal dental arch, an improved image can be achieved by selecting the wide layer exposure program.

- 1 Prepare the equipment and PC system per section *Preparation for panoramic image acquisition*.
- 2  Select the wide layer panoramic program on the Exposure Control Panel. Press the right key twice to move the flashing light from the standard panoramic position **P1** to the wide layer position **P3**.

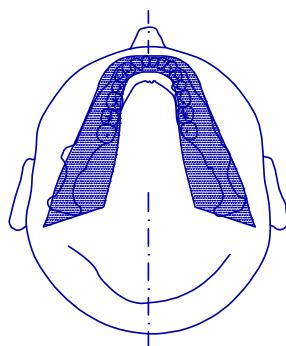


Fig 4.21. P3: Image layer



Fig 4.22. P3 & AEC Mode

- 3 To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging technique* for more information.

Technique factors in wide arch imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	70kV/ 12mA
230 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	66kV/ 16mA
<i>Note: Example with Pr 52 CCO, Constant Contrast = 63kV, Density = 6</i>				



- 4 Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 5 Position the patient and take exposure per steps 5 through 20 of the standard panoramic exposure procedure.
- 6 After the exposure return the system to the standard panoramic program by pressing the cursor keys to move the flashing light to the standard program position.

- 7 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

4.5 P4: Orthogonal exposure

An optimized view of the dentition only with optimized angulation and reduced radiation can be achieved by selecting the orthogonal exposure program.

- 1 Prepare the equipment and PC system per section *Preparation for panoramic image acquisition*.
- 2 Select the orthogonal exposure program on the Exposure Control Panel. Press the right key three times to move the flashing light from the standard panoramic position P1 to the orthogonal position **P4**. 

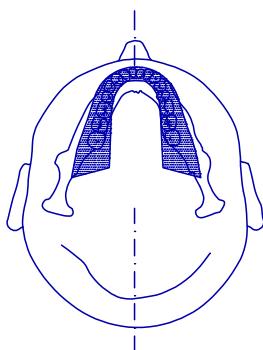


Fig 4.23. P4: Orthogonal image layer

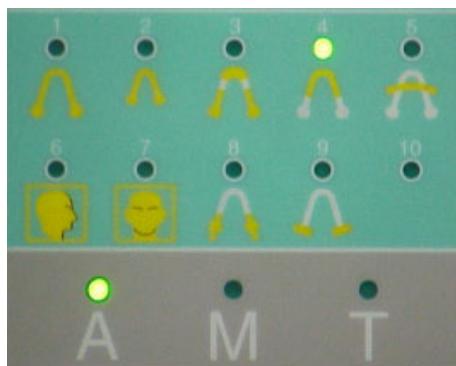


Fig 4.24. P4 & AEC Mode

- 3 To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging technique* for more information.

Technique factors in ortho zone imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	70kV/ 12mA
230 VAC	63kV/ 6,4mA	63kV/ 10mA	63kV/ 12mA	66kV/ 16mA

Note: Example with Pr 52 CCO, Constant Contrast = 63kV, Density = 6

- 4 Press patient positioning button to rotate the rotating unit to the patient positioning position. 
- 5 Position the patient and take exposure per steps 5 through 20 of the standard panoramic exposure procedure.
- 6 After the exposure return the system to the standard panoramic program by pressing the cursor keys to move the flashing light to the standard program position.

- 7 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

5 Special imaging procedures

5.1 P5: Maxillary Sinus view

- 1 Prepare the equipment per section *Preparation for panoramic image acquisition*.
- 2  Select the imaging program for a maxillary sinus view on the Exposure Control Panel. Press the right key four times to move the flashing light from the standard panoramic position **P1** to the maxillary sinus position **P5**.

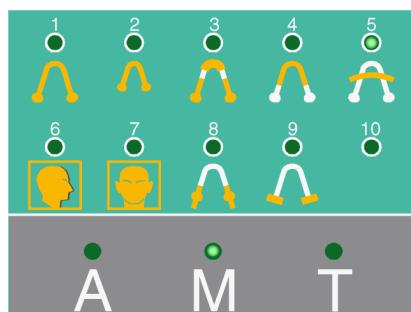


Fig 5.1. P5 & Manual mode

- 3 The system is in the Manual Exposure Control mode. To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging technique* for more information. Use one step higher technique factors compared to TMJ imaging.

Technique factors in Maxillary Sinus imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/8mA	63kV/ 12mA	66kV/ 12mA	77kV/ 12mA
230 VAC	63kV/8mA	63kV/ 12mA	66kV/ 16mA	66kV/ 16mA
<i>Note: Example with Pr 52 CCO, Constant Contrast = 66kV, Density = 7</i>				

- 4  Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 5 Remove the bite fork, bite fork rod and chin rest. Install the bite fork with bite fork rod over the sinus rest. Install hygienic covers.



Fig 5.2. Maxillary Sinus patient positioning accessories installed

- 6 Direct the patient to the machine and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles.

By pressing the up or down button on the Positioning Control panel adjust the carriage height so the sinus rest is at the patient's height. Have patient place chin on sinus rest.



- 7 Show the patient the grooves in the bite fork and place the bite fork into patient's mouth.
- 8 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane. Move the head support against the patient forehead and close the temple supports.

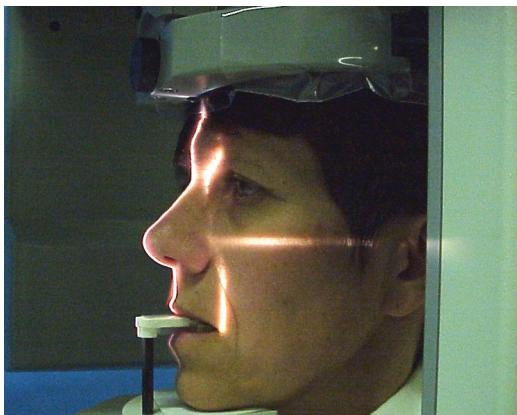


Fig 5.3. Sinus view positioning

- 9 Adjust the focal trough as necessary. Image layer is 18 mm posterior compared to Standard panoramic procedure. To set this layer 10 mm anterior or 10 mm posterior, press occlusal correction keys. Center layer position is selected by pressing normal occlusion key. This will adjust the unit during the exposure.

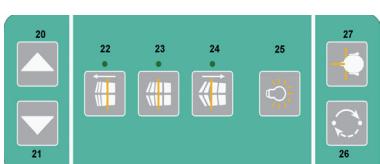


Fig 5.4. Positioning panel located at left side. Sinus layer adjustment keys: 10mm anterior (22), center (23),

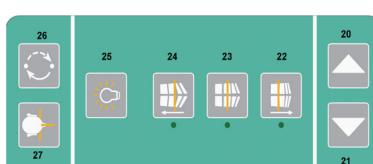


Fig 5.5. Positioning panel, located at right side. Sinus layer adjustment keys: 10mm anteric (22), center (23), 10mm

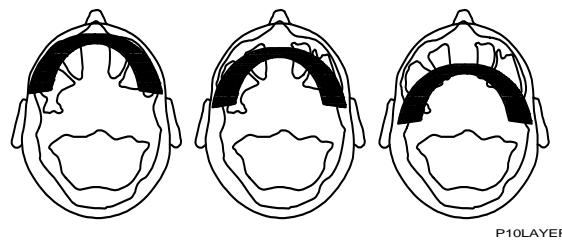


Fig 5.6. P5: Sinus view layers: front, center, back

- 10 Instruct the patient to close lips and swallow. This will raise the tongue to the roof of the mouth. Ask the patient to breathe through the nose and remain still during the exposure.
- 11 After patient positioning press start button, wait until the unit stops. Check that the patient positioning is not changed when the rotating unit is moved to its starting position.
- 12 Press and hold the exposure button. The system will cycle and expose the maxillary sinus region.
- 13 Release the exposure button, open temple supports and guide the patient out. Remove the bite fork and rod, reset chin rest and bite fork.
- 14 Return the system to the standard panoramic program.
- 15 Remove disposable covers and disinfect the unit.
- 16 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

5.2 P8: TMJ, Lateral projection

- 1 Prepare the equipment per section *Preparation for panoramic image acquisition*.
- 2 Select the imaging program for TMJ, lateral projection on the Exposure Control Panel. With OP100 D press the key two times to move the flashing light from the standard panoramic position **P1** to the TMJ, lateral projection position **P8**.

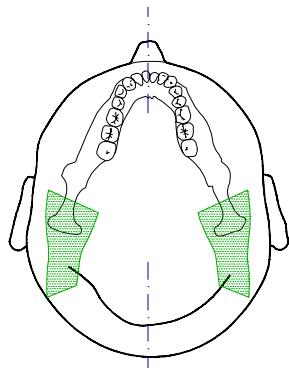


Fig 5.7. P8: Image layer

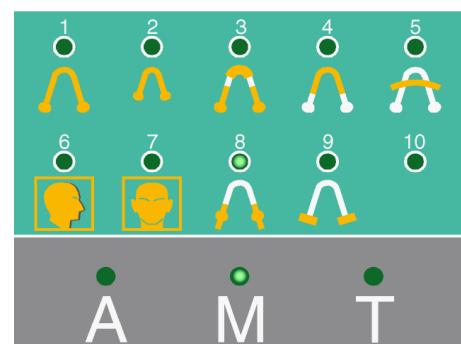


Fig 5.8. P8 & Manual mode

- 3 The system is in the Manual Exposure Control mode. To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the suggested values from the table below. Refer to section *Imaging technique* for more information.

Technique factors in TMJ imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/ 6.4mA	63kV/ 10mA	63kV/ 12mA	70kV/ 12mA
230 VAC	63kV/ 6.4mA	63kV/ 10mA	63kV/ 12mA	66kV/ 16mA
<i>Note: Example with Pr 52 CCO, Constant Contrast = 63kV, Density = 6</i>				

- 4 Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 5 Remove the bite fork, bite fork rod, chin rest and sinus rest. Install the TMJ nose support (2 models available) with hygienic coat and the TMJ pointer.

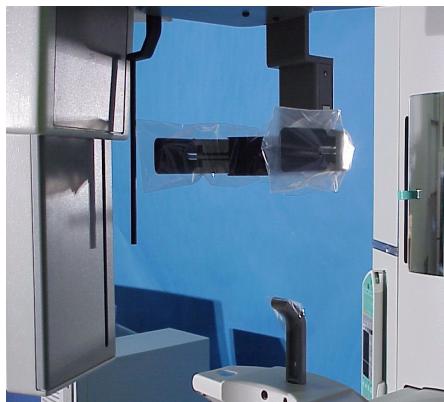


Fig 5.9. TMJ patient positioning accessories installed (short nose support)



Fig 5.10. TMJ patient positioning accessories installed (long nose support)

- 6 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc., from the head and neck area. Shadows caused by these opacities may obscure diagnosis.
- 7 It is strongly recommended to provide the patient with a lead apron for radiation protection.
- 8 Direct the patient to the machine and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles.

By pressing the up or down button on the Positioning Control panel adjust the carriage height so that the TMJ nose support is at the patient's nose height. Have patient place nose against TMJ nose support.





Fig 5.11. TMJ Lateral projection

- 9 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane. Move the head support by pressing it from sides against the patient and close the temple supports.
- 10 To adjust the focal trough reference to the TMJ, a special pointer is used. By pressing the appropriate occlusal adjustment button on the Positioning Control, move the TMJ pointer forward (towards the mirror) or back until the pointer aligns with the external auditory meatus.

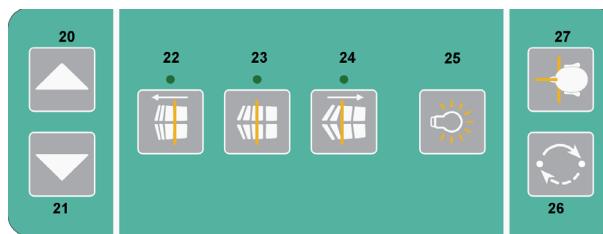


Fig 5.12. Positioning panel, left side. TMJ pointer adjustment keys: forwards (22), reset (23), backwards (24)



Fig 5.13. Positioning panel, right side. TMJ pointer adjustment keys: forwards (22), reset (23), backwards (24)

- 11 If the TMJ pointer doesn't align with external auditory meatus, replace the TMJ nose support with the other model and repeat patient positioning.
- 12 Have the patient close or open the jaw. If the jaw is open move the TMJ pointer 10 mm anterior compared to jaw closed positioning.
- 13 After patient positioning press start button, wait until the unit stops. Check that the patient positioning is not changed when the rotating unit is moved to its starting position.
- 14 Press and hold the exposure button. The system will cycle, exposing only the two TMJ's.



- 15 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer and TMJ nose support.
- 16 After the exposure return the system to the standard panoramic program by pressing the cursor keys to move the flashing light to the standard program position.
- 17 Remove disposable covers and disinfect the unit.
- 18 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

5.3 P8: Ortho TMJ, axial corrected lateral projection (optional)

When used, this optional program replaces the TMJ lateral projection exposure program P8 on the Control panel.

Ortho TMJ program provides a wide layer axial corrected views for the patient's left and right temporomandibular joints. The angle of correction for any particular patient can be derived from tracing a submental vertex image (SMV) obtained with cephalostat, or a statistical average of 18° to 20° may be used if a SMV is unavailable.

- 1 Expose, process and trace a submental vertex image. Determine the angle of the long axis of the condyle in relationship to a lateral base line. This will be the correction angle. Take care in positioning the patient while taking the SMV. Be sure the patient's ala-tragus line is vertical, if not this can result in an incorrect angular measurement.

If the left and right condyles are at vastly different angles, two corrected joint views may be required.

- 2 Prepare the equipment per section *Preparation for panoramic image acquisition*.
- 3 Select the imaging program for corrected lateral TMJ projections on the Exposure Control Panel. With the OP100 D press the key two times to move the flashing light from the standard panoramic position **P1** to the Ortho TMJ position **P8**.

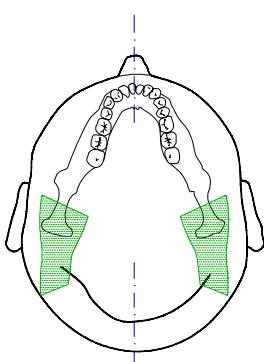


Fig 5.14. P8: Image layer

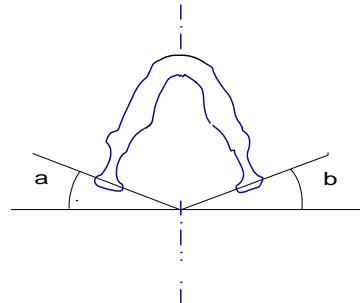


Fig 5.15. Condylar lateral angles

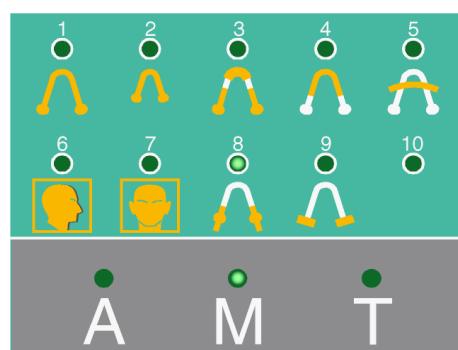


Fig 5.16. P8 & Manual mode

- 4 The system is in the Manual Exposure Control mode. To set technique factors by patient size select one of the preprogrammed patient size icons or manually entering the

5 Special imaging procedures

suggested values from the table below. Technique factors are two steps higher compared to the standard TMJ lateral view program. Refer to section *Imaging Technique* for more information.

Technique factors in Ortho TMJ imaging				
	child	juvenile	adult	heavy adult
110 VAC	63kV/ 10mA	66kV/ 12mA	70kV/ 12mA	73kV/ 12mA
230 VAC	60kV/ 10mA	63kV/ 16mA	66kV/ 16mA	70kV/ 16mA
<i>Note: Example with Pr 52 CCO, Constant Contrast = 66kV, Density = 7</i>				

- 5 Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 6 Remove the bite fork, bite fork rod, chin rest and sinus rest. Install the TMJ chin rest with hygienic coat.
- 7 Install the carbon fiber TMJ pointer with the TMJ angle indicator into the socket over the patient's head.



Fig 5.17. Ortho TMJ patient positioning accessories installed

- 8 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc., from the head and neck area. Shadows caused by these opacities may obscure diagnosis.
- 9 It is strongly recommended to provide the patient with a lead apron for radiation protection.
- 10 Direct the patient to the machine and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles. By pressing the up or down button on the Positioning Control panel adjust the carriage height so that the TMJ chin rest is at the patient's chin level. Have patient place chin against the TMJ chin rest.
- 11 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane. Move the head support by pressing it from sides against the patient and close the temple supports.



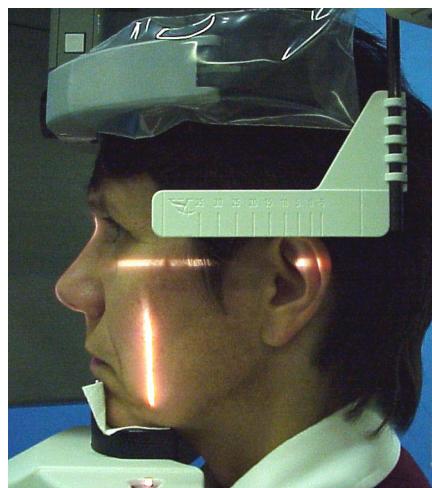


Fig 5.18. Ortho TMJ, patient

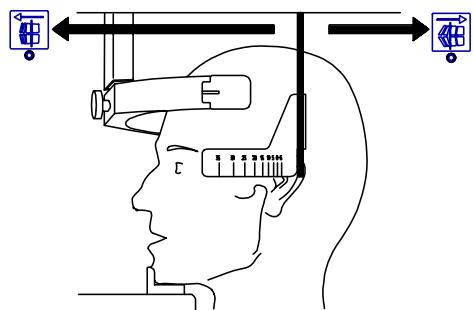


Fig 5.19. Angle indicator adjustment

- 12 To adjust the x-ray beam angle to the patient's condyler angle the TMJ pointer and angle indicator are used. By pressing the appropriate occlusal button on the Patient positioning panel, move the TMJ angle indicator forward or back until the desired angle is displayed over the patient's condyle.

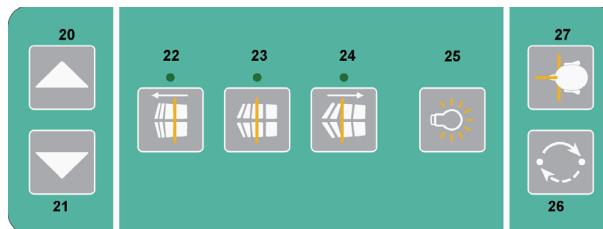


Fig 5.20. Positioning panel, left side. TMJ pointer adjustment keys: forwards (22), reset (23), backwards (24)

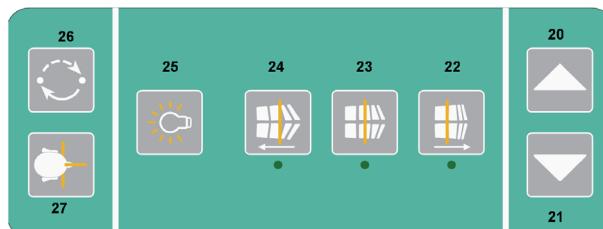


Fig 5.21. Positioning panel, right side. TMJ pointer adjustment keys: forwards (22), reset (23), backwards (24)

- 13 Have the patient gently close the jaws together.
- 14 After patient positioning press start button, wait until the unit stops. Check that the patient positioning is not changed when the rotating unit is moved to its starting position.
- 15 Press and hold the exposure button. The system will cycle exposing only the two TMJ's.
- 16 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer, TMJ chin rest and TMJ angle indicator.
- 17 After the exposure return the system to the standard panoramic program by pressing the cursor keys to move the flashing light to the standard program position. Remove Ortho TMJ accessories.



- 18 Remove disposable covers and disinfect the unit.
- 19 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

5.4 P9: TMJ, posteroanterior projection

- 1 Prepare the equipment per section *Preparation for panoramic image acquisition*.
- 2 Select the imaging program for TMJ, PA projection on the Exposure Control Panel. With OP100 D press the key one time  to move the flashing light from the standard panoramic position **P1** to the TMJ, PA projection position **P9**.

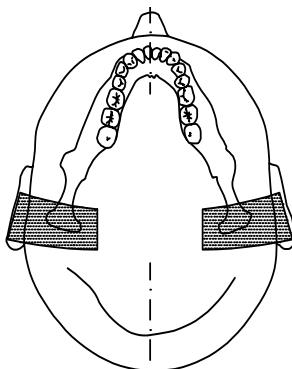


Fig 5.22. P9: Image layer

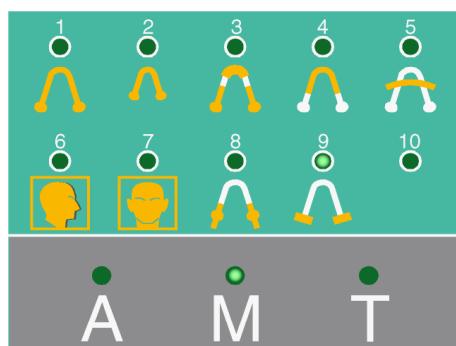


Fig 5.23. P9 & Manual mode

- 3 The system is in the Manual Exposure Control mode. Use technique factors per section TMJ, Lateral projection.
- 4 Press patient positioning button to rotate the rotating unit to the patient positioning position.
- 5 Position the patient as in TMJ, Lateral view and procedure steps through. Move the TMJ pointer 10 mm anterior compared to jaw closed positioning.



Fig 5.24. TMJ PA Projection

- 6 Have the patient open the jaw.
- 7 After patient positioning press start button, wait until the unit stops. Check that the patient positioning is not changed when the rotating unit is moved to its starting position.
- 8 Press and hold the exposure button. The system will cycle and expose only as necessary to display the TMJ's in PA projection.



- 9 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer and TMJ support.
- 10 Return the system to the standard panoramic program.
- 11 Remove disposable covers and disinfect the unit.
- 12 Proceed to the image handling. Refer to the *User Manual for Cliniview software* to get instructions how to use Cliniview software.

6 Cephalometric procedures (optional)

Programs P6 and P7 are cephalometric imaging programs. For cephalometric programs pre-programmed patient symbols or manual exposure values can be used to control the dose.

Image magnification is fixed 14%. Cliniview software compensates this magnification when measurements are made with Cliniview.

Positioning steps demonstrated in this manual are for right-mounted cephalostat. Steps for the left-handed cephalostat are similar otherwise the exception mentioned.

6.1 Preparing the operation

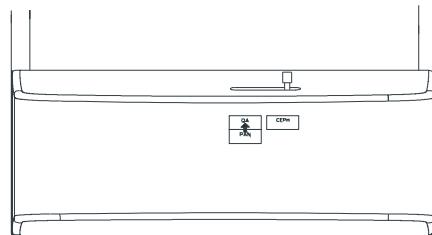
- 1 Set the CCD camera into the cephalo head's camera holder unless it isn't already in place.



WARNING!

The camera must not be dropped or exposed to impacts.

- 2 Turn the power switch to the "I" position. Slide the lever to the right edge selecting the cephalometric collimator in the tube head.



NOTE!

Remove the chin rest from the lower shelf in left handed cephalostat.
(Concerns units up to s/n 79812).

- 3 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc., from the head and neck area. Shadows caused by these opacities may obscure diagnosis.
- 4 Make the computer preparations according to *Cliniview User Manual*.

6.2 P6: Lateral projection

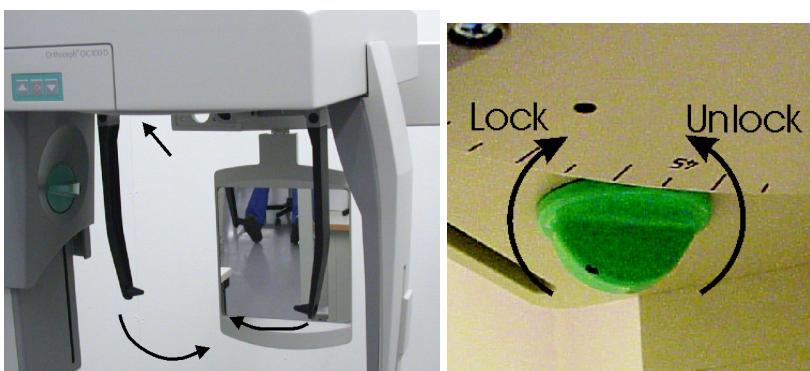
Tilt the nasion support aside. Drive the unit to the patient positioning position by pressing the patient positioning button.



CAUTION!

Make sure that the secondary collimator does not hit the nasion support during the movement.

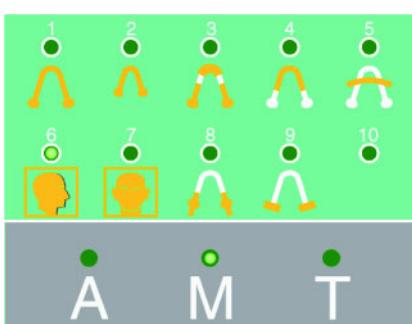
Turn the ear rods to the lateral projection position and lock by turning the handle on the cephalostat head.



NOTE!

Turning the handle 180 degrees alters the state of the ear rods (locked-unlocked) regardless of the turning direction.

Verify that the light under the program 6 (P6) in the control panel is lit.



Insert the optional hygienic covers over the ear rods and the nasion support. Guide the patient under the cephalostat.

Adjust the cephalostat to the proper height and introduce the ear rods to external auditory meatuses.

Switch the laser light on. Position the patient so that the Frankfurt-Horizontal plane (FH) passes over the ear opening and the infra-orbital notch.

**WARNING!**

Do not stare at the laser beam!

Tilt the nasion support down and set it to nasion. OC100 D uses the position information from Nasion support to perform Automatic facial contour by reducing kV and mA exposure values during the scanning.



Select the technique factors manually or use preselected patient symbols.

Verify that "READY" light is on. Press the exposure button to make the exposure.

After the exposure, release the patient by opening the ear rods and guide him/her out. Pay attention that the patient does not hit the secondary slot when stepping out from the cephalostat. Remove the disposables.

6.3 P7: Postero-anterior (PA) projection



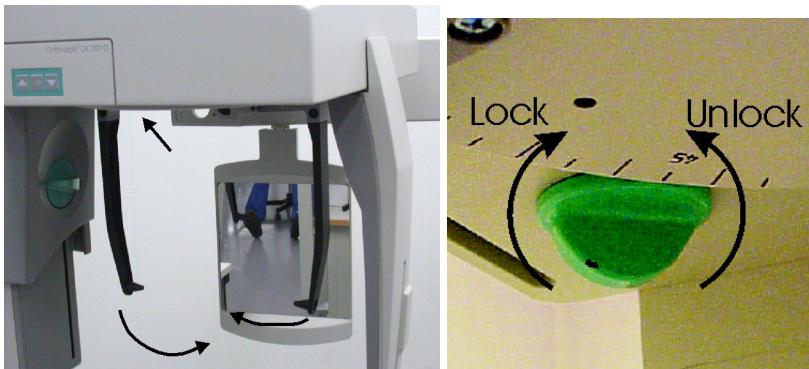
Slide the nasion support aside. Drive the unit to the patient positioning position by pressing the patient positioning button.

**NOTE!**

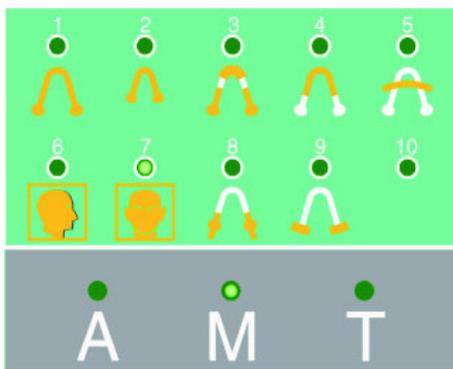
Make sure that the secondary collimator does not hit the nasion support during the movement.

6 Cephalometric procedures (optional)

Turn the ear rods to the PA projection position and lock by turning the handle on the cephalostat head.



Verify that the light under the program 7 (P7) in the control panel is lit.



Insert the optional hygienic covers over the ear rods. Guide the patient under the cephalostat.

Adjust the cephalostat to the proper height and introduce the ear rods to external auditory meatuses.



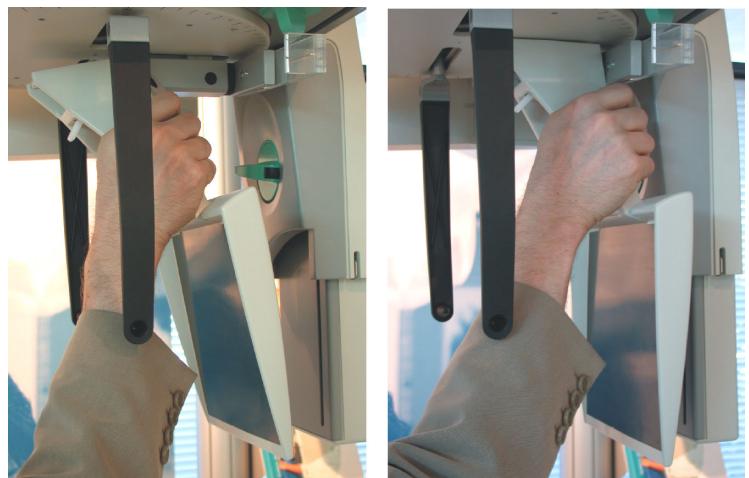
Select the technique factors.

Verify that "READY" light is on. Make the exposure by pressing the exposure button.

After the exposure, release the patient by opening the ear rods and guide him/her out. Pay attention that the patient does not hit the secondary slot when stepping out from the cephalostat. Remove the disposables.

6.4 Using the carpus support

Turn the rotation chassis so that the nasion support is against the cameraholder. Turn the nasion support sideway and fasten the carpus holder to the nasion support holder.



Press the white lever to attach the carpus support tightly.

Ask patient to remove any metal objects and place hand against the carpus holder. Select technique factors manually.

Directive technique factors for carpus imaging		
70 kV	3,2 mA	8sek

Verify that "READY" light is on. Press the exposure button to make the exposure.

6 Cephalometric procedures (optional)

7 Imaging technique

7.1 Automatic exposure control (AEC)

When the OP100 D is turned on, it is set as a default to Standard Panoramic with Automatic Exposure Control. The software will monitor the amount of radiation the CCD camera is receiving and automatically set the exposure factors for proper dose. After the exposure the adjusted values are shown on the display.

The AEC will stay engaged with the other panoramic procedures unless set to manual mode.

The signal to noise ratio can be changed while keeping AEC engaged:

- 1 The signal to noise ratio can be adjusted without disengaging the AEC by resetting the automatic exposure density scale on the Control Panel.

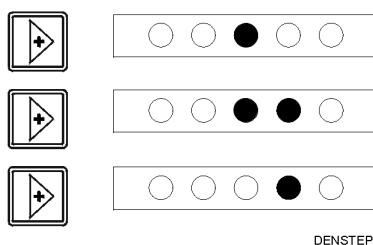


Fig 7.1. AEC density scale

- 2 Press the down key twice to move the flashing light from the standard panoramic position to the central light on the automatic exposure density scale.
- 3 To increase the signal to noise ratio, press the left key to move the flashing light to the right. Each change increases the radiation output by approximately 12 percent.
- 4 To decrease the patient dose, press the cursor key to move the flashing light to the left. Each change decreases the radiation output by approximately 12 percent.



NOTE!

AEC density is controlled in half steps. A half step between two indicators is shown with both indicators lit.

7.2 AEC test

To make sure the Automatic Exposure Control (AEC) works properly the following test can be performed.

Cover the x-ray source with lead. Set the unit to Automatic mode and choose the standard panoramic program. Make an exposure and observe the technique factors. The technique factors should increase to the highest values (85 kV, 12 mA).

Remove the lead from the x-ray source and make the exposure once again. Now the technique factors should decrease to the lowest value (57kV, 2 mA).

7.3 Exposure technique factors

OP100 D has a flexibility to use a variety of exposure technique factors, ranging from 57 kV to 85 kV and from 2 mA to 16 mA. The kV/mA values used depend on OP100 D software settings, ie. constant contrast kV setting defined in Pr 52 CCo and also on line voltage.

In the following charts each "ball" represent a kV/mA pair that can be used with the selected line voltage, with imaging programs P1 to P5 and P8 to P9. Exposure time is fixed with programs P1 to P5 and P8 to P9.

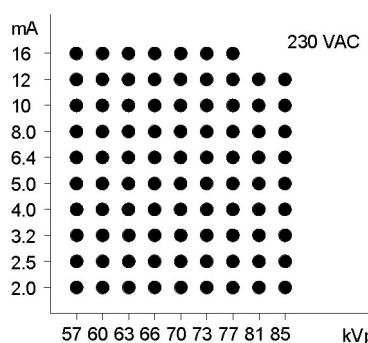


Fig 7.2. Exposure factors with 230

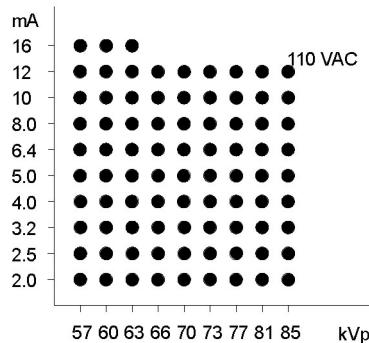


Fig 7.3. Exposure factors with 110

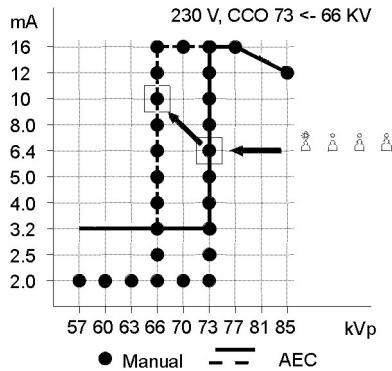


Fig 7.4. Example: When kV is lowered and mA increased, the same radiation output level results

Exposure factors shown on the control panel are automatically selected by the OP100 D software based on settings done during the installation. These settings can be changed. See *OP100 D User Program Manual, Pr 52 CCo* for details.

The following charts show examples of exposure values with different software settings. A "ball" represents a kV/mA value used in Manual mode and a "line" represents kV/mA values which can be selected by the Automatic Exposure Control (AEC).

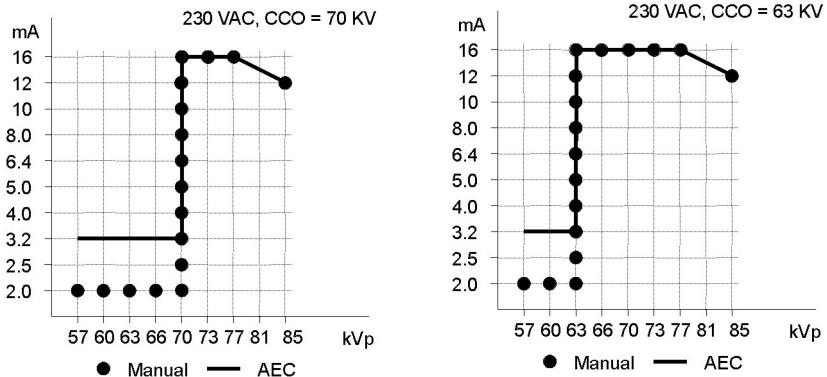


Fig 7.5. Possible exposure values when constant contrast has value of 70kV and supply voltage is 230 VAC.

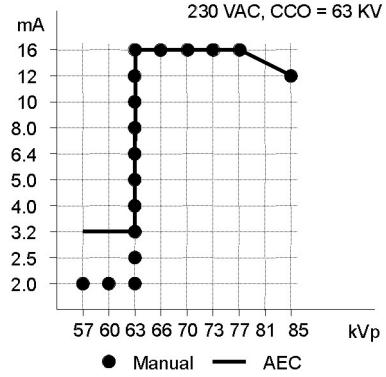


Fig 7.6. Possible exposure values when constant contrast has value of 63kV and supply voltage is 230 VAC.

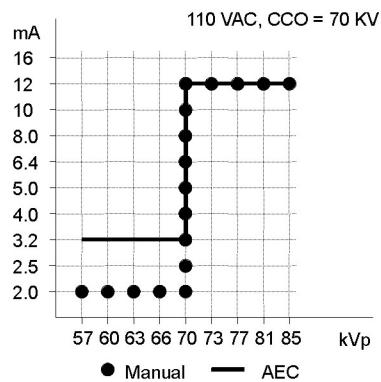


Fig 7.7. Possible exposure values when constant contrast has value of 70kV and supply voltage is 110 VAC.

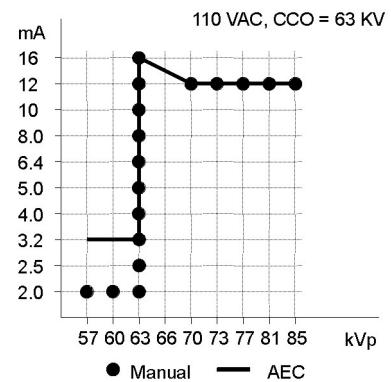


Fig 7.8. Possible exposure values when constant contrast has value of 70kV and supply voltage is 110 VAC.

7.4 Manual mode

If desired, the exposure technique factors can be set manually with the AEC disengaged. The technique factors can be set either by patient size or by specific kV and mA factors.

- To set the unit to manual mode first press the down key once to move the flashing light from the standard panoramic position to the AEC (A) position. Then press the right key once to move the flashing light to manual (M) position.

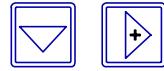
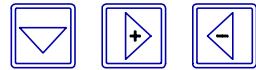


Fig 7.9. Manual mode

- At this time the light over the juvenile of the programmed exposure factor should be lit. To change the programmed exposure, first press the down key 2 times until the flashing light is over the patient size symbol. To raise or lower the setting, press the right or left key.
- To set specific technique factors set the unit to manual mode first, then press the down key once until the flashing light is at the kV and mA section. By pressing the right or left key the displayed value can be increased or decreased.
- Panoramic and Special procedures can use the following technique settings:



Panoramic, TMJ and Sinus Imaging Procedures Technique Factors	
KVp	57 - 60 - 63 - 66 - 70 - 73 - 77 - 81 - 85
MA	2 - 2.5 - 3.2 - 4 - 5 - 6.4 - 8 - 10 - 12 - 16
kVp/mA pairs	57/2 - 85/12 Combined values depend on Pr 52 CCO setting.
Exposure time	8.0 - 17.6s. Fixed for each imaging procedure.



NOTE!

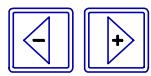
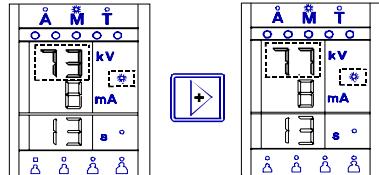
kVp and mA can be selected independently in Manual mode. With this option, kV can be selected in steps of 1 kV. See Service Program Manual, section Sr 89 COP, option 4 FE for details.

- Technique factors for patient size symbols can be programmed for Panoramic and Special procedures. See *User Program Manual*, section Pr52CCo for details.
- These programmed values are for guidance only. Adjust contrast and brightness with Cliniview software when necessary.
- To adjust for optimum image quality select one density setting lower or higher in Automatic Exposure Control and one point higher or lower technique factors in Manual Exposure Control and expose again. Consult your dealer for detailed information.

7.5 Free selection of kV and mA

OP100 D technique factors are normally selected based on kV target level set with the constant contrast program (Pr 52 CCo), where kV and mA values are tied to each other. It is possible to configure OP100 D so that kV and mA are selected Fig 7.10. Free selection of kV values independently in Manual mode.

Please consult your dealer to activate this software option. When activated, this feature has no effect on the AEC mode and on preprogrammed technique factors.



In Manual mode the tube voltage can be selected in steps of 1 kV. When the led indicator for kV/mA values is lit, first kV display is blinking. Select kV value by pressing the right or left key.



NOTE!

Pressing the key longer causes kV to change in larger steps.



Then press the down key; mA display is blinking. Select the mA value.

mA can be selected from the fixed table: 2.0, 2.5, 3.2, 4.0, 5.0, 6.4, 8.0, 10, 12 and 16.

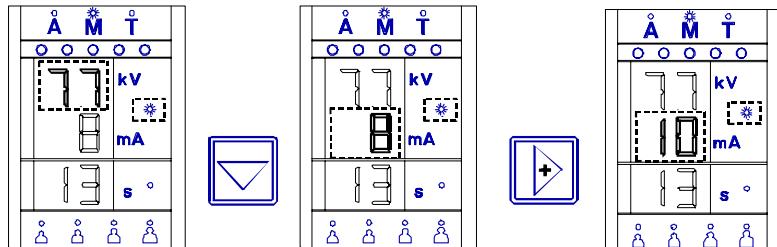


Fig 7.11. Free selection of ma values



NOTE!

If the kV is increased with maximum mA selection, the mA value is automatically decreased when the product of kV * mA exceeds the allowed X-ray tube rating.

7.6 Test mode

The movements of the unit can be performed without radiation. This may be useful for children or uncooperative patients to demonstrate the operation prior to taking the exposure.

- 1 To set the unit to test mode first press the down and right keys to move the flashing light from the standard panoramic position to the AEC (A) position. Then press the right key twice to move the flashing light to the test mode (**T**) position.

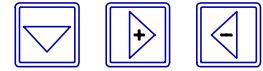


Fig 7.12. Test mode

- 2 The unit will now operate without X-ray emission.
- 3 To return to the AEC (A) mode press the left key twice.



7.7 Measurements from the image

In normal panoramic mode images the vertical dimension must be divided by a factor of 1.3. Horizontal dimensions should not be measured because the horizontal magnification is accurate only in the center of focal trough (1.3 in panoramic and TMJ lateral, 1.8 in TMJ PA) and changes rapidly when moving away from focal trough.



NOTE!

CliniView software corrects automatically the enlargement proportion. Refer to *User Manual for Cliniview software*.



WARNING!

In panoramic images the horizontal and vertical magnifications are the same only in the focal trough. Manufacturer assumes no liability on the accuracy of the measurements from the X-ray image. Angulation of the object being imaged affects on the dimensional accuracy on the image.

8 Special features

8.1 Quality assurance

The Orthopantomograph® OP100 D can produce a self diagnosing image for checking that OP100 D digital system, OP100 D unit, PC hardware with connections and Cliniview software, works properly.

- 1 Remove the bite fork with bite fork rod.
- 2 Set the primary collimator to the QA position (Move the lever to the left and pull up). QA selection is indicated in control panel with lowest kV/mA values (57kV/2mA) and a moving indicators in the AEC density scale.

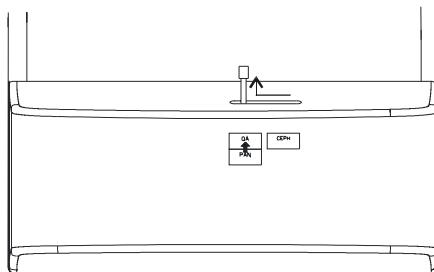
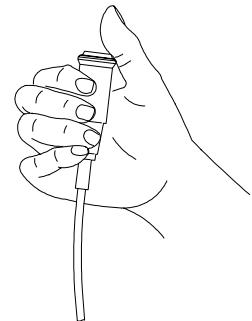


Fig 8.1. OP100 D QA collimator selection

- 3  Press the start button in the patient positioning panel. The rotating unit turns towards the column.
- 4 Computer preparation:
 - Switch on PC.
 - Start Windows software.
 - Start the Cliniview software. Refer to the *User manual for Cliniview software* to get instructions how to use Cliniview software.
 - Select test image patient from the patient database.
 - Press "Take PanImage" button to get ready for an exposure.
- 5 Press and hold the exposure button. The rotating unit will remain stationary while exposure with increasing kVp/mA values.
- 6 QA image appears on the PC display.
- 7 Check that you have 15 blocks in the image and their density is increasing smoothly from light to dark. If you do not have these blocks or the image does not appear on the display change Cliniview contrast default settings. If this doesn't work contact your local dealer.



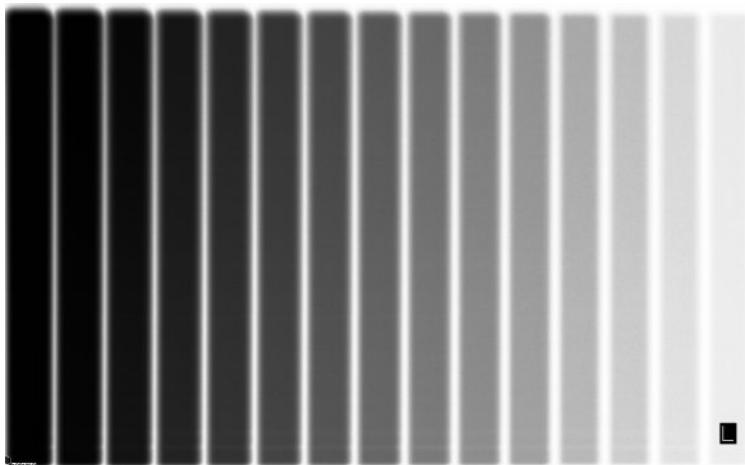


Fig 8.2. QA image

- 8 If everything is as described then the system is working properly.
- 9 Set the primary collimator back to the panoramic position and insert the bite block.
- 10 Perform the test if you suspect there is something wrong with your images.

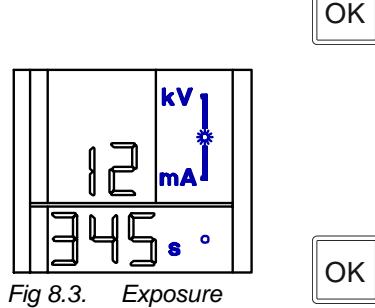
8.2 Exposure counter

The total number of exposures the system has taken is automatically counted and can be read any time.

Turn the OP100 D power on, and wait until the normal display appears. Make sure that one of the programs **P1-P9** is selected.

Press the OK key.

Several numbers will be displayed on the Control panel and other indicators will be turned off.



Numbers will be shown for few seconds or until the OK key is released.

Fig 8.3. Exposure counter

The total number of exposures is read from top to bottom. The example above is **12 345** exposures.

Resume to normal operation.

8.3 Preventive maintenance reminder

The exposure counter also provides a means of reminding when maintenance is due. After every 2000 exposures a special reminder message, "Ch 8 PSE", will be displayed for few seconds when the power is switched on.

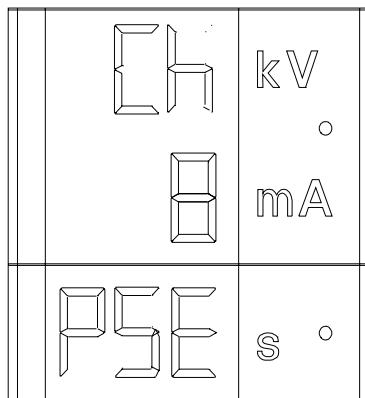


Fig 8.4. Preventive maintenance reminder

This message indicates that the user should contact the dealer for the scheduled maintenance. We recommend that this unit will be provided for regular service for best performance and reliable operation. Refer to chapter *Maintenance* of this manual for details.

The message display does not affect the equipment operation. It will be reset during the maintenance service procedure, or it can be reset by the user.

9 Understanding the OP100 D image

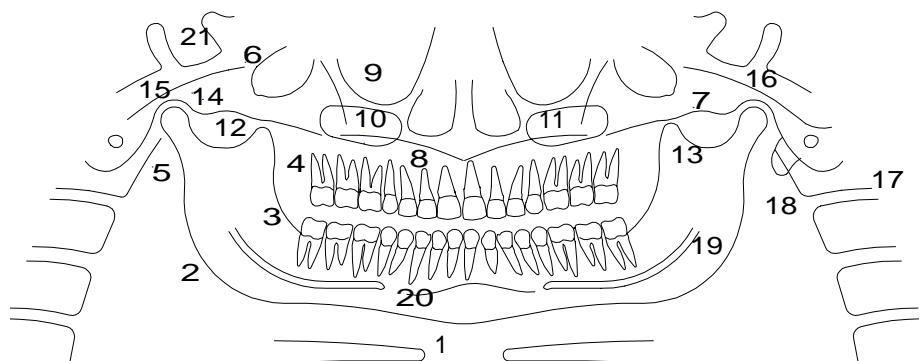


Fig 9.1. Drawing of OP100 D radiograph with anatomical landmarks and structures

Typical OP100 D radiograph with anatomical landmarks and structures.

- 1 **hyoid bone**
- 2 **angle of mandible**
- 3 **external oblique line**
- 4 **maxillary tuberosity**
- 5 **styloid process**
- 6 **middle cranial fossa**
- 7 **zygomatic arch**
- 8 **palate**
- 9 **orbit**
- 10 **septa in maxillary sinus**
- 11 **maxillary sinus**
- 12 **pterygoid plates**
- 13 **coronoid process**
- 14 **articular eminence**
- 15 **mandibular condyle**
- 16 **glenoid fossa**
- 17 **vertebra**
- 18 **ear lobe**
- 19 **mandibular canal**
- 20 **mental foramen**
- 21 **Sella Turcica**

10 Failure diagnostics

The OP100 D has many safety functions and features assuring the safe operation of the equipment. In the event of certain user failures or system malfunction the unit will not produce x-rays and a failure code will be displayed on the Control Panel.

10.1 Failure messages

In case of malfunction, the unit displays a failure message. Various letters and numbers will be displayed in the technique factors display positions next to kV, mA and s, eg. **Ch 6 POS**. Failure code classification is displayed next to kV. A special 2-digit failure code number is displayed next to mA.

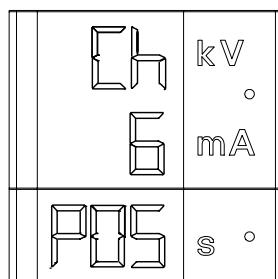


Fig 10.1. Failure message

10.2 kV display

The kV-display indicates the nature of the failure, whether it is caused by user (eg. exposure button prematurely released by operator), environment (eg. low line voltage) or protection in the unit (eg. tubehead too hot), or whether there is a serious defect in the unit, which disables the complete operation (eg. program memory error):

Ch	Check. A failure caused by the user (eg. exposure button prematurely released by operator).
Sy	Safety. Temporary malfunction or protection in the unit, caused by the unit or environment. Operation is prohibited or terminated to protect the operator, patient and the unit itself. (Eg. the temperature in the tube head assembly is too high due to intensive use). After the corrective action, unit can be used.
Er	Error. There is a serious defect in the unit, and the operation is therefore prohibited to protect the operator, patient and the unit itself. (Eg. failure in the CPU Board).



WARNING!

If the unit is further used, "er" failure may cause malfunction.

10.3 mA display

The mA-display indicates the actual numeric failure code by two-digit number. Each failure code has a unique number, to differ one malfunction from another:

kV	Ch	Sy	Er
mA	1 to 9	20 to 31	40 to 45

10.4 Time display

The exposure time display indicates the alphanumeric short form explanation of the malfunction. This reminds the user or the serviceman of what the actual numeric failure code means, or sometimes numeric information of the malfunction. The display may also blink telling more information about the fault, for example in Sy 20 where blinking display also tells the waiting time for tube head cooling.

kV	Time display
Ch-failure	PC, COL, POS, rEL, PSE, rEo, or numbers
Sy-failure	HHo, ArC, Inu, FIL, AEC, EEP, Por, CCD, PoL, PoH, PoU, or numbers
Er-failure	CPU, FIL, InP

10.5 Resetting failure

Ch failure codes can be reset by correcting the reason for the failure code. **Ch** and **Sy** failures can be reset by pushing any key in the control panel or in the patient positioning panel. If **Sy** failure appears repeatedly call your local dealer. Exception is **Sy** 20 failure which appears when the tube head is too hot and you have to wait for cooling. This is normal operation if you are exposing a lot and in warm places.

Er failures can not be reset. Switch the unit off and on, to test whether the failure was only temporary.



Fig 10.2. Patient positioning panel

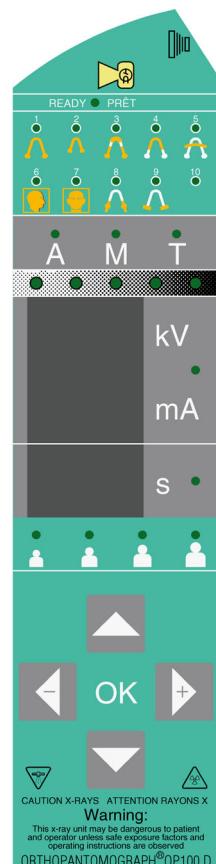


Fig 10.3. Control panel

10.6 Multiple failure codes

In the case of multiple errors press "OK" key to display other failure codes.

Check	Interpretation
Ch 1 PC	PC SYSTEM: System not ready for an exposure.
Ch 3 COL	COLLIMATOR: Collimator not in right position
Ch 5 ***	LINE VOLTAGE: Line voltage out of limits - Approximate line voltage (***) displayed in s-display
Ch 6 POS	POSITION: System not in Start position, - Start button not pressed prior to QA procedure or - Collimator in QA position when taking a panoramic exposure
Ch 7 rEL	EXPOSURE SWITCH: Exposure button prematurely released by operator - Blinking display tells also exposure time (***) in s-display
Ch 8 PSE	PREVENTATIVE SERVICE: Preventative service reminder after 2000 exposures
Ch 9 rEo	REMOTE EXPOSURE: Exposure was initiated from control panel, while remote exposure has been selected.

All error messages are explained in detail on *OP100 D & OC100D Troubleshooting Manual*.

PCI board LED:s (H1 is uppermost H5 is lowermost)

H1:	LINK_OK	Light is lit when link is OK.
H2:	EPROM FAILURE (red)	Light is lit when there is an EPROM failure
H3:	+3.3V	Light is lit when +3.3V.
H4:	+5V	Light is lit when +5V.
H5:	LOCAL RESET (red)	Light is lit when RESET.

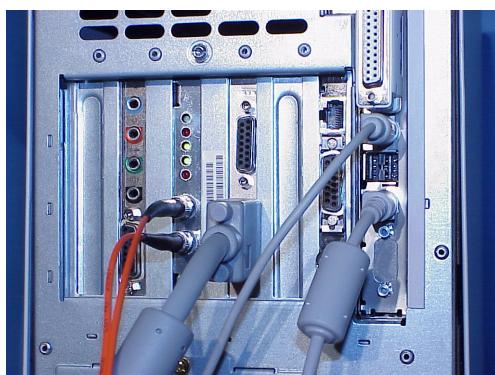


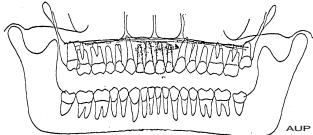
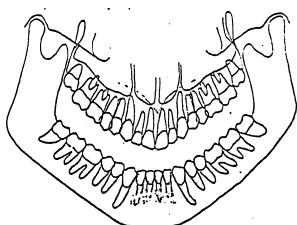
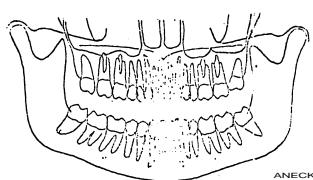
Fig 10.4. PCI board LED:s

11 Diagnosing image quality problems

High quality images with sharp contrast and good detail present optimum diagnostic information. Images with less quality are usually the result of one or more common problems, which are discussed here.

11.1 Patient positioning

Problem	Possible Cause	Remedy
Incisors and canines narrow and unsharp. Overshadow in molar and premo-lar areas. Rows of teeth are compressed.	1 Occlusal correction of focal trough set too far posterior 2 Image layer light not obeyed 3 Bite block was not used	1 Check patient positioning with light lines and occlusion correction buttons 2 Check patient positioning with light lines and occlusion correction buttons 3 Insert bite block
Incisors and canines wide and unsharp. Rows of teeth widened.	1 Occlusal correction of focal trough set too far anterior 2 Image layer light not obeyed 3 Bite block was not used	1 Check patient positioning with light lines and occlusion correction buttons 2 Check patient positioning with light lines and occlusion correction buttons 3 Insert bite block
Teeth appear wider on one side and narrower on the op-posite. Ramus widths are different on opposite sides.	1 Midsagittal line not obeyed 2 Patient's head not in center position	1 Check patient's mid sagittal plane with light line 2 Check that patient's head is centered

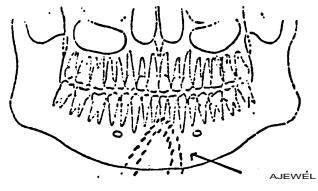
Problem	Possible Cause	Remedy
The shadow of hard palate is exposed over maxillary molars. Row of teeth has a wavy appearance. TM joints are exposed outward. Image is not "smiling". Mandible is imaged sharper than maxilla.	Patient head tilted back	Check FH plane
		
Rows of teeth curved upwards. Mandibular incisors are unsharp. TMJ joints exposed high and are often cut off from the image. Image is "smiling" too much.	Patient head tilted forward	Check FH plane
		
Middle area of the image too bright and unsharp. Spine shadow.	1 Patient's neck was not stretched 2 kV compensation not used or LOW compensation was used with heavy adult patient	1 Stretch patient's neck 2 Enable or increase kV compensation
		
Rows of teeth overexposed.	Tongue was not against the roof of palate.	Ask patient to swallow and place tongue against the roof of palate.

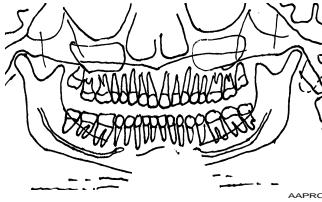
Problem	Possible Cause	Remedy
TMJ's exposed on different heights on image. Bilateral distortion in molar and premolar regions.	1 Patient tilted to one side 2 Midsagittal light line not obeyed.	1 Check midsagittal plane and center patient's head. 2 Check midsagittal plane and center patient's head.
Rows of teeth exposed too high. TMJ's cut off.	1 Chin was not resting on chin support 2 Patient positioned too high	1 Check patient positioning and type of bite fork rod. 2 Check patient positioning and type of bite fork rod.
Rows of teeth exposed too low. Mandible not exposed completely to the image.	Chin rest was not used with bite fork.	Install chin rest.

11.2 Image brightness & contrast

Problem	Possible cause	Remedy
Images are too light	1 ClinView: Contrast and brightness not optimum	1 Adjust contrast and brightness.
Images are too dark	1 ClinView: Contrast and brightness not optimum. 2 Density setting is too high in Pr52CCo when patient symbols are used. 3 Manual technique factors used too high. 4 AEC control misadjusted.	1 Adjust contrast and density. 2 Adjust density setting to a lower value. 3 Decrease technique factors. 4 Call service.
Lack of image contrast	1 ClinView: Contrast and brightness not optimum. 2 kV used is too high.	3 Adjust contrast and brightness. 4 Lower the kV setting. See Pr52 CCo (User program manual) for details.

11.3 Artefacts

Problem	Possible cause	Remedy
Irregular, bright shadows or artefacts	 Patient is wearing metal objects, such as earrings, necklace etc.	Ask patient to remove objects.

Problem	Possible cause	Remedy
An unexposed area is shown down in the lower middle section of the image.	Lead apron misplaced.	Check the lead apron positioning.
		
Partial lack of detail and motion artefacts. Irregular vertical bright lines on image.	Patient has moved during the exposure.	Retake the image.
Vertical dark lines on image.	Patient's shoulder in touch with machine parts.	Check patient positioning.
One side of the image unexposed.	Exposure button released prematurely.	Retake the image.
Right and left image sides are unexposed. TMJ's are not shown.	Orthogonal procedure was mistakenly used.	Select correct panoramic procedure.
QA: Light horizontal line on image.	Bite block was left on place.	Remove the bite block.
Horizontal lines on image.	CCD camera problem.	Consult the dealer.
CEPH: Unexposed rectangular on the image.	Ceph collimator not correctly selected.	Select correct collimation.
CEPH: Lateral view has 2 ear holder pins.	1 Cephalostat lock not locked 2 Ear holders misaligned	1 Lock it 2 Call service

11.4 Unit operation

Problem	Possible cause	Remedy
READY not lit.	1 Unit is not ready for exposure 2 PC is not ready for exposure 3 System is not ready for exposure	1 Check the program selection and CCD camera. If the unit still not ready, momentarily press exposure button: Failure message will be displayed. Make the corrective measures 2 Start PC and CliniView software. Press take Pan Image button. 3 Check that the fibre optic cables are connected.
Patient's back head is touching the x-ray tube during the exposure.	1 Patient's head inclination not correct 2 Patient is too big for the unit. 3 Patient has slumped.	If the image is not acceptable then 1 Check the head position and retake the image. 2 Check the patient positioning. Make the exposure even though the head may touch the tube head. 3 Check the patient positioning. Make the exposure even though the head may touch the tube head.
Patient's shoulders are touching the x-ray tube or CCD camera.	Patient is too big for the unit. Wide shoulders.	Reverse patient's hands on handles: left to right side handle and vice versa.

12 User's statement

Instructions for the use of the Orthopantomograph® OP100 D and precautionary statements are part of the OP100 D User Manual.

Radiation leakage technique factors

The maximum-rated peak tube potential is 85 kVp with the maximum rated continuous tube current of 1.5 mA. 1.5 mA is the equivalent maximum rated continuous tube current for 12 mA with a duty cycle of 1:7. Duty cycle is automatically calculated by the software so that the next exposure does not exceed the anode thermal capacity. The equation used by the software is

$$\text{mA*s*kVp} = \text{Initial heat capacity [J]} + \text{Anode cooling rate [J/s]} * 3600 \text{ [s]}$$

where:

mA*s*kVp = Maximum energy input during one hour

Initial heat capacity = 28000 Joules [J] for tube type D-051S

Anode cooling rate = 120 Joules/s [J/s] for tube type D-051S

3600 = 1 hour observation time [s]

Beam limiting device / tube housing assembly compatibility

The tube housing assembly THA 100 is compatible with the beam limiting device BDP138 or BDC184.

Equipment statement for tube housing assembly

Maximum operating voltage is 85 kVp. Effective focal spot 0.5 mm (IEC 336/1982).

X-ray tube: Toshiba D-051S. For additional information please refer to the tube specification sheets.

Maximum deviation from indicated values

Parameter	Indicated value	Deviation
Tube voltage	57 - 85 kVp	± 5 kVp
Tube current	2 - 16 mA	$\pm 1\text{mA}$ or 15%, whichever is larger
Exposure time (pan)	16.8 - 17.6 s	± 0.1 s or 15%, whichever is larger
Exposure time (TMJ, Sinus)	8 - 15.6 s	± 0.1 s or 15%, whichever is larger
Exposure time (cephalometric)	8 - 20 s	± 0.1 s or 15%, whichever is larger

Power supply requirements

Rated nominal voltage 110 / 230 VAC, 50/60 Hz single phase. Line voltage ranges are 99 - 121 VAC and 207 - 253 VAC. Automatic regulation for all voltages within the line voltage range.

Maximum line current

With 110 VAC power supply systems maximum line current during the exposure is 15 A, at stand-by maximum 1A. The system line fuses are 15 A slow blow type.

With 230 VAC power supply systems the maximum line current during the exposure is 10 A, at stand by maximum 1 A. The system line fuses are 10 A slow blow type.

General output rating and duty cycle

The following charts represent technique factors that can be used with the selected line voltage. One of the three technique factors is always fixed. Panoramic and Special procedures use fixed exposure time.

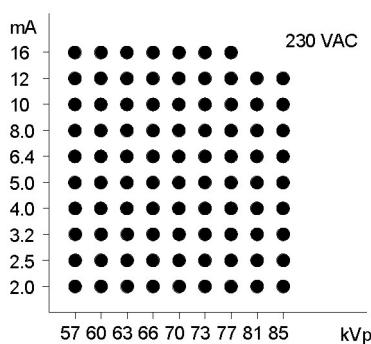


Fig 12.1. Possible technique factors with 230 VAC

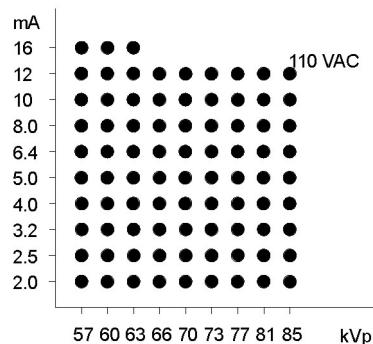


Fig 12.2. Possible technique factors with 110 VAC

Exposures are automatically limited during duty cycle cooling times, minimum of 15 s.

Maintenance

To keep the equipment in compliance with the DHHS Performance Standard the following maintenance schedule shall be observed:

Up to 40 exposures per week, perform maintenance every 12 months. At 40 - 100 exposures per week, perform maintenance every 6 months. Refer to the chapter *Maintenance* of this manual for details.

Tube ratings

Maximum rating chart

Multi-Peak Full Wave rectified

(HF Inverter System)

Focal spot: 0.5 mm (IEC 336/1982)

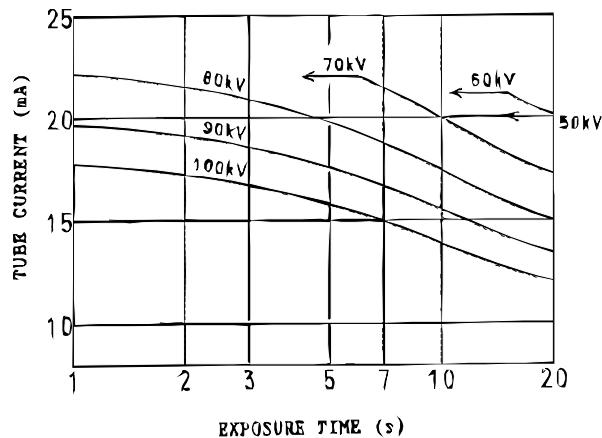


Fig 12.3. Tube ratings

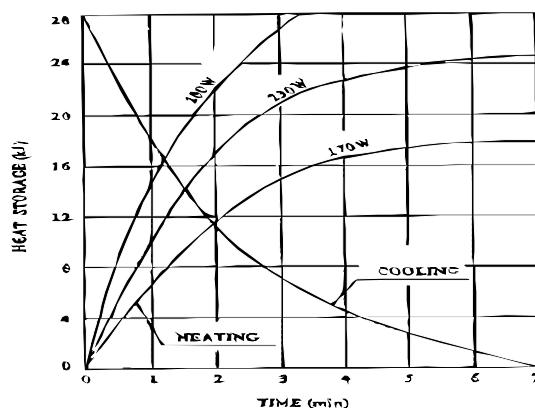
Tube anode thermal characteristics (D-051s)

Fig 12.4. Tube anode thermal characteristics (D-051S)

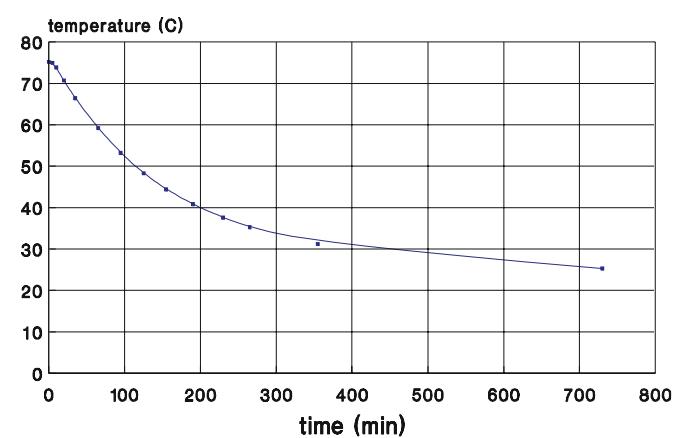
Tube head assembly cooling curve**OP100D TUBEHEAD COOLING CURVE**

Fig 12.5. Tube head assembly cooling curve

060293/PJ

Location of a focal spot is marked on the tube head's cover.

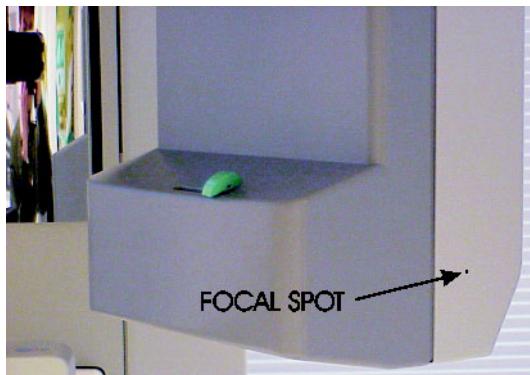


Fig 12.6. Focal spot

Measurement criteria for exposure time

Exposure time

Consists of beginning and ending points as measured by a calibrated x-ray monitor at 70% of the peak radiation waveform

kV

The high voltage mean value received after measurement with a calibrated x-ray monitor

mAs

The resistance value divided by voltage. A calibrated x-ray monitor measures the voltage over feedback resistor and provides a mAs value.

The nominal x-ray voltage 85 kV is obtained at highest tube current 12 mA.

The nominal tube current 16 mA is obtained at the highest tube voltage 77 kV.

The highest electric power is obtained at 77 kV tube voltage and 16 mA tube current.

The nominal electric power of 1232 W is obtained when loading time is 0.1s and nominal x-ray tube voltage 77 kV is used.

We reserve the rights for technical changes at any time.

13 Technical specifications

Manufacturer:	Instrumentarium Imaging P.O. Box 20, FIN-04301 Tuusula, FINLAND
Quality system:	In accordance with ISO 9001 standard
Environmental management system:	In accordance with ISO 14001 standard
Electrical & mechanical safety:	According to IEC 601-1, UL and C-UL (File E218408) CE models marked according to the Medical Device Directive 93/42/EEC

Product name:	ORTHOPANTOMOGRAPH® ORTHOCEPH®
Model:	OP100 D OC100 D
Product type:	Digital Panoramic X-ray Unit Digital Panoramic X-ray Unit with Cephalostat

Unit data	
Class	I
Type	B
Protection	IP-20
Operation	Continuous operation with intermittent loading
Power supply	Mains plug connection
High voltage	DC
Software version with AEC	1.4.15 or higher

Tube head assembly	
Tube head assembly type	THA 100
Tube type	Toshiba D-051S, Stationary anode
Tube voltage	57 - 85 kV
Max. tube current	2 - 16 mA
Max. electric output	1,36 kW

Tube head assembly	
Target angle	5 degrees
Focal spot	0,5 mm (IEC 336/1982)
Nominal anode input power	1750 W
Reference axis	In the middle of the panoramic sensor's active area
Max. anode heat content	28 kJ
Max. X-ray tube assembly heat content	385 kJ
Max. continuous heat dissipation of the X-ray tube assembly	38 W
Total filtration	2,5 mm Al
Leakage Technique Factors	85 kV /1.5 mA

Electrical connections	
Nominal mains voltage	110 / 230 VAC +/- 10% Automatic mains voltage compensation
Input power frequency	50 / 60 Hz
Nominal current	10A @ 230 VAC, 15A @ 110 VAC
Fuses	326 Littelfuse (slow blow) 10A @ 230 VAC, MDA-15 COOPER BUSSMAN (Time delay) 15A @ 110 VAC
Power consumption	2.3 kVA @ 230 VAC, 1.65 kVA @ 110 VAC
Maximum impedance of main	1,0 Ω

Positioning lights	
Panoramic, TMJ & Maxillary Sinus Programs	Tungsten halogen

Positioning lights	
Cephalostat FH laser light	Class I Warning symbols are placed next to the lights and the label describing the laser classification is placed inside the carriage side cabinet. USA / Canada models have different types of laser stickers according to local requirements.
	EN 60825-1/A2:2001 (IEC 60825-1 Ed.1.1, 2001-08)

X-ray generator	
Nominal power	1,2 kW
Tube voltage	57 - 85 kV
Tube current	2 - 16 mA
Supply frequency	75 - 150 kHz
Spine compensation	0 to 8 kV increment max. 85kV
Spine compensation mode	Automatic (ASC), Pre-programmed

User interface	
Program and technique factors selection, exposure control	Control panel, removable Auxiliary exposure button with 10m cable* Note: * optional in USA/Canada
Patient positioning	Positioning panel, integrated
Connection to PC	Optical link
Connection cable (OP100 D - PC)	Optical fibre 10m or 20m

Panoramic programs & technique factors:	
Standard Adult Panoramic (Program 1)	57-85kV / 2-16mA / 17.6 s
Pediatric Panoramic (P2)	57-85kV / 2-16mA / 16.8 s
Ortho Zone (P3) Wide Layer Panoramic (P3 optional)	57-85kV / 2-16mA / 17.0 s 57-85kV / 2-16mA / 17.4 s
Orthogonal Panoramic (P4)	57-85kV / 2-16mA / 16.8 s

Panoramic programs & technique factors:	
Maxillary Sinus (P5)	57-85kV / 2-16mA / 15.6 s
TMJ lateral 2 views (P8)	57-85kV / 2-16mA / 10.8 s
Ortho TMJ (P8 optional)	57-85kV / 2-16mA / 10.8 s
TMJ PA, 2 views (P9)	57-85kV / 2-16mA / 8.0 s
Quality Assurance QA (P0)	57kV/2mA -85kV / 8mA, 12.7 s, 15 values
Exposure Control	Automatic Exposure Control (AEC) (P1-P4) Pre-programmed icons for all programs Automatic Spine Compensation

Cephalometric programs & technique factors:	
Lateral view (P6)	60-85kV / 3.2-16mA / 8-20 s
PA/AP, facial and oblique views (P7)	60-85kV / 3.2-16mA / 8-20 s
Carpus View (P7)	60-85kV / 3.2-16mA / 8-20 s
Exposure Control	Automatic soft tissue adjustment through manual nasion setting, Automatic Facial Contour (AFC) Pre-programmed icons for all programs.
Magnification factor	1.14

Image storing and retrieving:	
File formats	Standard 8-bit (.png) Enhanced 16-bit (.d32) Compressed (.jpg)
Typical panoramic file size	1.6 MB in "png" format 9.2 MB in "d32" format 0.5 MB in "jpg" format
Typical cephalometric file size	2.4 MB in "png" format 11.8 MB in "d32" format 0.8 MB in "jpg" format
Patient database	Standalone workstation Server on local area network (LAN)
Communication standards	DICOM 3.0(By merge) print, storage, import/export, patient worklist- with optional Cliniview DICOM version.

Panoramic patient positioning	
Operation	Left or right side of unit Motorised carriage movement
Positioning aids	Chin rest, bite block, 3-point headrest Curved mirror, 3 tungsten halogen positioning lights, Occlusion correction buttons

Cephalostat patient positioning	
Operation	Arm mounts on left or right side of the unit Interlocked pan/ceph CCD camera Motorised carriage keys at cephalostat head assembly. Lock for ear positioner rotation movement
Positioning aids	Ear holders, Nasion support with vertical mm scale, Frankfurt horizontal plane laser light, Contact plate (Carpus view) and Patient positioning mirror in left handed cephalostat

Cephalostat scanning	
Scanning method	Horizontal scan, synchronized CCD camera and secondary slot motion
Scanning time	8 - 20 s.

Panoramic image receptor	
Camera unit	Pan camera or interchangeable pan/ ceph camera
Technology	Charged Couple Device (CCD)
Image pixel size	96 x 96 μm^2
Image field height	5.4 inches / 138 mm / 1440 pixels
Resolution	Pan: 5.5 LP/mm
Data transmission	Fibreoptic cable Transmission speed 160 MBps

Cephalometric image receptor	
Camera unit	Separate ceph camera or interchangeable pan/ceph camera
Technology	Charged Couple Device (CCD)
Image pixel size	96 x 96 μm^2
Image field height	7.5 inches / 190 mm / 1980 pixels
Image field width in lateral view	10.2 inches / 260 mm, maximum
Image field width in PA view	7.9 inches / 200 mm
Resolution	5 LP/mm (cephalometric)
Data transmission	Fibreoptic cable Transmission speed 160 MBps

OP100 D physical measures:	
source-image distance (SID)	19.2 inches / 487 mm (Panoramic)
Installation	Standard wall mount with $\pm 45^\circ$ angled joint, Optional base for free standing unit
Magnification	30% nominal in panoramic and lateral TMJ procedures 80% nominal in PA TMJ procedure
Height x Width x Depth (inches/mm)	87.3 x 32.7 x 39.4 inches -Max. 2225 x 830 x 1000 (standard column) - 84.0 x 32.7 x 39.4 inches -Max. 2135 x 830 x 1000 (short column option)
Weight	175 kg / 385 lbs. (Panoramic)

OC100 D physical measures:	
source-image distance (SID)	68.7 inches / 1745 mm
source-object distance (SOD)	60 inches / 1524 mm
Magnification	14% nominal in cephalometric procedures

OC100 D physical measures:	
Installation	Standard wall mount with 45° angled joint, Optional base for free standing unit
Height x Width x Depth (inches/mm)	87.6 x 74.8 x 39.4 inches-Max. 2225 x 1900 x 1000 (standard column)-84.0 x 74.8 x 39.4 inches-Max. 2135 x 1900 x 1000 (short column option)
Weight	210 kg / 465 lbs. (Cephalometric)

Ambient temperatures:	
Transportation and Storage	-10°...+50°C
Operation Temperature	+10°...+40°C, RH max. 95%

Recommended computer system:	
Platform	Pentium II® PC or equivalent
Processor	700MHz or higher
Hard disk	20GB HDD minimum
CD-ROM	32X CD-ROM minimum
Operating system	Windows® 2000 Windows® XP
Main memory (RAM)	256 MB
Display graphics	SVGA, 1024x768, 16.7M colors (24-bit), graphics card 4 MB minimum
Color monitor size	17" or larger (15" minimum)
PCI board connection	PCI slot
Back-up	CDR DAT Iomega® Jaz® MOD

Customized model OP100D

Patient positioning (Please specify)	
Options	Description
LL	Controls on the left side of the unit. Left side operator's view for panoramic patient positioning. Cephalostat arm on the left. Controls and ceph arm can be reversed any later date.

Patient positioning (Please specify)	
RR	Controls on the right side of the unit. Right side operator's view for panoramic patient positioning. Cephalostat arm on the right. Controls and ceph arm can be reversed any later date.
LR	Controls on the left side of unit. Left side operator's view for panoramic patient positioning. Cephalostat arm on the right. Controls and ceph arm can be reversed any later date.
RL	Controls on the right side of unit. Right side operator's view for panoramic patient positioning. Cephalostat arm on the left. Controls and ceph arm can be reversed any later date.

Program options (Ordered separately)	
Options	Description
Ortho TMJ	Axial corrected TMJ software. Replaces lateral TMJ program (P8)

Ceph ready option (Ordered separately)	
Options	Description
Ceph CCD camera with OP100 D	Unit has the same CCD camera as ceph unit. Cost saving with future digital ceph upgrade.

Installation options for OP100 D (Ordered separately)	
Options	Description
Short column	9 cm shorter column. Allows low ceiling siting.
Cooling Fan Kit	For heavy-duty users (more than 50 OP100 D images a day) or for sites with high ambient temperature
OP100 D Base plate	Base for OP100 D. Free standing installation for pan
Universal base plate	Flat steel plate base. Free standing installation. OP100 D and OC100 D.

Field upgrades for model OP100 D	
Upgrade	Description
Digital Cephalostat Kit	Add digital ceph imaging to OP100 D digital pan
Ortho TMJ software Kit	Axial corrected TMJ software replaces lateral TMJ program P8

14 Maintenance

This unit is designed to provide reliable performance and many years of customer satisfaction. In order to assure safe performance of this X-ray equipment, a preventative maintenance program must be established. It is the owner's responsibility to supply or arrange for this service. Consult your Orthopantomograph® dealer to arrange for this service.

Maintenance Schedule

Maintenance service for Orthopantomograph® OP100 D is suggested at installation and after each 2000 exposures. This periodic maintenance is outlined in *OP100 D Service Manual Maintenance*.

These maintenance procedures require the services of a qualified technician. In addition to periodic maintenance any deviation from normal performance should be immediately reported to your dealer.



WARNING!

Only trained and qualified personnel should be permitted access to the internal parts of the equipment.

Monthly Inspection by User

The user must perform monthly the following inspections:

- Visually check that all visible labels are intact and legible
- Visually check that the exposure indicator light is lit for the duration of exposure
- Confirm that the audible indicator sounds for the duration of the exposure
- Check that exposure button must be kept pressed continuously during the exposure cycle
- Check that exposure terminates and an error code is displayed when prematurely releasing the exposure button
- Check all the functions of the control panel and the positioning panel

Preventive Reminder

The equipment has a special feature that displays a message "Ch 8 PSE" on time display after every 2000 exposures. See *OP100 D User Program Manual* for details.



NOTE!

Wiring diagrams, schematics and other documents, which are needed when the unit is repaired, will be supplied by request.

For more than 100 years, healthcare providers worldwide have relied on GE Healthcare for medical technology, services and productivity solutions.

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