PLANMECA

Planmeca Proline EC panoramic



USER'S MANUAL

Publication number 688043 **En**
Version 20
Published 2005-08

1 INTRODUCTION 1
2 SYMBOLS 2
3 WARNINGS AND PRECAUTIONS 3
4 CHECKLIST - BEFORE USING THE UNIT 4
5 PM PROLINE EC PANORAMIC X-RAY - MAIN PARTS 5
6 CONTROL PANEL - KEYS AND DISPLAYS 8
7 PREPARATIONS FOR THE EXPOSURE 13
7.1 Switching the unit on 13
7.2 Loading the cassette 13
7.3 Preparing the patient 15
8 PANORAMIC EXPOSURE 17
9 TEMPOROMANDIBULAR JOINT EXPOSURE (P10) 22
9.1 First exposure - jaw closed 23
9.2 Second exposure - jaw open 26
9.3 Exiting the TMJ exposure mode 27
10 SINUS PROGRAM (P20) 28
11 ADDITIONAL FUNCTIONS 31
11.1 Vertical sector selection 31
11.2 Automatic cassette carriage return 31
11.3 Setting the clock 32
11.4 Automatic closing of the temple supports 33
11.5 Adjusting the tone of the exposure warning signal 33
11.6 Recalling previous exposure settings 34
11.7 Quick exposure settings 34
12 AUTOMATIC EXPOSURE CONTROL (AEC) (OPTIONAL) 36
13 PANORAMIC SCALE 39
14 TROUBLESHOOTING 40
14.1 Help messages 40
14.2 Error codes 40
14.3 Cooling time 44
15 CLEANING 44
16 SERVICE 44
17 DISPOSAL OF THE UNIT 45
18 TECHNICAL SPECIFICATIONS 46
19 USER'S STATEMENT FOR PLANMECA PROLINE EC PANORAMIC X-RAY 48

The manufacturer, assembler, and importer are responsible for the safety, reliability and performance of the unit only if:

- installation, calibration, modification and repairs are carried out by qualified authorized personnel
- electrical installations are carried out according to the appropriate requirements such as IEC364
- equipment is used according to the operating instructions

Planmeca pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice.

COPYRIGHT PLANMECA 2005-08

PUBLICATION PART NUMBER 688043 Revision 20

1 INTRODUCTION

The Planmeca Proline EC X-ray unit uses panoramic and cephalometric techniques to produce X-ray images for the diagnosis of dentomaxillofacial anatomy. The unit is allowed to be used only under supervision of a dental/health care professional.

This manual describes how to operate the Planmeca Proline EC Panoramic X-ray unit. Please read these instructions thoroughly before using the unit.

CE 0537

Planmeca Proline EC panoramic X-ray fulfills the requirements of Directive 93/42/EEC.

NOTE ***This manual is valid for software revisions: PK 6.50 or later and PG 6.50 or later.***

CAUTION ***This X-ray unit may be dangerous to both patient and operator unless safe exposure values are used and correct operating procedures are observed.***

CAUTION ***Federal law restricts this device to sale by or on the order of a dentist.***



All key illustrations indicate that the key should be pressed or, where indicated, pressed and held down. Pressing a key will either switch a function on or off, depending on the original setting, or change the value.



The display values shown in this guide are only examples and should not be interpreted as recommended values unless otherwise stated.

The exposure values given in these instructions are based on Kodak Ektavision green sensitive film and Kodak Ektavision screens. If you are using a different film and screen combination you may have to use different exposure values.

The exposure values required to produce good X-ray images will vary considerably according to the build and age of the patient, the film processor used and processing procedures being followed. Therefore, the exposure values given in this guide are average values and are only meant to guide the user. Users are encouraged to develop their own radiographic techniques based on these values.

2 SYMBOLS



Type B equipment (Standard IEC 601-1).



Alternating current (Standard IEC-417).



Attention, consult accompanying documents (Standard IEC 601-1).



X-ray device.



Electrostatic sensitive device (Standard IEC 60417).



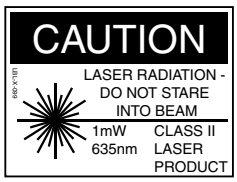
Separate collection for electrical and electronic equipment according to Directive 2002/96/EC (WEEE).

3 WARNINGS AND PRECAUTIONS

NOTE ***It is very important that the place where the unit is to be used and the position from which the user is to operate the unit are correctly shielded. Since radiation safety requirements vary from country to country and state to state it is the responsibility of the user to ensure that all local safety requirements are met.***

NOTE ***If the x-ray unit has been stored at temperatures under +10°C for more than a few hours, time must be allowed for the unit to reach room temperature before turning it on.***

CAUTION ***This X-ray unit may be dangerous to both patient and operator unless safe exposure values are used and correct operating procedures are observed.***





NOTE ***The patient positioning lights are class II laser products (21 CFR § 1040.10).***

NOTE ***Class 1 laser product (Standard EN 60825-1:1994).***
The patient positioning lights are class 1, inherently safe laser lights.

NOTE ***EMC requirements have to be considered, and the equipment must be installed and put into service according to the specific EMC information provided in the accompanying documents.***

NOTE ***Portable and mobile RF communications equipment can affect Planmeca Proline EC X-ray unit.***

CAUTION ***The remote exposure control, Autoprint and Admark film marking systems are connected to the X-ray units Planet connectors. Do NOT connect any other devices to the Planet connectors.***

4 CHECKLIST - BEFORE USING THE UNIT

- Make sure that you are fully acquainted with the appropriate radiation protection measures and these instructions before using the unit.

- Make sure that the film processor is in working order and is ready for use.

- Make sure that you are using the correct film processing chemicals for the film you are using.

- Make sure that the processing chemicals you are using are fresh and are at the correct processing temperatures and concentrations.

- Make sure that the safelight you are using in the darkroom is suitable for the film being used.

- Make sure that the film you are going to use is fresh. Do not use old film.

- Make sure that the film and intensifying screen you are using are compatible. Do not mix films and screens of different colour sensitivity.

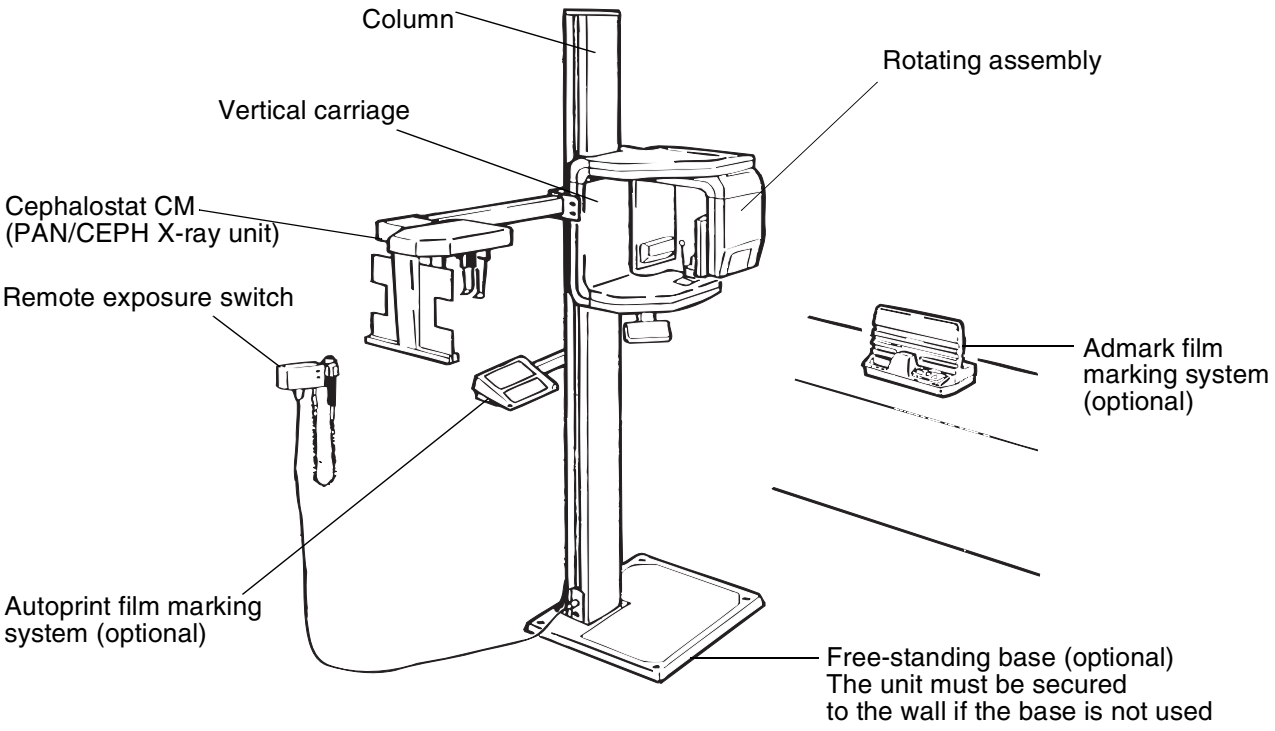
- Make sure that the film and screen are the right type for the technique you plan to use.

- Make sure that the intensifying screen is free of dust and is not scratched or damaged.

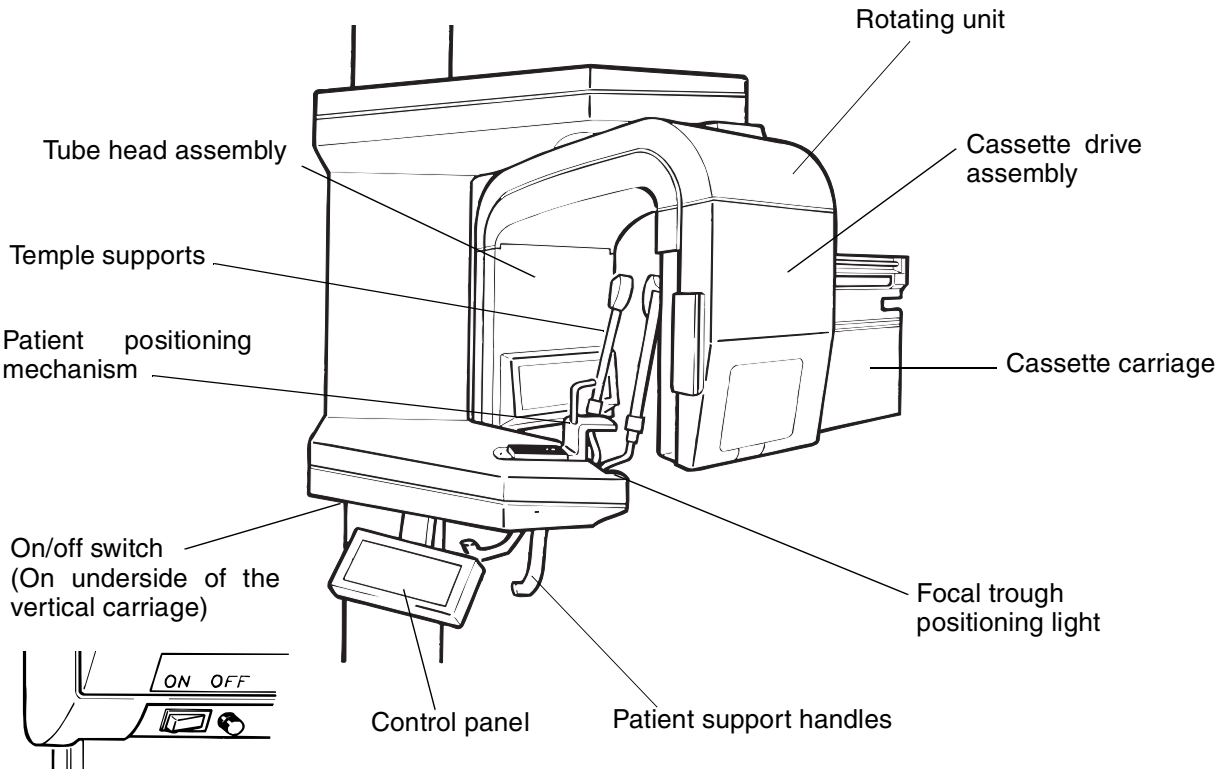
- Never leave the cassette open.

5 PM PROLINE EC PANORAMIC X-RAY - MAIN PARTS

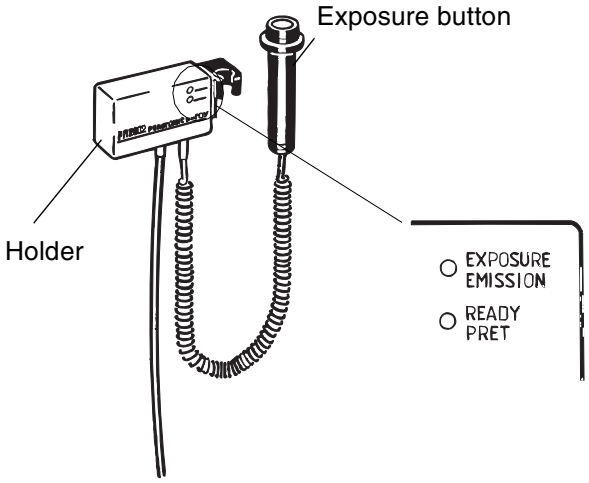
General view of the X-ray



Main parts of the vertical carriage and rotating assembly



Remote exposure switch



When you take an exposure you must press and hold down the exposure button for the whole duration of the exposure. If you remove your finger from the exposure button before the exposure cycle is completed radiation is interrupted, the rotating unit will stop moving, the temple supports will open, and an error code will appear on the main display which is on the control panel.

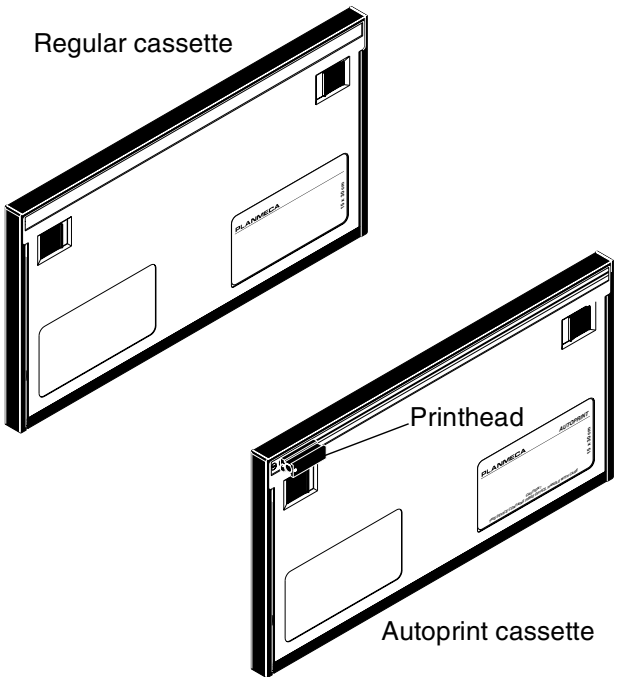


Error code

The error code must be cleared from the display before the unit can be used again. See section “14.2 Error codes” on page 40 for information on how to clear error codes from the display.

The exposure indicator light of the remote exposure switch will come on when an exposure is taken and indicates that the unit is generating radiation. If your switch is equipped with a green ready light, it will come on when the unit is correctly set up and ready to take an exposure.

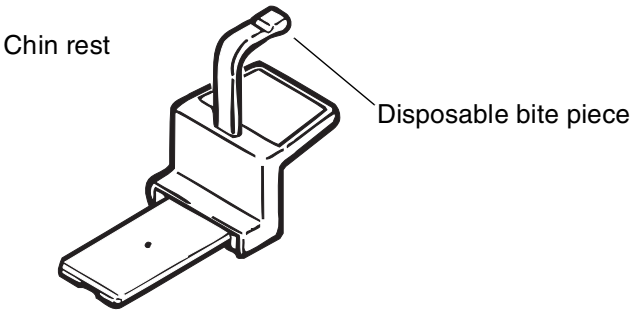
Cassettes

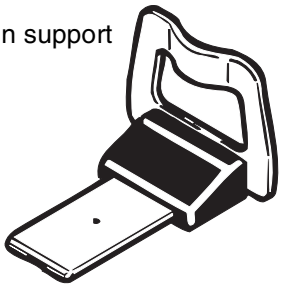


There are two versions of the panoramic film cassette, the regular version and the Autoprint version. The cassette door swings open from the top to the bottom. The Autoprint cassette must be used with the Autoprint film marking system. Be careful when handling and loading the Autoprint cassette not to damage the printhead (the small block that slides along the top of the cassette door). Never stack Autoprint cassettes or place them printhead down on a surface.

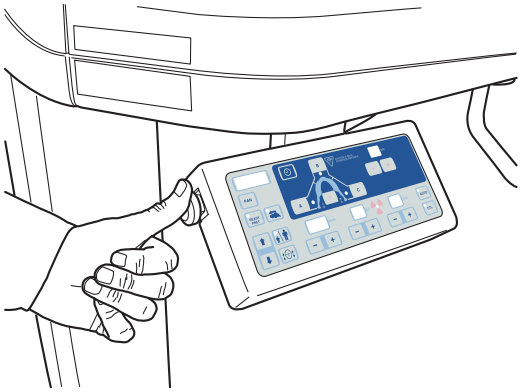
NOTE ***When the optional Automatic Exposure Control (AEC) is used, the cassette must be AEC compatible (indicated with text “AEC COMPATIBLE” in the cassette label).***

Patient supports

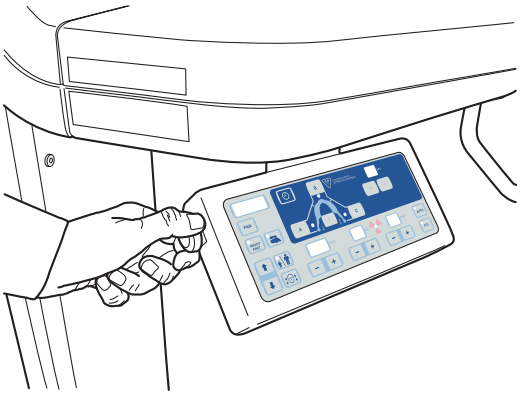




Emergency stop button

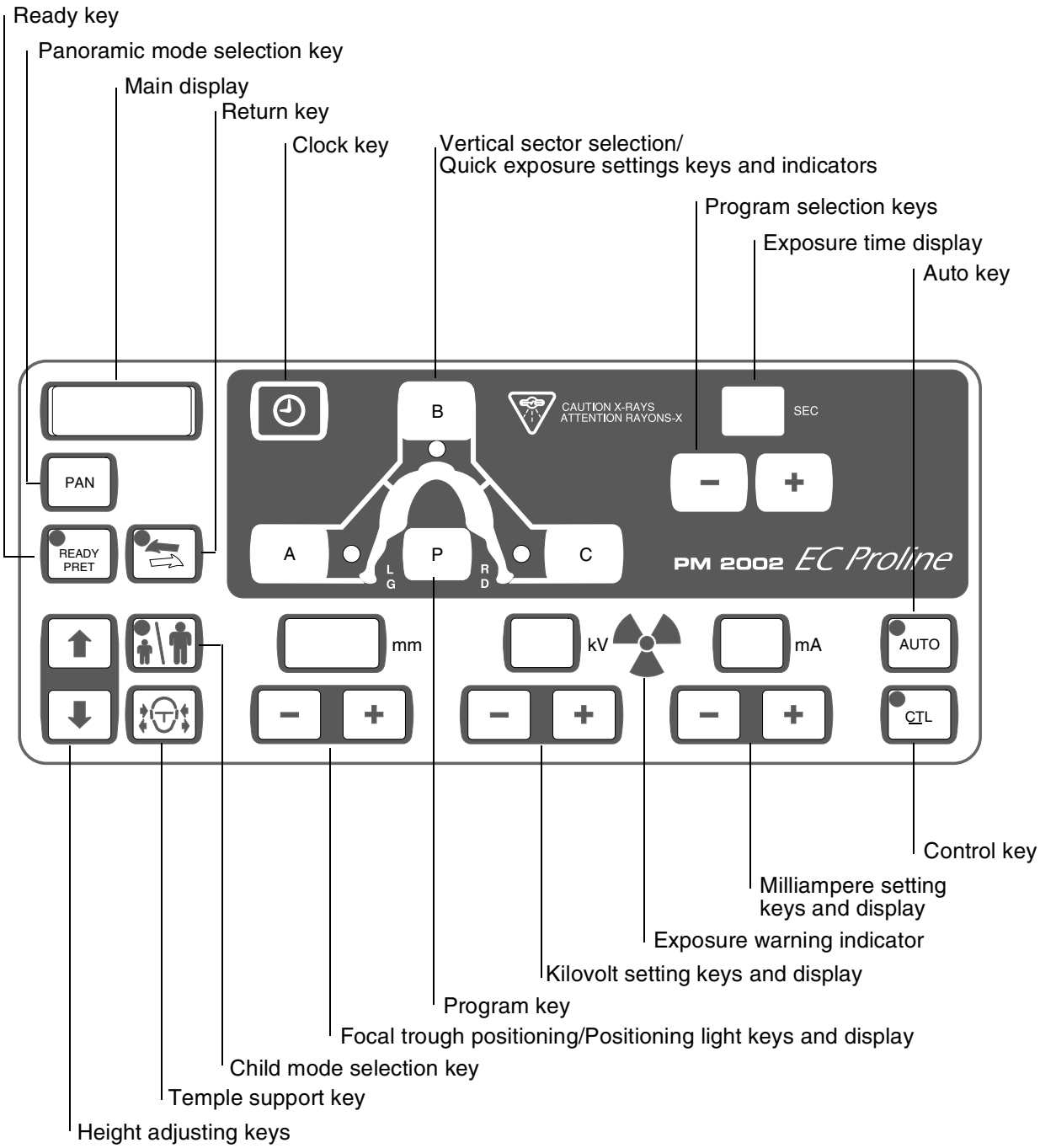


The emergency stop button is located on the side of the control panel. Press the button to stop the vertical carriage movement in an emergency.



The Error message Er53 will appear on the main display. Press the Control key to clear the error code from the display and pull the stop button out to start the unit again.

6 CONTROL PANEL - KEYS AND DISPLAYS



Main display



In normal operation the current time will appear on the main display. If the unit malfunctions an error code will be displayed. See section “14.2 Error codes” on page 40 for a list of error codes and their meanings.

Panoramic mode selection key



Press and hold down the panoramic mode selection key when you want to enter the panoramic mode. Hold down the key until you have heard two audible signals: one when you start to press the key and one when the panoramic mode is entered. Taking a panoramic exposure is described in section “8 PANORAMIC EXPOSURE” on page 17.

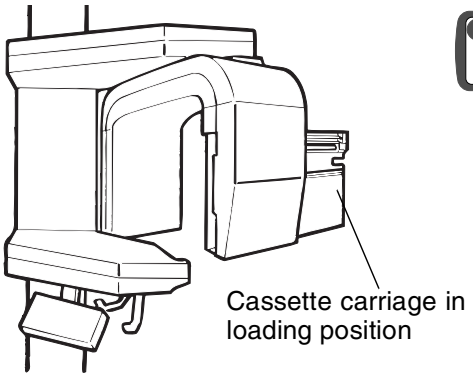


The text PAn is briefly shown on the Main display.

NOTE ***When the unit is switched on it is in the panoramic mode.***

NOTE ***The text P 10 is shown on the main display when you are in the temporomandibular joint exposure mode.***

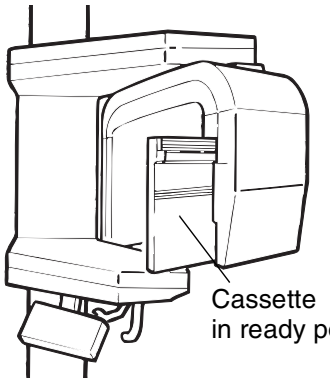
Return key





Press the return key after an exposure has been taken to drive the rotating assembly back to the ready position and cassette carriage to the loading position. The return key can also be used to drive the cassette carriage from the ready position to the loading position. Note that the rotating assembly can be set to return automatically to the ready position, see section “11.2 Automatic cassette carriage return” on page 31.

Ready key

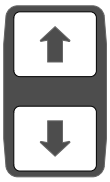




Press the ready key to drive the cassette carriage and the rotating assembly to the ready position. The temple supports will close, if they are not already closed, and the ready indicator light will come on.

NOTE ***The automatic closing of the temple supports can be switched off, refer to section “11.4 Automatic closing of the temple supports” on page 33.***

Height adjusting keys



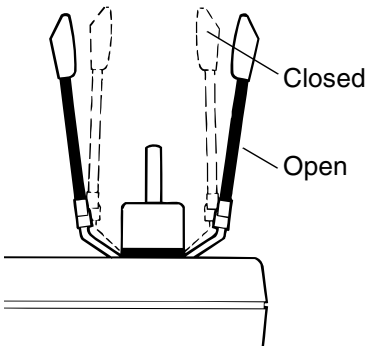
Press and hold either of the height adjusting keys to move the vertical carriage up or down so that the unit can be adjusted to suit the height of the patient. Note that the carriage will move slowly at first and then accelerate. The speed at which the carriage starts to move can be changed if required. Contact your dealer.

Child mode selector key



Press the child mode selector key when you are to take an exposure of a child or a very small adult. The indicator light will come on and the width of the exposed area (the exposure time) is reduced slightly.

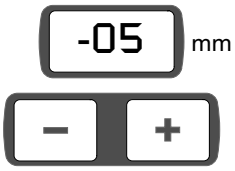
Temple support key





Press the temple support key to open or close the temple supports, depending on the original position. Note that the temple supports will automatically close when you press the Ready key and when an exposure cycle is initiated. They will automatically open after an exposure has been taken.

Focal trough positioning keys and display/Positioning light ON switch

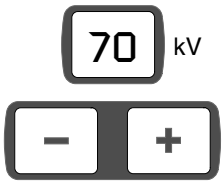


The focal trough positioning keys have two functions:

Press either key once to switch on the focal trough positioning light.

Press and hold either key, when the focal trough positioning light is on, to move the patient positioning mechanism backwards or forwards so that the patient's teeth can be positioned within the focal trough. The plus (+) key moves the patient backwards, and the minus (-) key moves the patient forwards. The number that appears on the display serves as a reference if you need to retake the exposure.

Kilovolt (kV) setting keys and display



The kilovolt setting minus (-) key decreases the kilovolt value and the plus (+) key increases it. The maximum value is 80 kV and the minimum value is 60 kV.

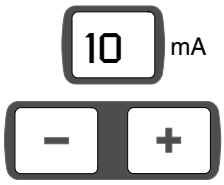
Exposure warning indicator



The exposure warning light will come on when you press the exposure button to take an exposure. You will also hear a warning signal. The tone of the warning signal can be changed if required. See section “11.5 Adjusting the tone of the exposure warning signal” on page 33.

During the exposure preparation time a low-pitched signal is heard. A high-pitched signal indicates that the unit is radiating.

Milliampere (mA) setting keys and display



The milliampere setting minus (-) key decreases the milliampere value and the plus (+) key increases it. The maximum value is 12 mA and the minimum value is 4 mA.

Auto key



The auto key allows you to use certain programmed parameter values. The parameter values are stored in the memory with auto and P keys. See section “11.7 Quick exposure settings” on page 34.

Control key



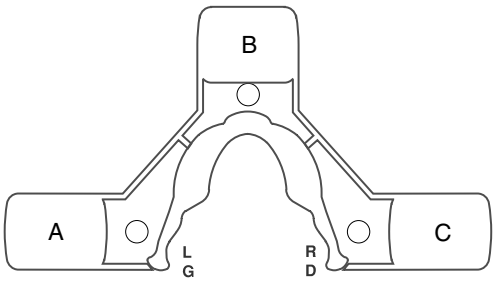
Some of the keys have second functions which can only be used when the control key is pressed to activate the additional function mode. When this key is pressed the indicator light will come on. This key is also used to clear error codes from the display, see section “14 TROUBLESHOOTING” on page 40.

Clock key



Press the clock key once and the day and month will replace the current time on the main display. Press the key a second time and the year will appear. Press the key a third time, or wait five seconds, and the current time will reappear. If you wish to set the clock see section “11.3 Setting the clock” on page 32.

Vertical sector selection keys



The vertical sector selection keys are for selecting the vertical sector or sectors of the jaw you do not wish to expose. When you press one of these keys the indicator light will come on. This indicates that the sector will not be exposed. Vertical segmenting is described in section “11.1 Vertical sector selection” on page 31.

These keys are also used to program and select the quick exposure settings, see section “11.7 Quick exposure settings” on page 34.

Program (P) key

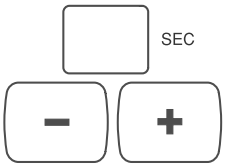


The program (P) key is used to store the quick exposure settings in the memory. See section “11.7 Quick exposure settings” on page 34.

The P key is also used to select the temporomandibular joint exposure (double TMJ) program (P10) and sinus program (P20). Hold down the key until you have heard two audible signals: one when you star to press the key and one when the program mode is entered. The temporomandibular joint exposure is described in section “9 TEMPOROMANDIBULAR JOINT EXPOSURE (P10)” on page 22 and the sinus exposure program in section “10 SINUS PROGRAM (P20)” on page 28.

PAN/CEPHMODEL:
The program (P) key is used to select the cephalometric exposure mode and the desired collimator (CPH4, CPH5, CPH6), as well as the double TMJ program. Hold down the key until you have heard two audible signals: one when you start to press the key and one when the selection mode is entered.

Exposure time/Exposure mode selection keys and display



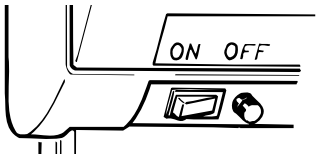
The exposure times for the different views will appear on this display. The exposure time will automatically change when the exposure mode is chosen, or when the child mode is selected.

After the P key has been pressed, these keys are used to change the program. When the desired program number is shown on the Main display, the exposure mode is entered by pressing the P key again.

PAN/CEPHMODEL:
In the cephalometric mode the exposure time is changed with these keys, refer to the PM 2002 EC Cephalostat CM User’s manual.

7 PREPARATIONS FOR THE EXPOSURE

7.1 Switching the unit on



Switch the unit on with the on/off switch which is located on the underside of the vertical carriage on the left-hand side. The control panel lights will come on and the unit will carry out a self-test which will last a few seconds.



When the self-test is completed a message will appear briefly on the main display stating that the unit has passed the test.



The time will then appear on the main display. The unit is now ready for use.



Error code

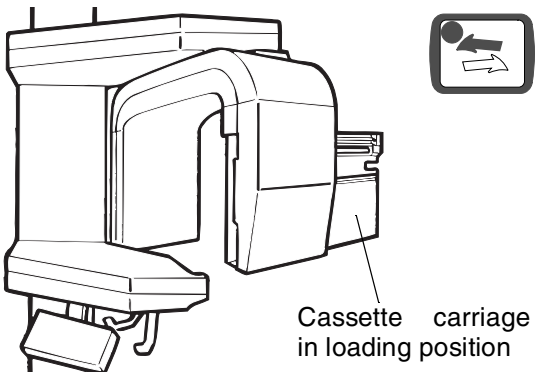
NOTE ***The unit incorporates a self-checking feature that monitors the operation of the unit. If there is a malfunction or an operating error the unit will stop working and an error code will appear on the main display. For information on what the error codes mean see section “14.2 Error codes” on page 40.***



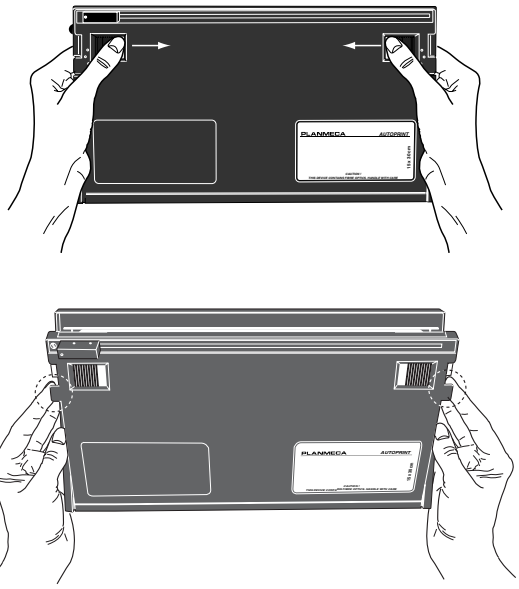
Help message

NOTE ***The help message is shown on the main display if a key that has no function is pressed, or if the function is not allowed. The help message disappears when you release the key (exposure switch). For information on what the help messages mean see section “14.1 Help messages” on page 40.***

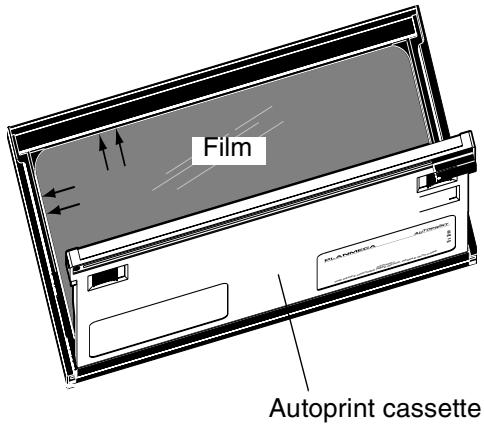
7.2 Loading the cassette



Press the return key to move the cassette carriage to the loading position if it is not already in that position.



In the darkroom, push the latches inwards to open the cassette door (see figure beside) and place a film in the cassette. Handle the film in accordance with the manufacturer's instructions and be careful not to damage the intensifying screens.

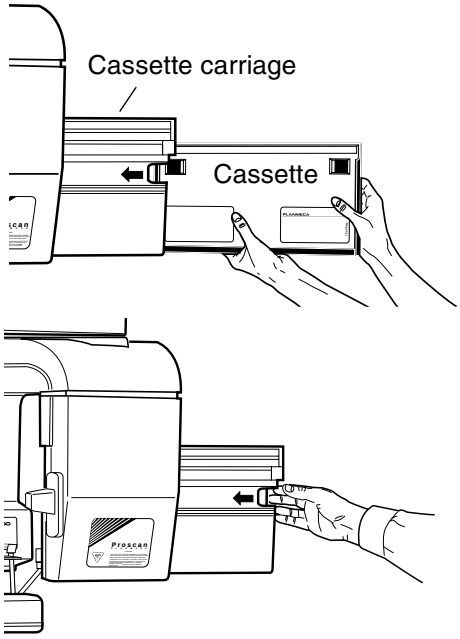


When you are using the Autoprint cassette position the film so that it touches the inner left-hand and upper edges of the cassette. With the regular cassette position the film so that it touches the bottom edge. The film must be on the intensifying screen.



Close the cassette carefully by pressing the door from below the latches with your thumbs (see figure beside). Make sure that the latches click into their positions.





Slide the cassette into the cassette carriage. Make sure that you insert the cassette in the direction of the arrow marked on the door and that the cassette is pushed completely into the cassette carriage.

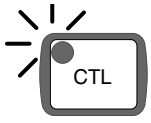
7.3 Preparing the patient

Ask the patient to remove any spectacles, hearing aids, dentures, and personal jewellery such as earrings, necklaces, and hairpins.

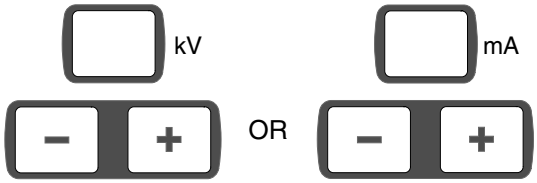
Place a protective lead apron over the patient's back if required.

Demonstrating the unit without taking an exposure

If the patient is nervous you may have to reassure them by demonstrating the unit. This "dummy run" should be carried out with the radiation switched off.



Press the Control key to activate the additional function mode. The indicator light will come on.



Press any of these keys to switch the radiation off. The kV and mA values will clear from the displays which indicates that the radiation has been switched off.



Press the ready key to drive the unit to the ready position. The cassette will move to the ready position, the ready light will come on, and the temple supports will close.



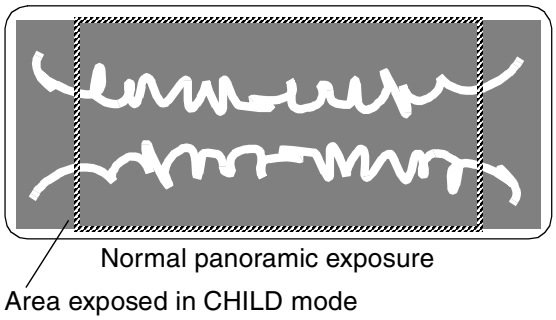
Press and hold down the exposure button for the duration of the “exposure” (18 seconds) to demonstrate the movement of the unit. The rotating unit will move through one exposure cycle.

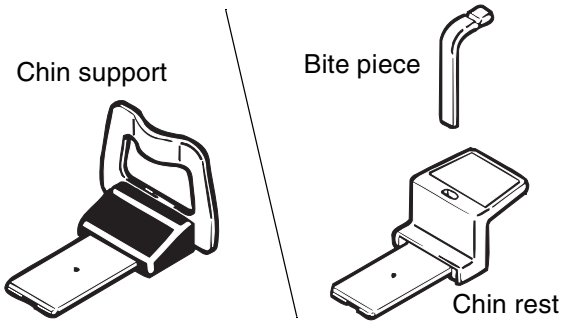
To switch the radiation on again repeat the keying sequence you used to switch the radiation off.

8 PANORAMIC EXPOSURE

All exposure values given in this section are based on Kodak Ektavision film and Kodak Ektavision screen. If you are using a different film and screen combination you may have to adjust these values.

This procedure will produce a full size panoramic exposure of both jaws. If the child mode is selected the width of the exposed area will be slightly less.





Use the chin rest for this procedure. Insert a new bite piece into the hole in the top of the rest.

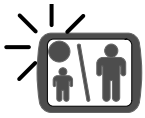
NOTE ***For edentulous patients or for patients who are unable to use the bite piece the chin support can be used. You may also have to place a roll of gauze or cotton between the patient's jaws to raise the upper ridge to the correct position.***



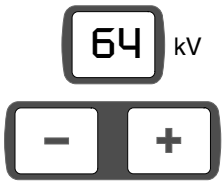
NOTE ***If the unit is in not in the panoramic exposure mode, press and hold down the panoramic mode selection key.***

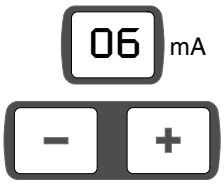


The text PAn will appear briefly on the main display.



If the patient is a child or a very small adult select the child mode. The indicator light will come on.





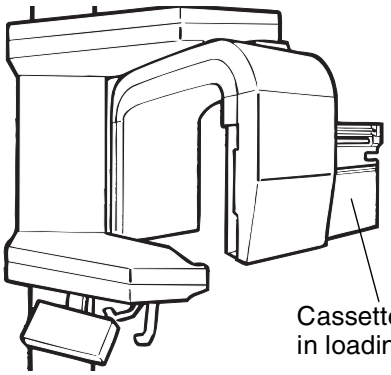
Select the correct exposure values for the patient being X-rayed according to the values in the following table. If you are using a different film screen combination you may have to adjust the exposure values.

PANORAMIC EXPOSURE VALUES
Based on Kodak Ektavision film and Kodak Ektavision screen

PATIENT	kV VALUE	mA VALUE
Child up to 6 years of age[a]	60	4
Child 7-12 years of age	62	5
Adult female or small male	64	6
Adult male	68	7
Large adult male	70	9

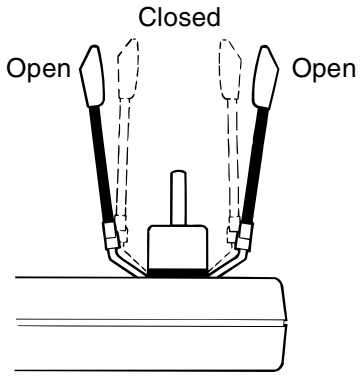
a. Use the CHILD MODE.

NOTE ***In case the unit is in the AEC mode the default exposure values are used. These values cannot be changed by the user.***





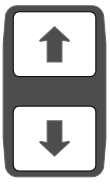
Press the return key to move the rotating assembly to the ready position and the cassette carriage to the loading position if they are not already in that position.



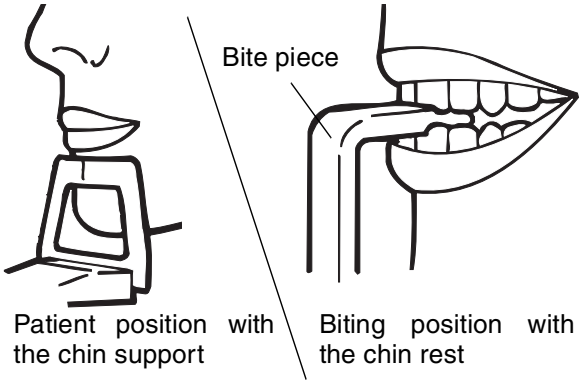


Press the temple support key to open the temple supports if they are not already open.

Guide the patient to the unit so that they are facing the chin rest.



Press either of the height adjusting keys to adjust the height of the vertical carriage until the chin rest is slightly higher than the patient's chin. By positioning the chin rest slightly higher than the patient's chin the patient will be encouraged to stretch up to reach the chin rest. This will help to stretch and straighten the patient's cervical vertebrae.



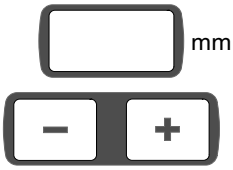
Ask the patient to step forward, grasp the patient handles, stretch up and place their chin on the chin rest. Slide the bite piece up or down until the patient is able to bite it. The incisal edges of the maxillary and mandibular teeth must be in the groove in the bite piece.

When you are using the chin support, position the patient so that the chin, just below the lower lip, touches the top bar of the chin support.

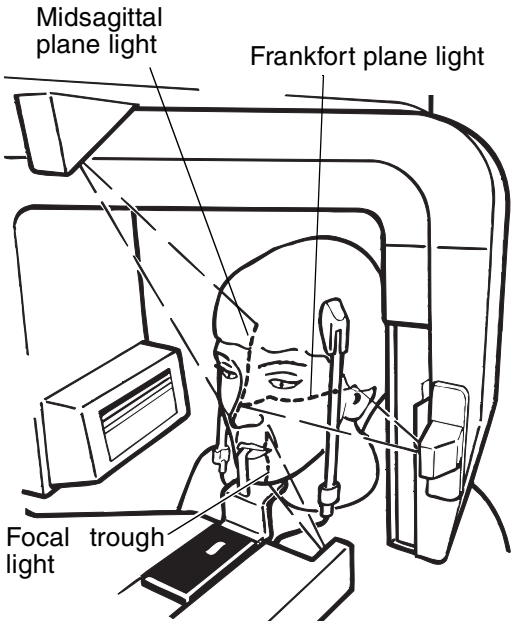


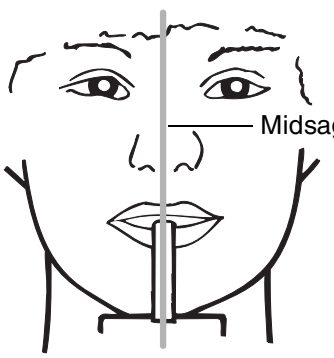
Press the temple support key to close the temple supports.

Stand behind the patient and make sure that the patient's shoulders are level and the neck muscles relaxed.

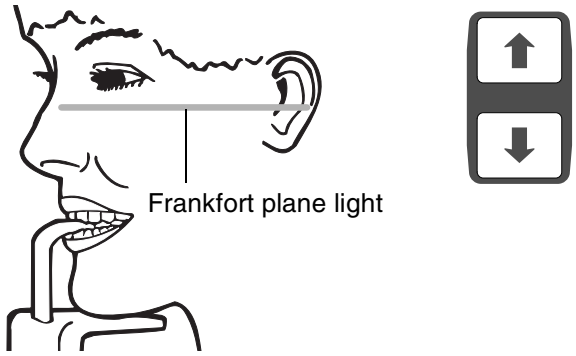


Press either of the focal trough positioning keys to switch the three patient positioning lights on. Note that the lights will automatically switch off after 25 seconds if you do not use these keys to adjust the position of the patient positioning mechanism. If the lights go out before you have positioned the patient press either key a second time to switch the lights on again.

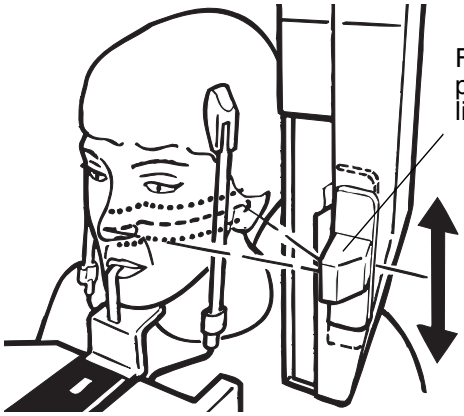




Position the patient's head so that the midsagittal plane coincides with the midsagittal plane light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.

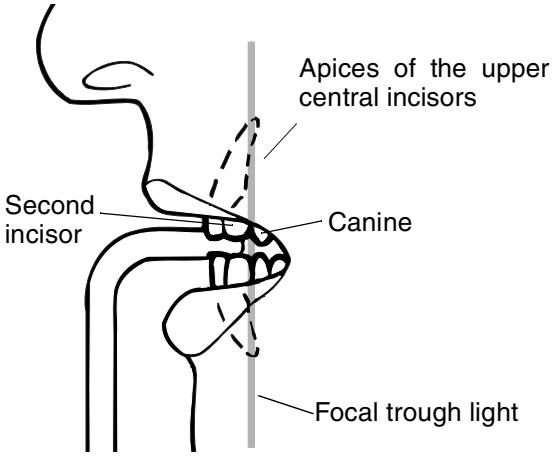


Position the patient's head so that the Frankfort plane coincides with the Frankfort plane light beam. To do this support the back of the patient's head with your hand and then adjust the tilt of the patient's head by raising or lowering the vertical carriage with these keys. The patient's back should be straight. If necessary stretch and straighten the patient's cervical vertebrae by moving the vertical carriage up slightly.



Note that the Frankfort plane light, located on the side of the cassette drive assembly, can be slid up and down to accommodate different head sizes.

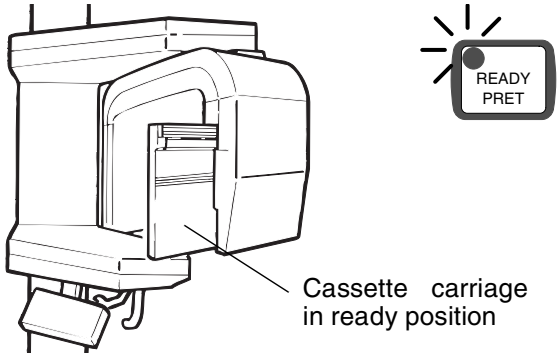




Position the apices of the patient's upper central incisors within the image layer (focal trough) of the unit.

To do this press and hold either of the focal trough positioning keys to move the patient positioning mechanism, and patient, backwards or forwards until the focal trough light, which indicates the centre of the focal trough, falls between the second incisor and the canine. For an average patient positioning the teeth as described above will place the apices of the upper central incisors within the focal trough. The minus (-) key moves the patient forwards, and the plus (+) key moves the patient backwards.

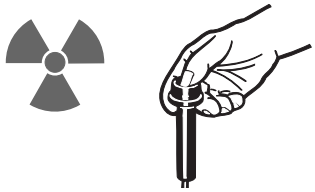
The number that appears on the display is the distance the patient positioning mechanism must have been moved, backwards or forwards, for the patient's teeth to be positioned within the focal trough and it serves as a reference if you need to retake the exposure.



Press the ready key to drive the unit to the ready position. The indicator light will come on.

Ask the patient to close their lips on the bite block, swallow, place their tongue flat against the roof of the mouth, breathe normally, and stand as still as possible.

Move at least two meters (seven feet) from the X-ray. Protect yourself from unnecessary radiation.



Press and hold down the exposure button on the remote control for the duration of the exposure (18 seconds). The rotating assembly will move through one exposure cycle. During the exposure cycle the radiation warning light will come on and you will hear the radiation warning tone. When the rotating assembly has completed the exposure cycle the temple supports will automatically open and the patient can then be guided from the unit.

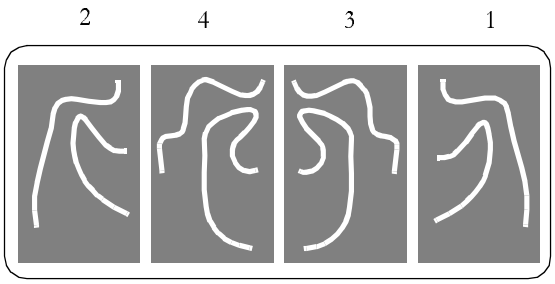
NOTE ***If automatic cassette carriage return is activated, see section "11.2 Automatic cassette carriage return" on page 31, the rotating unit will return to the ready position before the temple supports open.***



Press the return key to drive the rotating assembly to the ready position and the cassette carriage to the loading position. This is not necessary if the cassette carriage is set to return to the loading position automatically.

Remove the cassette from the cassette carriage and process the film.

9 TEMPOROMANDIBULAR JOINT EXPOSURE (P10)



Temporomandibular joint exposure

All exposure values given in this section are based on Kodak Ektavision film and Kodak Ektavision screen. If you are using a different film and screen combination you may have to adjust these values.

This procedure will produce open and closed views of the left and right temporomandibular joints with the Planmeca Proline EC panoramic X-ray unit.

Chin support

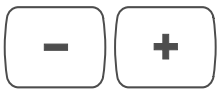


Note that this is a double exposure and the rotating assembly will travel through two exposure cycles.

Use the chin support for this exposure.



Press and hold down the P key until you have heard two audible signals to enter the program selection mode.



The program selection keys are used to scroll the exposure mode numbers. Press the minus (-) key to decrease the value and the plus (+) key to increase it. The menu is cyclical, after the last (first) choice the first (last) is displayed again.

NOTE ***If you interrupt the exposure mode selection for over 10 seconds, the unit automatically exits the selection mode and returns to the last selected mode.***



Press the P key when the number P 10 appears on the main display to enter the TMJ exposure mode.



The program number stops flashing and the rotating assembly drives to the correct position.



When you want to see the current time in the special program mode press the clock key. The time is shown on the Main display for three seconds.

9.1 First exposure - jaw closed

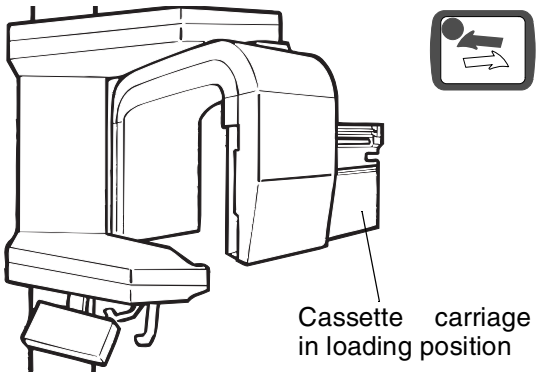


Select the correct exposure values for the patient being X-rayed according to the values in the following table.

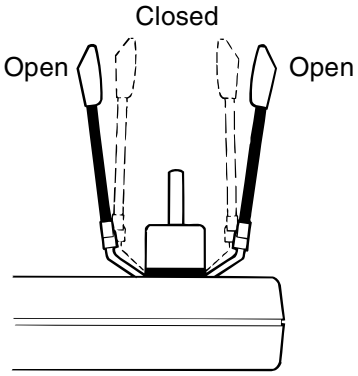
Note that there are two sets of kV values. One set for the closed jaw and a second set for the open jaw. If you are using a different film screen combination you may have to adjust the exposure values.

TEMPOROMANDIBULAR JOINT EXPOSURE VALUES
Based on Kodak Ektavision film and Kodak Ektavision screen

PATIENT	kV VALUE		mA VALUE
	Jaw closed	Jaw open	
Child 10 and over	66	64	5
Adult female or small male	70	68	6
Adult male	74	72	8
Large adult male	78	76	10



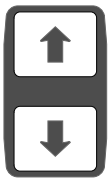
Press the Return key to move the rotating assembly to the ready position and the cassette carriage to the loading position if they are not already in that position.





Press the temple support key to open the temple supports if they are not already open.

Guide the patient towards the unit so that they are facing the chin support. Explain to the patient that you will take a double exposure and that the unit will rotate twice.

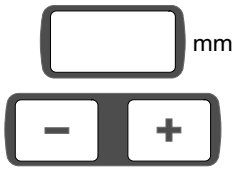


Press either of the height adjusting keys to adjust the height of the vertical carriage until the opening in the chin support is approximately level with the patient's mouth.



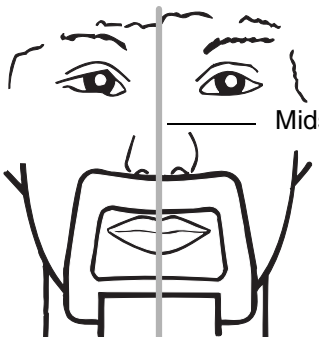
Ask the patient to step forward, grasp the patient handles and press their lips against the chin support. The patient's nose must rest on top of the support and their mouth must be closed, their teeth together.

Press the temple support key to close the temple supports.

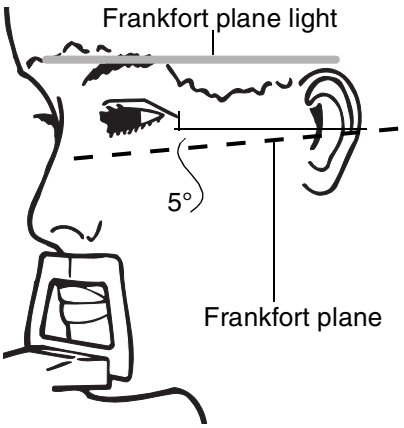


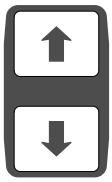
Press either of the focal trough positioning key to switch the three patient positioning lights on so that the patient can be positioned.

Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed. Make sure the patient's back is straight.

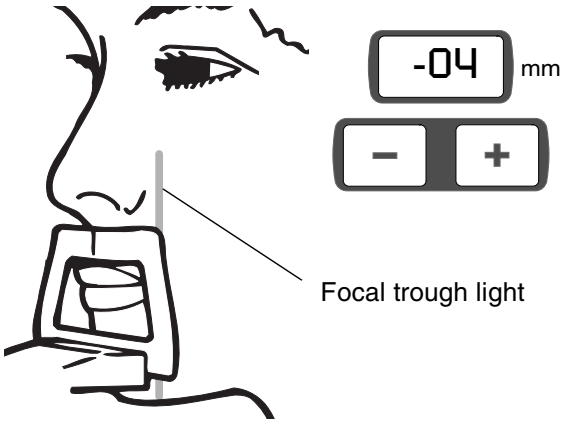


Position the patient's head so that the midsagittal plane coincides with the midsagittal plane light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.





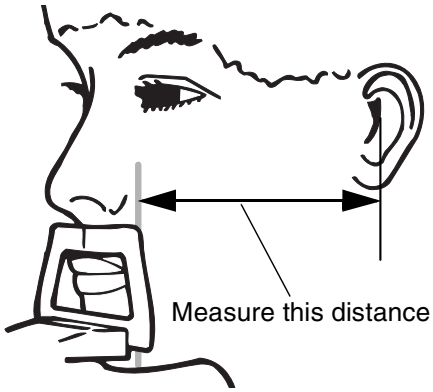
Position the patient's head so that the Frankfort plane is tilted down 5°. To do this support the back of the patient's head with your hand and, using the Frankfort plane light as a reference line, adjust the position of the patient's head by raising or lowering the vertical carriage with the height adjusting keys. Make sure the patient's back is straight.



Position the apices of the patient's upper central incisors within the image layer (focal trough) of the unit.

To do this ask the patient to open their lips so that you can see their teeth. Then press and hold either of the focal trough positioning keys to move the patient positioning mechanism, and patient, backwards or forwards until the focal trough light, which indicates the center of the focal trough, falls between the second incisor and the canine. For an average patient positioning the teeth as described above will place the apices of the upper central incisors within the focal trough. The minus (-) key moves the patient forwards, and the plus (+) key moves the patient backwards.

Note the number on the Focal trough positioning display.

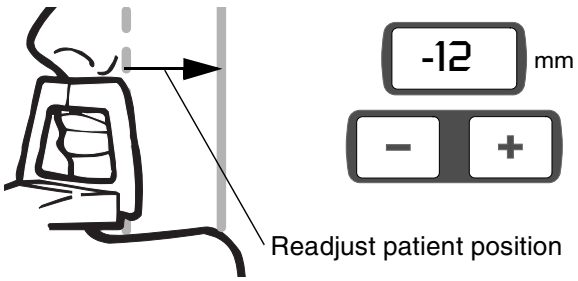


Measure the distance from the focal trough light beam to the center of the auditory meatus and then determine, from the table below, how much the patient must be moved, backwards or forwards, to be correctly positioned for the temporomandibular joint exposure.

For example: If the number on the display was -04 and the measured distance is 90 mm, you have to move patient -8mm and the final position of the patient is -12mm.

POSITIONING GUIDE FOR TEMPOROMANDIBULAR JOINT EXPOSURES

Distance from light beam to auditory meatus	Adjustment to the position of the patient
80 mm	+8 mm
85 mm	+4 mm
90 mm	0 mm
95 mm	-4 mm
100 mm	-8 mm
105 mm	-12 mm
110 mm	-16 mm



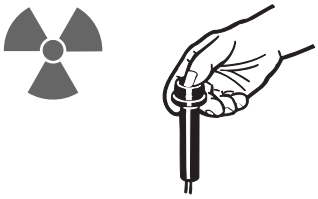
Press either of the focal trough positioning keys to readjust the position of the patient according to the measurements given in the table.



Press the ready key to drive the unit to the ready position. The indicator light will come on.

Ask the patient to stand as still as possible.

Move two meters (seven feet) from the unit. Protect yourself from unnecessary radiation.

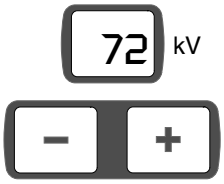


Press and hold down the exposure button on the remote control for the duration of the exposure. The rotating assembly will move through one complete exposure cycle and then automatically return to the ready position. The temple supports will remain closed and hold the patient in position for the second exposure.



The program number P 11 will appear on the main display to indicate that the first exposure is taken. After the second exposure is taken the program number P 10 will appear on the display.

9.2 Second exposure - jaw open



Reduce the kV value by 2kV for the open jaw exposure. Refer to exposure table on page 23.



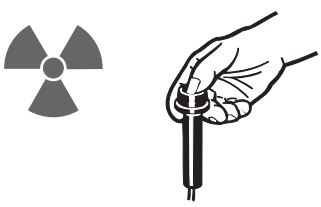
Press the Ready key to drive the cassette carriage to the ready position so that the open jaw exposure can be taken.



Ask the patient to open their mouth as far as possible. Make sure that the patient's top lip is still touching the chin support.

Ask the patient to stand as still as possible.

Move two meters (seven feet) from the unit. Protect yourself from unnecessary radiation.



Press and hold down the exposure button on the remote control for the duration of the second exposure. When the rotating assembly has completed the second exposure cycle the temple supports will auto-

matically open. The patient can now be guided from the unit.

NOTE ***If automatic carriage return is activated, see section “11.2 Automatic cassette carriage return” on page 31, the rotating assembly will return to the ready position before the temple supports open.***



Press the return key to drive the rotating assembly to the ready position and the cassette carriage to the loading position. This is not necessary if the cassette carriage is set to return to the ready position automatically.

Remove the cassette from the unit and process the film.

9.3 Exiting the TMJ exposure mode



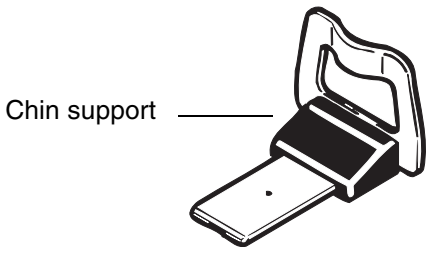
When you want to enter the panoramic exposure mode, press and hold down the panoramic mode selection key until you have heard two audible signals.

10 SINUS PROGRAM (P20)

All exposure values given in this section are based on Kodak Ektavision film and Kodak Ektavision screen. If you are using a different film and screen combination you may have to adjust these values.

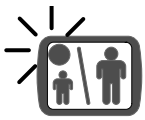
This procedure will produce an exposure of the maxillary sinus along the plane selected. If the child mode is selected the width of the exposed area will be slightly reduced.

Use the chin support for this exposure.





Select the Sinus program (P20), see section " Program (P) key" on page 12.



Select the child mode if the patient is a child or a very small adult. The indicator light will come on.

NOTE ***When you take panoramix exposures using the child mode with the X-ray units that have been upgraded with the transversal slicing system, only the width of the exposed area (exposure time) is reduced.***

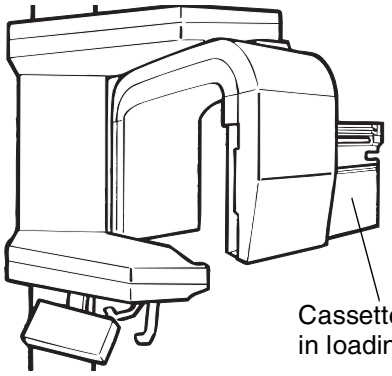


Select the correct exposure values for the patient being X-rayed according to the values in the following table. Note that the kV value for a sinus exposure is 4kV higher than the corresponding panoramic exposure.

SINUS EXPOSURE VALUES
Based on Kodak Ektavision film and Kodak Ektavision screen

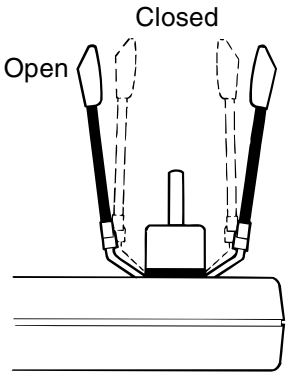
PATIENT	kV VALUE	mA VALUE
Child 10 and over[a]	64	4
Adult female or small male	68	6
Adult male	72	8
Large adult male	76	10

a. Use the CHILD MODE.





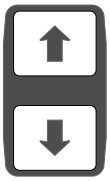
Press the return key to move the rotating assembly to the ready position and the cassette carriage to the loading position if they are not already in that position.





Press the temple support key to open the temple supports if they are not already open.

Guide the patient towards the unit so that they are facing the chin support.



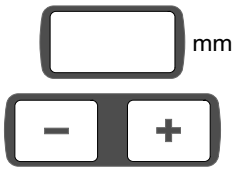
Press either of the height adjusting keys to adjust the height of the vertical carriage until the opening in the chin support is approximately level with the patient's mouth.



Ask the patient to step forward, grasp the patient handles and press their lips against the chin support. The patient's nose must rest on top of the support and their mouth must be closed.

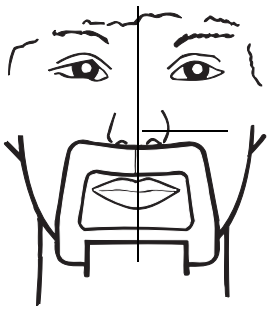


Press the temple support key to close the temple supports.

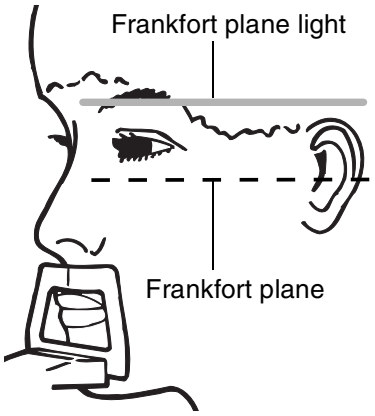


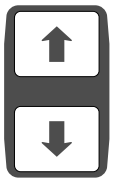
Press either of the focal trough positioning key to switch the three patient positioning lights on so that the patient can be positioned.

Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed.

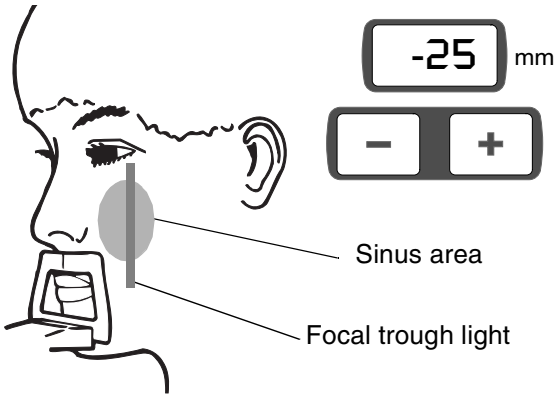


Position the patient head so that the midsagittal plane coincides with the midsagittal light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.





Position the patient's head so that the Frankfort plane coincides with or, if you are unable to slide the light far enough down, is parallel to the Frankfort plane light beam. To do this support the back of the patient's head with your hand and then adjust the tilt of the patient's head by raising or lowering the vertical carriage with the height adjusting keys. The patient's back should be straight. If necessary stretch and straighten the patient's cervical vertebrae by moving the vertical carriage up slightly.

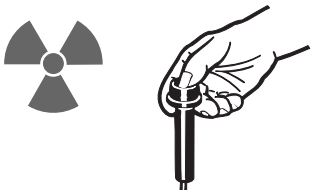


Press and hold either of the focal trough positioning keys to adjust the position of the patient positioning mechanism until the focal trough light falls on the region of the maxillary sinus that you wish to X-ray.



Press the ready key to drive the cassette carriage to the ready position. The ready light will come on.

Ask the patient to swallow and stand as still as possible. Move two meters (seven feet) from the unit. Protect yourself from unnecessary radiation.



Press and hold down the exposure button on the remote control for the duration of the exposure. At the end of the exposure cycle the temple supports will automatically open. The patient can then be guided from the unit.

NOTE ***If the automatic cassette carriage return is activated, see section "11.2 Automatic cassette carriage return" on page 31, the rotating assembly will return to the ready position before the temple supports open.***

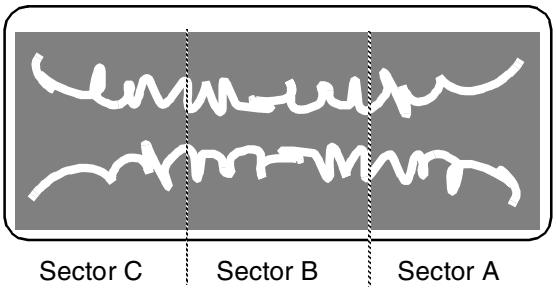


Press the return key to drive the rotating assembly to the ready position and the cassette carriage to the loading position. This is not necessary if the cassette carriage is set to return to the loading position automatically.

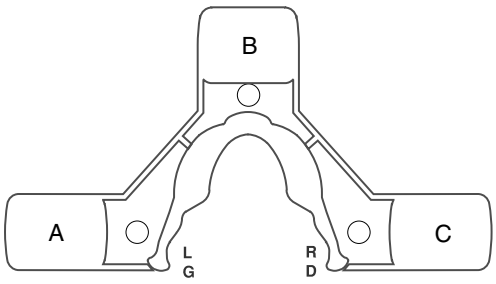
Remove the cassette from the unit and process the film.

11 ADDITIONAL FUNCTIONS

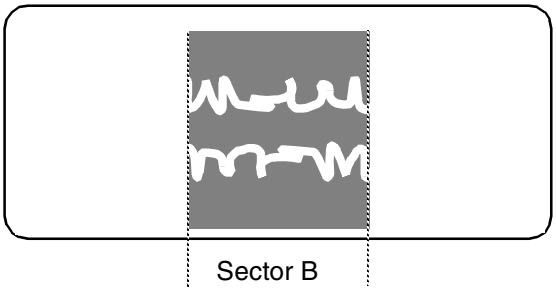
11.1 Vertical sector selection



This feature allows exposures of different vertical jaw sectors to be taken. This will reduce the radiation dosage as only diagnostically interesting areas need to be X-rayed.



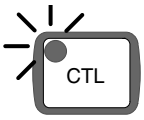
Press the required sector keys to SWITCH OFF the radiation exposure in those sectors. The corresponding indicator lights will COME ON. Note also that the exposure time will decrease.



For example if keys A and C are pressed these two sectors will NOT appear on the film. The exposed film will look like the picture opposite.

11.2 Automatic cassette carriage return

The X-ray can be set so that the rotating assembly will automatically return to the ready position and the cassette carriage to the loading position at the end of an exposure.



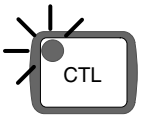
Press the control key to enter the additional function mode. The indicator light will come on.



Press and hold down the return key until the indicator light comes on, about four seconds. The automatic cassette carriage return function is now activated.

To switch the automatic cassette carriage return off repeat the above keying sequence. The indicator lights will go out.

11.3Setting the clock

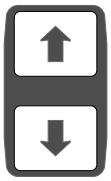


Press the control key to activate the additional function mode. The indicator light will come on.





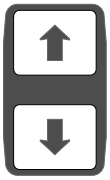
Press the clock key to enter the clock setting mode. The display digit indicating minutes will start to flash.



Press either of the height adjusting keys to set the correct minutes (0 - 9). The up arrow will increase the number and the down arrow key will decrease it.



Each time you press the clock key different clock digits will start to flash:
- first minutes, unit then tens
- then hours
- then days
- then months
- and finally years.



Press either of the height adjusting keys to change any of the clock settings.

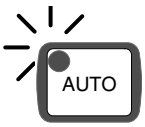


Press the ready key to exit the clock mode when you have finished setting the clock.

The clock will start to run when the ready key is pressed, with seconds cleared. Use this to synchronize the clock and a time signal.

11.4 Automatic closing of the temple supports

The temple supports will automatically close when the ready key is pressed.



This function can be switched off as follows:

Press the auto key. The indicator light will come on.

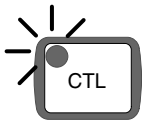




Press and hold down the temple supports key for four seconds. The text “hLr0” will appear briefly on the main display indicating that the automatic closing of the temple support is switched off.

To switch the automatic closing of the temple support on again repeat the above keying sequence. The text “hLr1” will appear briefly on the main display indicating that the function is activated.

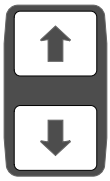
11.5 Adjusting the tone of the exposure warning signal



Press the control key to activate the additional function mode. The indicator light will come on.



Press the program key to switch the exposure warning signal on.



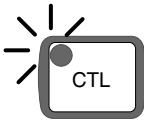
Press either of the height adjusting keys to adjust the tone of the warning signal. The up arrow will increase the tone and the down arrow key will decrease it.



Press the ready key to accept the new tone and exit the signal adjusting mode.

11.6 Recalling previous exposure settings

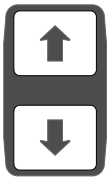
The exposure settings selected for the previous 25 exposures are stored in the memory. This information can be recalled if required.



Press the control key to activate the additional function mode. The indicator light will come on.



Press the height adjusting down key to recall the exposure settings of the last exposure taken with the unit. The settings that were selected for the exposure will appear on their respective displays.



Press either of the height adjusting keys to scroll backwards or forwards through the memory.

NOTE ***If the temporomandibular joint exposure program was used, the program number P 10 will be shown on the main display.***



Press the ready key if you wish to take another exposure using any of the previously stored exposure settings. The rotating assembly will move to the ready position so that the exposure can be taken.



Press the control key if you do not wish to take an exposure using settings from a previous exposure. The unit will return to the normal mode.

11.7 Quick exposure settings

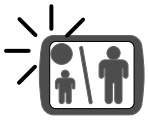
This feature allows you to use preprogrammed exposure settings. There are three memory locations for both the panoramic and temporomandibular joint exposure modes. Note that before using the quick exposure settings you must first store the parameters values in the memory.

PAN/CEPH MODEL:
There are three memory locations also for the cephalometric mode.

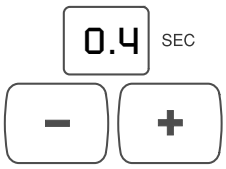
Programming the quick exposure settings



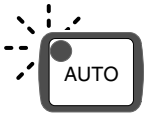
Select the kV and mA values you want to store.



NOTE ***Also the child mode selection can be stored in the memory.***



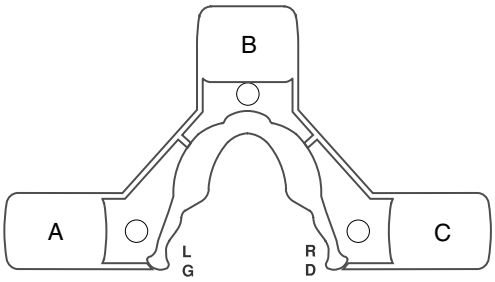
PAN/CEPH MODEL:
In the cephalometric mode the exposure time is also stored in the memory.



Press the auto key. The indicator light will start to flash.

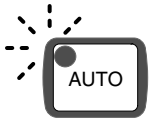


Press the P key to enter the programming mode.

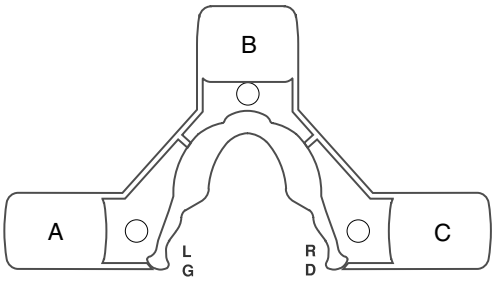


Press the memory location (A-C) in which you want to store the exposure settings. The auto key indicator light will go out and the exposure settings are stored in the memory.

Selecting the quick exposure settings



Press the auto key. The indicator light will start to flash.



Press the required memory location (A-C). The auto key indicator light will go out and the exposure settings appear on their respective displays.

NOTE ***The quick exposure setting programming and selection can be interrupted by pressing any other key than auto, P or memory location keys.***

12 AUTOMATIC EXPOSURE CONTROL (AEC) (OPTIONAL)

The Automatic Exposure Control (AEC) adjusts the exposure values in order to achieve the desired optical density and contrast on the x-ray image.

The basic idea of the AEC is to measure the patient radiation transparency during the exposure and to adjust the correct kV and mA values in order to achieve the desired optical density and contrast on the x-ray image.

Before starting the exposure the user can select the density level, patient size and kV and mA values. The patient size preselection is used to assist the system to start the exposure with the best imaging values. The maximum kV value is 80 kV and the minimum value is 60 kV. The maximum mA value is 12 mA and the minimum value is 4 mA.

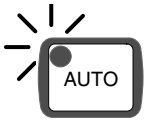
During the exposure, the continuous AEC function automatically adjusts the correct exposure values.

NOTE ***Make sure that the cassette is AEC compatible, i.e. marked with text "AEC COMPATIBLE".***

NOTE ***The AEC is not compatible with phosphorus plates. Use only X-ray film.***

NOTE ***The AEC can only be used in the panoramic mode, not with sinus, temporomandibular joint or cephalometric exposures.***

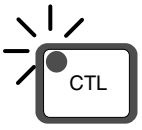
NOTE ***The vertical sector "A" can not be deselected when using AEC.***



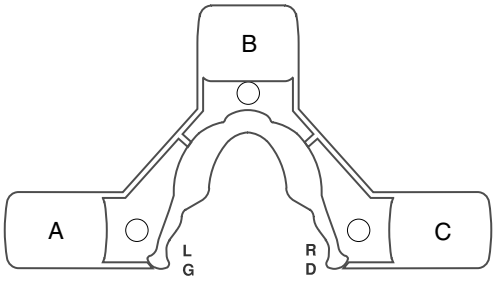
Enter the Automatic Exposure Control (AEC) mode by pressing and holding down the auto key until the indicator light comes on.

The current optical density and the patient size are shown on the exposure time display for one second when the AEC mode is entered.

Selecting the optical density



Press the control key. The indicator light will come on.



Select the desired optical density by pressing the respective vertical sector selection key:
- A: light exposure
- B: normal exposure
- C: dark exposure.

The letter indicating the selected density is shown on the exposure time display.

If the optical density is not selected the last time selected density is used.

Patient size selection

Normal adult nA SEC

Large adult LA SEC

Small adult SA SEC

Child CH SEC



The patient size selection adjusts the kilovolt (kV) and milliampere (mA) default starting values. After selecting the patient size the user can freely select the kV and mA values according to the patient size. The desired values can also be selected by pressing AUTO and a corresponding selection key (A, B or C).

Press the child mode selector key to select the patient size: child, small adult, normal adult and large adult. The letters indicating the selected patient size are shown on the exposure time display. When the size “child” is selected, also the child mode selector key indicator light will come on.

The patient size menu is cyclical, after the last choice the first one is selected again.

NOTE ***If the patient size is not selected the last time selected size is used.***

Density/size check

By pressing the PAN key the selected density is shown for one second on the sec display. Also the patient size (LA, nA, SA or CH) is shown for one second on the same display.

Verifying the fuctioning of the AEC

Attach the calibration filter to the tube head assembly



Proceed as follows to check the functioning of the AEC:

1. Remove the temple supports and patient positioning mechanism and insert an AEC compatible cassette into the cassette carriage.

2. Attach the calibration filter with tape in the middle of the tube head assembly as shown on the figure beside.

3. Make sure that the unit is in AEC mode. Take an exposure with calibration values 8 mA/68 kV. If the AEC function is in order, the exposure values should not change.

4. Decrease the mA value manually by 4 mA from the calibration value. Take an another exposure. The AEC function should now adjust the exposure values upwards.

5. Increase the mA value manually by 4 mA from the calibration value. Take an another exposure. The AEC function should now adjust the exposure values downwards.

If the verifying of the AEC function was not successful, the calibration must be carried out again, contact your Planmeca dealer.

Adjustment range of AEC exposure parameter

Child: the range varies from -4 to +3 units compared to the original values.

Small or average patient: the range varies from -5 to +5 units compared to the original values.

Large patient: the range varies from -5 to +6 units compared to the original values.

One unit corresponds to 1 mA or 2 kV, i.e. the maximum increase of the exposure parameter for example for child exposure can be 3 mA and 6 kV or
2 mA and 2 kV.

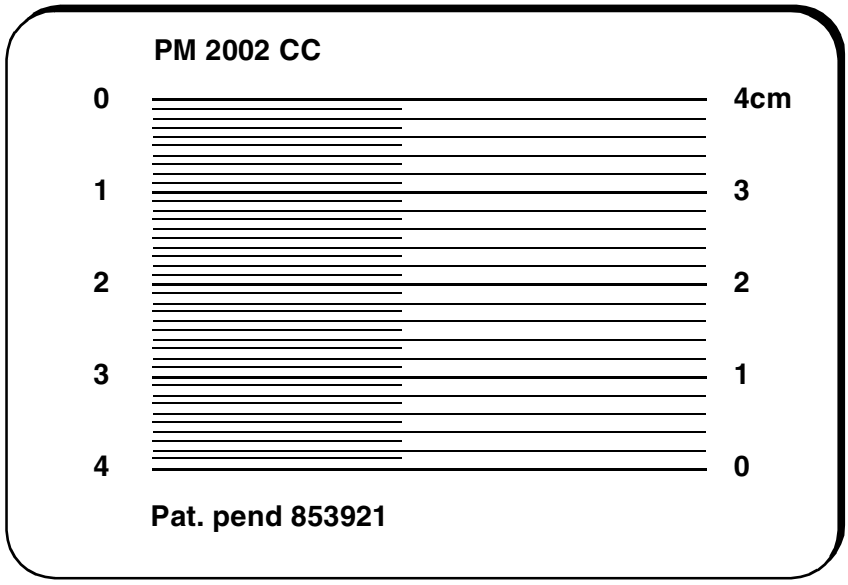
Exiting the AEC mode

Exit the AEC mode by pressing and holding down the auto key until the indicator light goes off.

13 PANORAMIC SCALE

The PLANMECA PANORAMIC SCALE is for measuring vertical features that appear on panoramic radiographs taken with a PLANMECA X-ray units. The scale is useful when carrying out dental procedures such as:

- root canal therapy; the scale can be used to take direct measurements of the root canal
- the preparation of the root canal for root post anchoring; the length of the root can be accurately measured
- an aid in periodontics; depths of bone pockets and the amount of remaining bone support can be determined.



Using the scale

For accurate results the PLANMECA PANORAMIC SCALE must only be used with panoramic radiographs taken with PLANMECA X-ray units.

Place the radiograph you wish examine on a light box. The Panoramic scale can now be placed on the radiograph and used to measure features in the vertical direction.

For patients with teeth that are severely tilted in the bucco-lingual direction the measurements taken with the PLANMECA PANORAMIC SCALE will be too short.

14 TROUBLESHOOTING

14.1 Help messages

The following is a list of the help messages. These messages appear on the Main display if a key is pressed that has no function, or if the function is not allowed for some reason. The help message disappear automatically when you release the key.

Help code	Help message explanation
HE 0	The key has no function in this mode.
HE 1	The key has no function with the control key.
HE 2	The error code must first be cleared from the display by pressing the control key.
HE 6	The temple support motor has been inactivated. The support movement does not operate.
HE 8	The child mode can not be selected in double TMJ exposure mode.
HE 10	The X-ray unit is busy, wait until the previous function is completed.

14.2 Error codes

The Planmeca X-ray incorporates a self-checking feature that continually monitors the operation of the unit. If there is a malfunction the unit will immediately stop and an error code will appear on the console display.



Press the Control key to clear the error code from the display and check from the error list what you can do to correct the error occurred. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician and report the error code with any other symptoms. Process also the film and examine it to see if it is completely exposed.

ERROR CODE	ERROR MESSAGE EXPLANATION
Er 00	You removed your finger from the remote exposure button before the unit had completed the exposure cycle. Remove the partially exposed film from the cassette, place a fresh film in the cassette and take another exposure. If the error reappears, even when you hold the exposure button down for the duration of the exposure, call your service technician.
Er 01	Short loss of power or drop in line voltage. If this occurs during an exposure remove the partially exposed film, place a fresh film in the cassette and take another exposure.

ERROR CODE	ERROR MESSAGE EXPLANATION
Er 07	The rotating unit is not in the ready position. Check that the program selection is completed. Press the ready key to move the rotating unit to the ready position and then take an exposure.
Er 10	Overvoltage in tube head. Turn off the unit first for 30 seconds, try again without the patient and the film cassette: take three exposures with values 60 kV and 4 mA and one exposure with values 80 kV and 12 mA. If the error reappears after this, please contact your service technician.
Er 11	Sudden kilovolt drop. Turn off the unit first for 30 seconds, try again without the patient and the film cassette: take three exposures with values 60 kV and 4 mA and one exposure with values 80 kV and 12 mA. If the error reappears after this, please contact your service technician.
Er 12	Tube filament initializing is not done. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 21	Up/down motor time out. Check that the up/down movement is not obstructed. If there is no visible obstruction, turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 22	Temple rest motor time out. If this motor runs more than 3 seconds continuously this error code occurs. Turn off the unit first for 30 seconds and then try again. If the error is still present, the temple rest motor must be inactivated. Press the Control key and press and hold down the Temple support key. The text HLd 0 will appear on the Main display, and the supports can not be moved. The unit can be used without temple supports. Remove the supports and call your service technician.
Er 23	Layer adjust motor time out. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 24	Primary slot motor time out. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 25	Cassette motor time out. Try to drive the cassette carriage without the patient by pressing the ready and return keys. Check that the movement is not obstructed. If there is no visible obstruction, turn off the unit first for 30 seconds, try again. If the error is still present, please contact your service technician.
Er 26	Rotation motor time out. Check that the rotation movement is not obstructed. If there is no visible obstruction, turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 30	kV value does not reach given value. Turn off the unit first for 30 seconds, try without the patient and the film cassette. Take an exposure with values 60 kV and 4 mA and an exposure with values 80 kV and 12 mA. If the error is after this present, please contact your service technician.
Er 31	mA value does not reach given value. Turn off the unit first for 30 seconds, try without the patient and the film cassette. Take an exposure with values 60 kV and 4 mA and an exposure with values 80 kV and 12 mA. If the error is after this present, please contact your service technician.
Er 32	Tube filament control inoperative. Turn off the unit first for 30 seconds, try without the patient and the film cassette. Take an exposure with values 60 kV and 4 mA and an exposure with values 80 kV and 12 mA. If the error is after this present, please contact your service technician.

ERROR CODE	ERROR MESSAGE EXPLANATION
Er 33	Tube filament control inoperative. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 40	The rotation does not reach the end sensor. The cassette carriage might have touched the patient's shoulder during the exposure. Process the film and examine it to see if it is completely exposed. If any part is unclear use the vertical sector selection mode to take another exposure of this sector. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 41	Rotation goes over the end limit sensor. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 42	Secondary slot not in the position for the panoramic exposure. Guide the patient from the unit and remove the cassette. Select the cephalometric mode (CPH4, CPH5 or CPH6). After the rotating unit stops moving select the panoramic mode. Press the Ready key to drive the cassette carriage to the ready position. Pull the cassette carriage slightly further. Turn off the unit first for 30 seconds and then take an exposure without a patient. If the error is still present, please contact your service technician.
Er 43	Secondary slot not in the position for the cephalometric exposure. Guide the patient from the unit. Move the soft tissue filter to the zero position by pulling the cassette carriage fully out. Press the Control key to clear the error code from the display. Move the soft tissue filter back to the desired position. If the error is still present, you can take an exposure with soft tissue filter in the zero position. Contact your service technician.
Er 44	The patient positioning mechanism zero point is set incorrectly. Contact your service technician.
Er 50	The temperature of the tube head is too low. Wait for the unit to reach the room temperature. If the error is still present, please contact your service technician.
Er 51	Temperature sensor open. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 52	mA or kV feedback cable open. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 53	Up/down motor does not consume power. If your unit is equipped with the STOP switch, check that it is not activated. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 54	Up/down motor consumes too much power. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 57	Exposure button activated when the unit is turned on. Turn off the unit for 30 seconds. If the error is still present, please contact your service technician.
Er 60	Generator processor power too low. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 61	Processor communication error. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.

ERROR CODE	ERROR MESSAGE EXPLANATION
Er 62	Limit sensor power missing. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 64	The radiation reaching the AEC sensor is very low or missing completely. Check that the cassette is AEC compatible, i.e. marked with text “AEC COMPATIBLE”. If the cassette type is correct, contact your service technician.
Er 65	The radiation reaching the AEC sensor is too high. If the cassette is in the cassette carriage and the patient is positioned when this error occurs, contact your service technician.
Er 70	Processor communication error. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 71	Generator processor program memory failure. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 72	Keyboard processor program memory failure. Turn off the unit first for 30 seconds, try again without the patient. If the error is still present, please contact your service technician.
Er 73	Keyboard processor program error. Turn off the unit first for 30 second. If the error is still present, please contact your service technician.
Er 74	Keyboard processor operating improperly. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 75	Keyboard processor operating improperly. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 80	Keyboard processor EEPROM failure. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 81	Generator processor EEPROM failure. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 82	Keyboard processor configuration error. Turn off the unit first for 30 second. If the error is still present, please contact your service technician.
Er 83	Generator processor configuration error. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 84	Tube power generator time out. Turn off the unit first for 30 seconds, try again without the patient and the film cassette. If the error is still present, please contact your service technician.
Er 90	Keyboard processor EEPROM not activated. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 91	Keyboard processor stack overflow. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Er 99	Error code generation error. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.

14.3 Cooling time



If a large number of exposures are taken in rapid succession the X-ray tube may overheat and stop working. A cooling time will appear on the Main display which indicates the delay before next exposure can be taken.



If the temperature of the tube head exceeds 60° C the temperature will appear flashing on the display. The unit will resume operation when the temperature drops to the normal level. The time will then reappear on the Main display.

15 CLEANING

NOTE ***When disinfecting the unit surfaces, always disconnect the unit from mains.***

The bite piece and the patient support handles can be cleaned with alcohol-based solutions. The bite piece and patient support handles must be cleaned after every patient.

Other unit surfaces can be cleaned with a soft cloth damped in a mild cleaning solution. It is recommended to clean the surfaces once a day.

16 SERVICE

To guarantee user and patient safety and to ensure image quality the unit must be checked and recalibrated by a qualified PLANMECA service technician once a year or after every 10,000 exposures if this is sooner. Please refer to the Planmeca Proline EC Panoramic X-ray technical manual for complete servicing information.

17 DISPOSAL OF THE UNIT

In order to reduce the environmental load over the product's entire lifecycle, PLANMECA's products are designed to be as safe as possible to manufacture, use and dispose of.

Parts which can be recycled should always be taken to the appropriate processing centres, after hazardous waste has been removed. Disposal of obsolete units is the responsibility of the waste possessor.

All parts and components containing hazardous materials must be disposed of in accordance with waste legislation and instructions issued by the environmental authorities. The risks involved and the necessary precautions must be taken into account when handling waste products.

Disposal of Planmeca Proline EC Panoramic x-ray unit
X = action, (X) = action in cases where processing is available

Part	Main materials for disposal	Recyclable material	Waste disposal site	Hazardous waste (separate collection)
Frame and covers				
- metal	Aluminium,	X		
	galvanized steel,	X		
	lead			X
- plastic				
	PUR,		X	
	other plastics	X		
Motors		(X)		
Component boards		(X)		
Cables, transformers	Copper,	X		
	steel,	X		
	transformer oil		X	
X-ray tube				X
Packing	Wood,	X		
	cardboard,	X		
	paper	X		
Other parts			X	

18 TECHNICAL SPECIFICATIONS

X-ray tube	Toshiba D-052SB
Focal spot size	0.5 x 0.5mm accoring to IEC 60336
Target angle	5°
Total filtration	min. 2.5 mm Al
Generator	Constant potential, microprocessor controlled, operating frequency 80 kHz
Anode voltage	60-80 kV ± 5%
Anode current	4-12 mA ±(5% + 0.5mA)
Exposure time	Panoramic: 4.9 - 18 s as indicated ±8% Cephalometric: 0.2 - 5 s ±8%
Cooling period	Automatically controlled
Film size (film-based X-ray)	Panoramic:15 x 30 cm Cephalometric: 18 x 24 cm and 8” x 10”

The unit equipped with ceph film size 18 cm x 24 cm

X-ray beam size on film in ceph mode (H x W)	230 mm x 170 mm (primary slots 4 and 5) 170 mm x 230 mm (primary slot 6)

The unit equipped with ceph film size 8 in. x 10 in.

X-ray beam size on film in ceph mode (H x W)	245 mm x 190 mm (primary slots 4 and 5) 190 mm x 245 mm (primary slot 6)
Cassette (film-based X-ray)	Flat
SID	Panoramic: 480 mm (19”) Cephalometric: 160 - 170 cm (63” - 67”)
Magnification	Panoramic: constant 1.2 Cephalometric: 1.08 - 1.13
Line voltage / Mains frequency	100-132 V~ / 50 or 60 Hz, 180 - 240 V~, 50 Hz
Apparent resistance	0.3 ohms 100 V~ / 0.8 ohms 230 V~
Regulation	Automatic ± 10%
Line current	max. 8A at 230V~, 15A at 100V~
Fusing	8FF 500 VAC at 180 - 240 V~ 16FF 500 VAC at 100 -132 V~
Maximum continuous heat dissipation	< 250W

Electrical classification

Class	I
Type	B

Mechanical data

Weight	Panoramic:108 kg / 238 lbs Pan/ceph 126 kg / 278 lbs
Dimensions	(HxDxW) 2200x930x890 mm, 86.6x36.6x35 inch
Color	RAL 9002

Environmental requirements

Ambient temperature	Operating	+5°C to +40°C
	Storage	-10°C to +50°C (film-based X-ray) 0°C to +50°C (Dimax3 digital X-ray system)
Humidity	25% - 75%	

Manufacturer

PLANMECA Oy, Asentajankatu 6, 00880 Helsinki, FINLAND
phone: +358 20 7795 500

OPTIMUM SPACE REQUIREMENTS:

X-RAY	W	H	D
Planmeca Proline EC panoramic X-ray	1535mm 60 in	2250 mm 89 in	1250 mm 49 in
Planmeca Proline EC panoramic X-ray with Autoprint	1630 mm 64 in	2250 mm 89 in	1250 mm 49 in
Planmeca Proline EC Panoramic X-ray and Cephalostat CM	2250mm 60 in	2250 mm 89 in	1250 mm 49 in

NOTE ***For information given in User's statement please refer to Planmeca Proline EC X-ray unit's technical manual.***

19 USER'S STATEMENT FOR PLANMECA PROLINE EC PANORAMIC X-RAY

Radiation leakage technique factors

The maximum-rated peak tube potential is **80 kVp** and the maximum rated continuous tube current is **12mA** for the maximum-rated peak tube voltage.

Minimum filtration

The Radiation port contains additional filtration of at least **1.5 mm aluminium**.

Total filtration min. **2.5 mmAl**.

When the X-ray beam is attenuated with the 3 mmAl the dose is reduced by factor **0.50-0.56**

Maximum attenuation equivalent of the front panel of the panoramic cassette holder

0.5 mmAl

Rated line voltage

100-132 V~, 180 - 240 V~. Line voltage regulation 10%.

Maximum line current

Maximum **15** Amperes at 100 V~, 8A at 230 V~

Technique factors that constitute the maximum line current condition

80kV / 12mA

Generator rating and duty cycle

1.5kW, duty cycle approximately **1:10**. The wait period is calculated using the following formula:

$t_w = f(HS_{MAX} - HS_1) - f(HS_0)$

where HS_{MAX} = maximum tube anode heat storage capacity (28 kJ)
HS_0 = current tube anode heat storage
HS_1 = heat storage caused by next intended exposure (kV x mA x s)
f = tube anode cooling rate as a function of heat storage (given by tube manufacturer)

Maximum deviation of peak tube potential from indicated value

±5%

Maximum deviation of tube current from indicated value

±(5% + 0.5mA)

Maximum deviation of exposure time from indicated value

±8%

DEFINITION OF MEASUREMENT CRITERIA

Exposure time

The beginning and end points of the exposure time are defined at **70%** of the peak radiation waveform measured with a calibrated X-ray monitor.

Peak tube potential

Is defined as the measured high voltage mean value measured with a calibrated non-invasive kVp meter.

Tube current

Is defined using the resistance and voltage over the feedback resistor measured with a calibrated multimeter. The mA value is then the voltage divided by the resistance.

The nominal X-ray voltage together with the highest X-ray tube current obtainable from the high-voltage generator when operated at its nominal X-ray tube voltage

80 kV 12mA

The highest X-ray tube current together with the highest X-ray tube voltage obtainable from the high-voltage generator when operated at its highest X-ray tube current

12mA 80kV

The X-ray tube voltage and X-ray tube current which result in the highest electric output power

80kV 12mA

The nominal electric power for a load time of 0.1s and at the nominal X-ray tube voltage

80 kV 12mA - 1500W

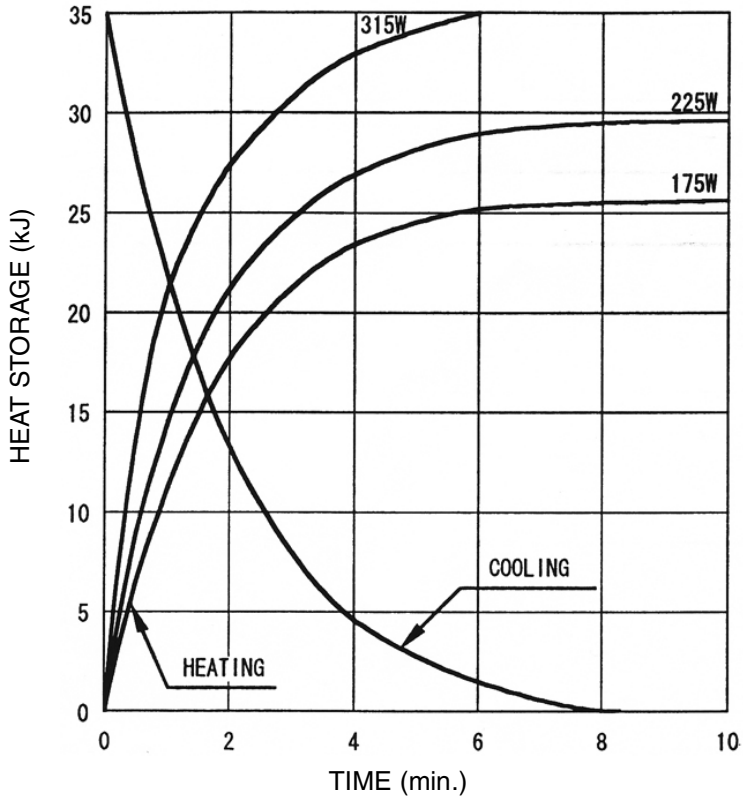
Nominal anode input power of the X-ray tube

1344 W

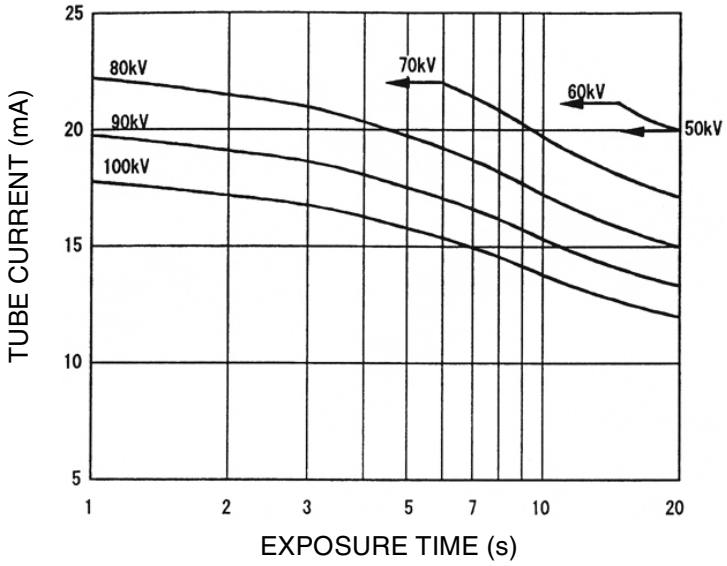
Maximum anode heat content of the X-ray tube

35 kJ

Anode heating/cooling curve of the X-ray tube



Single load rating of X-ray tube



Target material of the X-ray tube

Tungsten anode

Reference axis to which the target angle and the focal spot characteristics of the X-ray tube refer

90° with respect to the anode-cathode axis

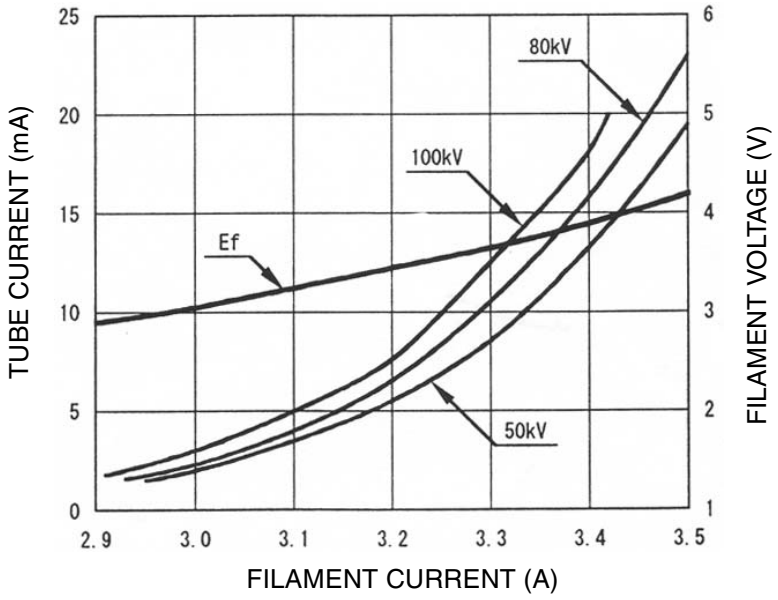
Target angle with respect to the reference axis

5°

Filtration in terms of quality equivalent filtration of the X-ray tube

Inherent filtration at least 0.8 Al/50 kV according to IEC 522/1976

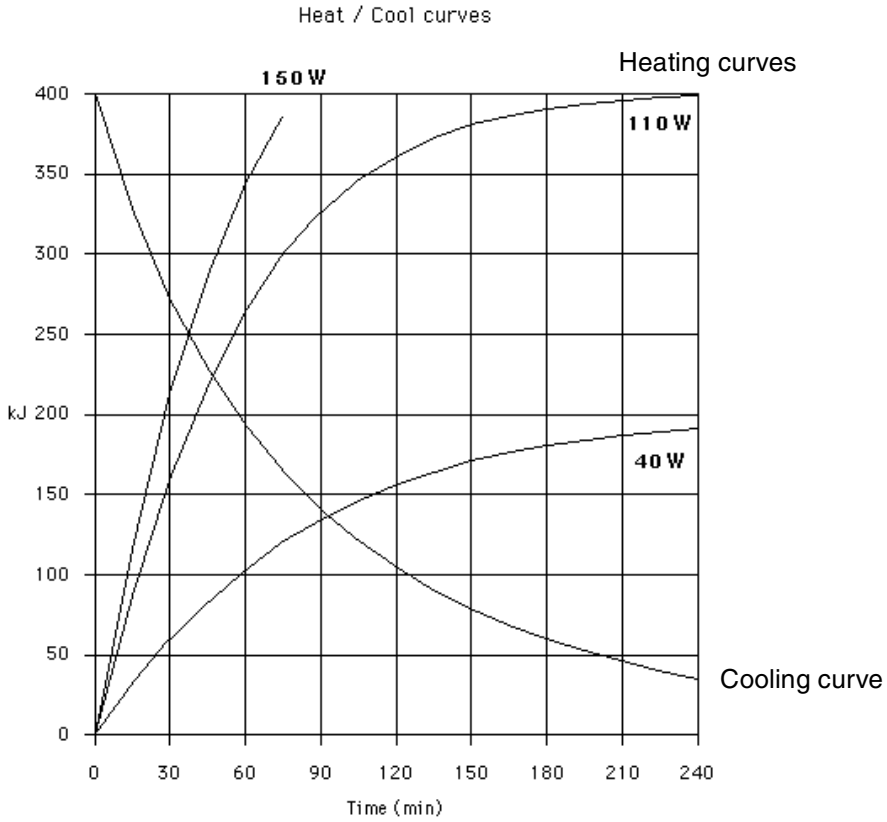
Emission & filament characteristics of the X-ray tube



Maximum X-ray tube assembly heat content

400 kJ

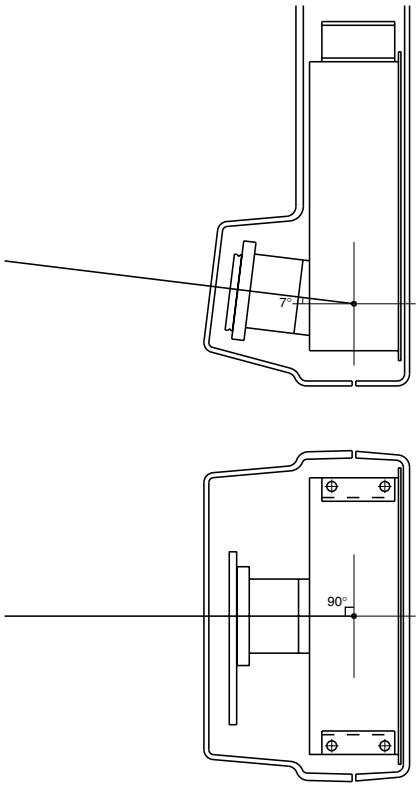
X-ray tube assembly heating/cooling curve



Maximum continuous heat dissipation of the x-ray tube assembly

6 kJ/min.

Reference axis to which the target angle and the focal spot characteristics of the tube head assembly refer



Target angle with respect to the reference axis

5°

Dimensions of the tube head assembly

(WxHxD) 245 mm x 275 mm x 135 mm

Weight of the tube head assembly

10.4 kg without collimator assembly
11.3 kg with collimator assembly

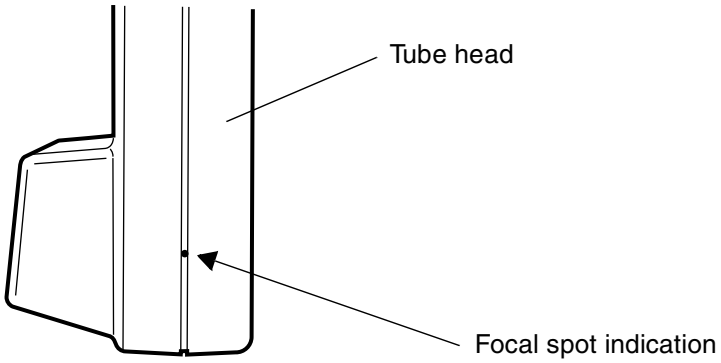
Values of loading factors concerning leakage radiation

80 kV, 12 mA

Tolerances of the focal spot on the reference axis

X= ±0.5 mm (sideways)
Y= ±0.5 mm (in depth)
Z= ±0.5 mm (in height)

Indication of focal spot



PLANMECA

www.planmeca.com

PLANMECA OY Asentajankatu 6, 00880 Helsinki, Finland, tel. +358 20 7795 500
fax +358 20 7795 555, e-mail: sales@planmeca.com, www.planmeca.com