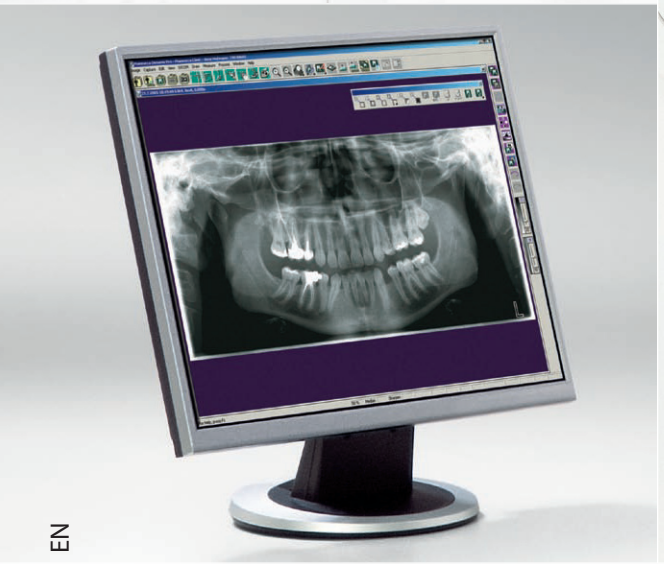

EN

PLANMECA
Proline XC

user's manual

10010939_6

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 IEC 60364
- 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.

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1 INTRODUCTION

The Planmeca Proline XC 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 XC Panoramic X-ray unit. Please read these instructions thoroughly before using the unit.

CE 0537

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

NOTE **This manual is valid for software revisions: PK 6.70 or later and PG 6.70 or later as well as for GUI software revision 1.6.0.0R 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).

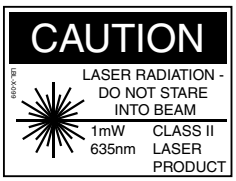
X-ray source assembly, emitting (Standard IEC 60417).

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 XC 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.***

NOTE **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.**

NOTE **If the temperature of the tube head exceeds 60° C the message "Please wait" and the current temperature of the tube head will appear on the display and no exposures can be taken. The message appears on the display until the temperature drops below 60° C. The images can now be taken normally. The time will then reappear on the main display.**

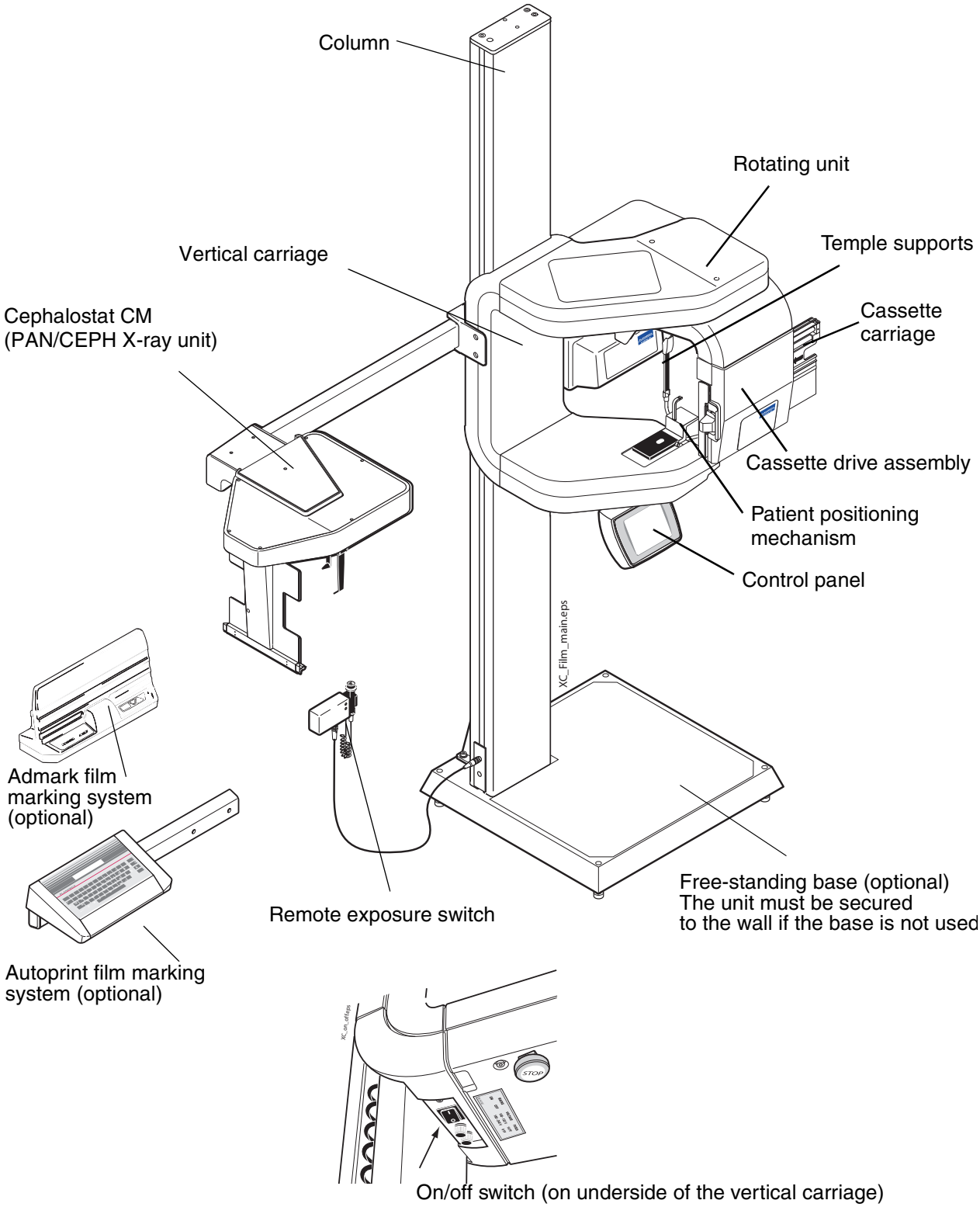
NOTE **Maintain audio and visual contact with the patient and the unit during the exposure.**

4 CHECKLIST - BEFORE USING THE UNIT

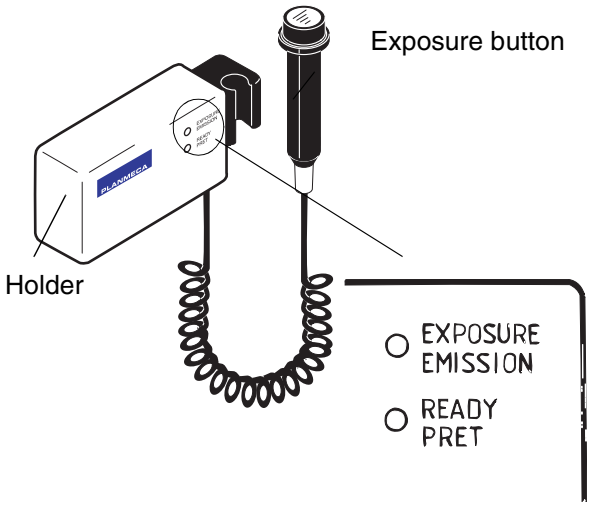
- Make sure that you are fully acquainted with the appropriate radiation protection measures and these instructions before using the unit.
- Make sure that the film processor is in working order and is ready for use.
- Make sure that you are using the correct film processing chemicals for the film you 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 PROLINE XC PANORAMIC X-RAY - MAIN PARTS

General view of the X-ray



Remote exposure switch



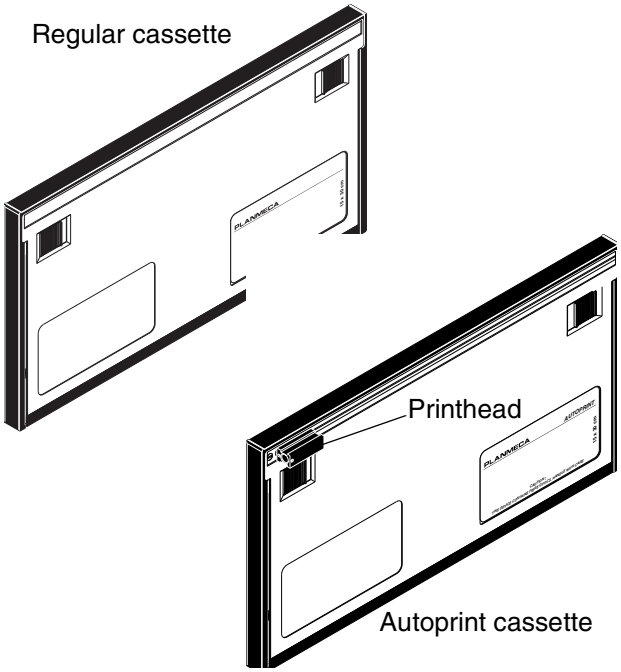
When you take an exposure you must press and hold down the exposure button for the whole duration of the exposure. If you remove your finger from the exposure button before the exposure cycle is completed radiation is interrupted, the rotating unit will stop moving, the temple supports will open, and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

The error code must be cleared from the display before the unit can be used again. See section “13.2 Error codes” on page 43 for information on how to clear error codes from the display.

The exposure indicator light on the remote exposure switch will come on when an exposure is taken and indicates that the unit is generating radiation. Also, the READY field on the control panel will change the colour.

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

Cassettes

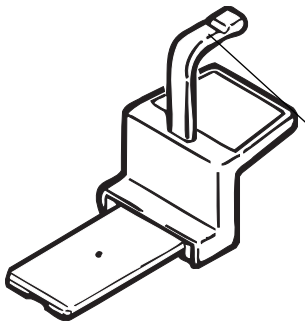


There are two versions of the panoramic film cassette, the regular version and the Autoprint version. The cassette door swings open from the top to the bottom. The Autoprint cassette must be used with the Autoprint film marking system. Be careful when handling and loading the Autoprint cassette not to 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).**

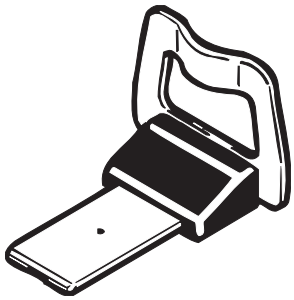
Patient supports

Chin rest

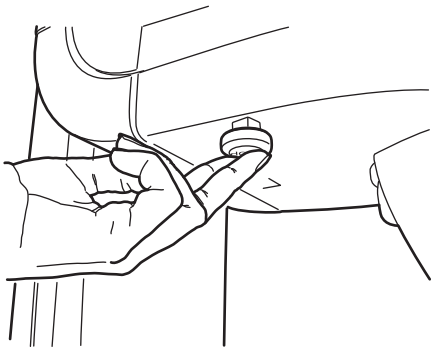


Disposable bite piece

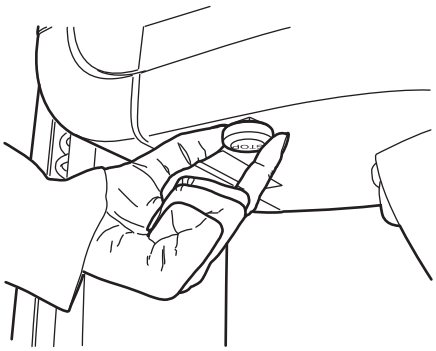
Chin support



Emergency stop button

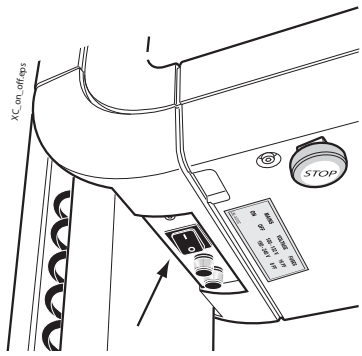


The emergency stop button is located on the underside of the vertical carriage. Press the button to stop all movements and radiation emition.



The Error message *Error 58* will appear on the main display. To clear the error code from the display touch *OK* and pull the stop button out.

6 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 unit will carry out a self-test which will last a few seconds.

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 “13.2 Error codes” on page 43.**

7 GRAPHIC USER INTERFACE

To make a selection on the control panel, touch the screen on a text field or on an icon. For example, to select the program type touch the *Prog.* field. You will hear a signal tone when a field or an icon is activated.

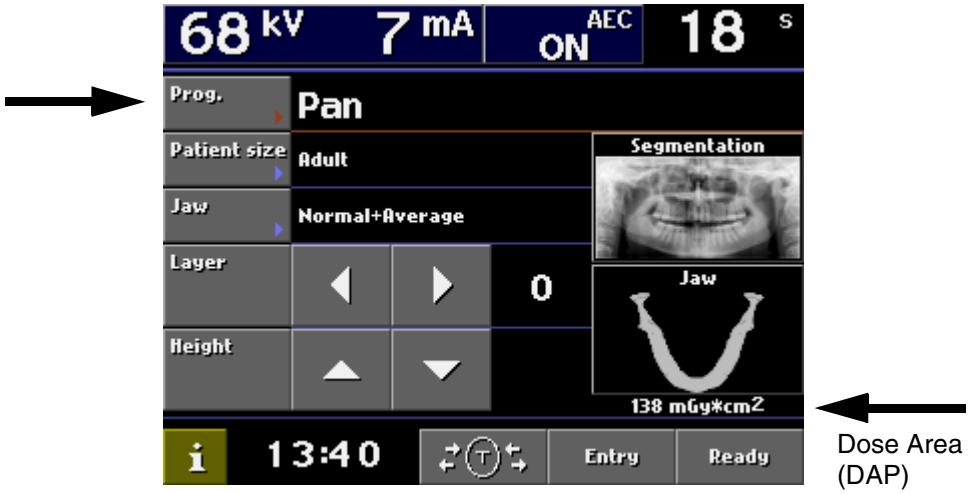
To cancel a selection, touch the *Cancel* field. Only the text fields and icons on the screen are touch-sensitive, and touching the areas outside them will not activate an action.

NOTE **Refer to the Cephalostat user's manual for information on how to select the cephalometric exposure program.**

NOTE **The radiation dose will be displayed on the main display in case you have enabled the DAP function, see section "7.4.2 Behavioural preferences" on page 23.**

7.1 Selecting panoramic exposure program

To select the panoramic exposure program touch the *Prog.* field on the main display. The main display is the display that is shown when the unit is switched on.



The *Select program type* display shown below appears. Select program type *Pan*.

NOTE **The exposure program Ceph will appear on the list in case the X-ray unit is equipped with Cephalostat.**

When you have selected the panoramic exposure program the main display will be shown again.

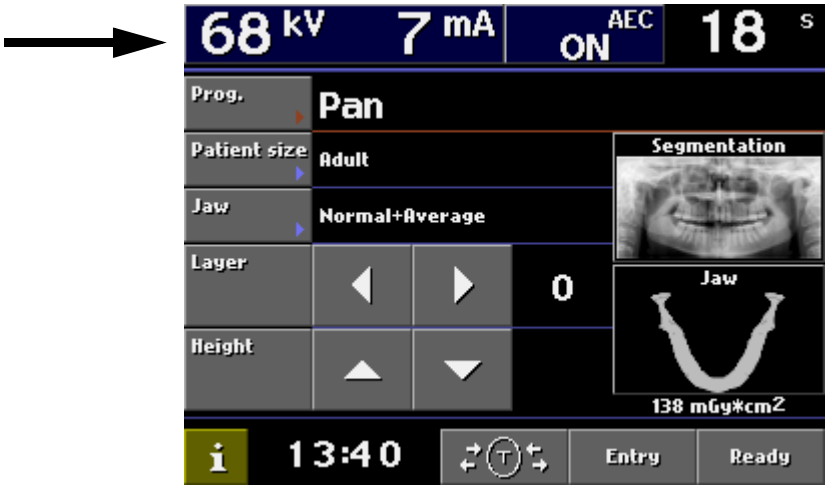
7.1.1 Selecting patient size

To change the patient size from adult to child, touch the *Patient size* field on the main display. To change the setting back to adult, touch the *Patient size* field again.

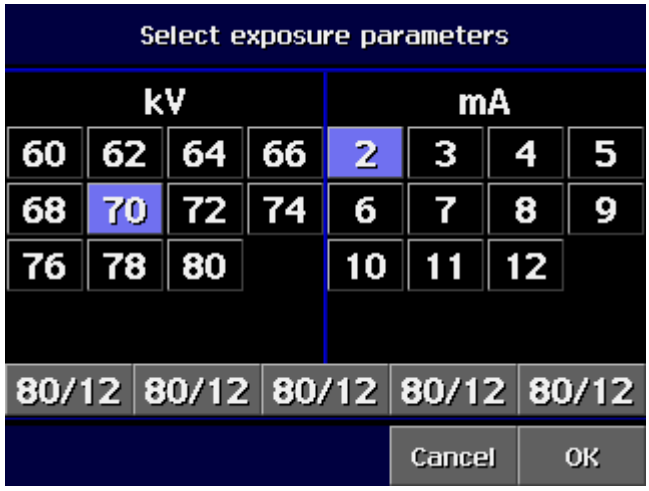
If the patient is a child or a very small adult select the *Child* setting, otherwise select *Adult*. When you select the Child setting the width and height of the exposed area will be slightly reduced.

7.1.2 Selecting kilovolt and milliampere values

Touch the *kV/mA* field on the main display.



The following display appears.



Quick buttons

Select the correct kV and mA values for the patient being X-rayed according to the build of the patient. Alternatively you can select one of the quick buttons on the bottom of the *Select kV/mA* display.

The exposure values for a panoramic exposure are given in section “9 PANORAMIC EXPOSURE” on page 29.

Confirm the selection and return to the main display by touching *OK.*

Programming quick button values

You can use the quick buttons on the bottom of the *Select kV/mA* display. The quick button values have been preset at the factory but you can also program the values.

If you want to program the values select first the kV and mA values by touching the corresponding fields and then touch the desired quick button until you hear a signal tone. By doing this the kV and mA values will be changed for the quick button.

You can program the quick button values for each exposure program, i.e. panoramic, sinus and TMJ exposure programs.

Confirm the selection and return to the main display by touching *OK.*

7.1.3 Panoramic 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".**

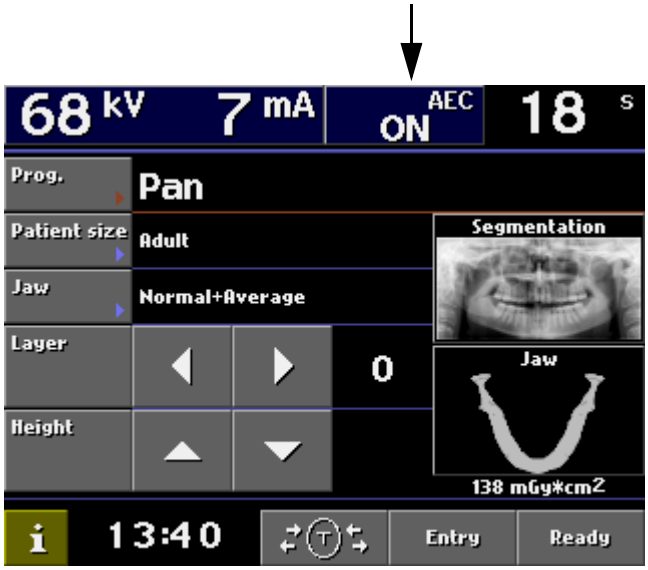
NOTE **The AEC is not compatible with phosphorus plates. Use only X-ray film.**

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

NOTE **The sector on the patient's left can not be deselected when using AEC.**

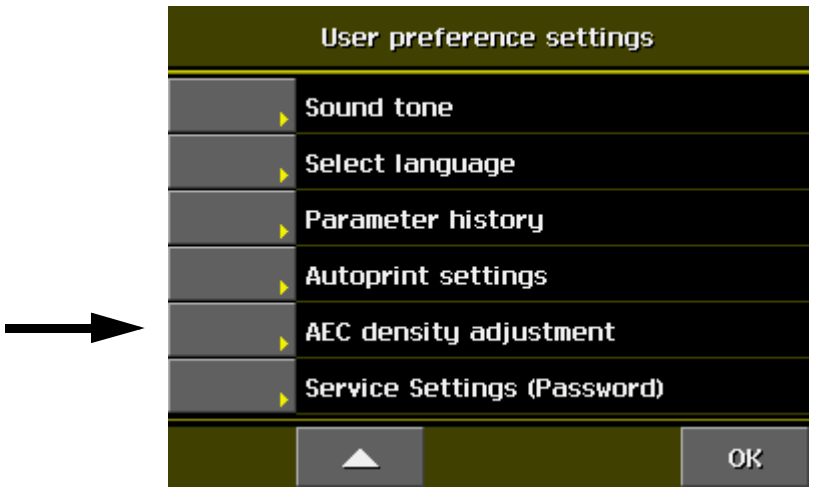
Using the AEC function

If your X-ray unit is equipped with the panoramic AEC function it can be activated by touching the *AEC* field on the top of the main menu in the **panoramic mode**. When the AEC function is activated it automatically selects the kV and mA starting values based on the patient and jaw size for optimal exposure. Selecting the right patient and jaw size will assist in the AEC operation.

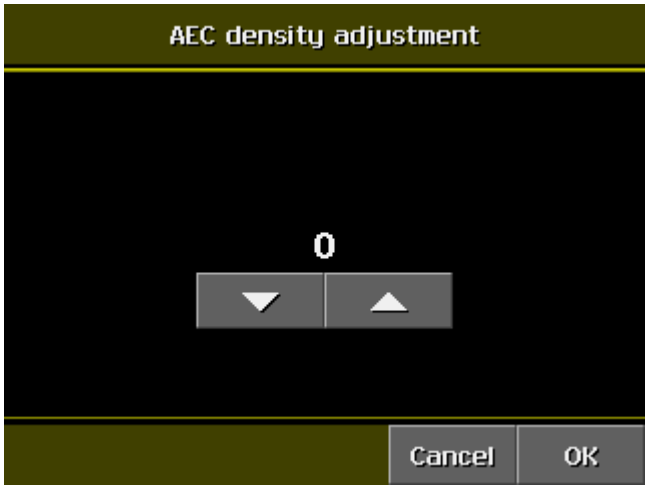


Selecting optical density

Touch the *i* field on the main display. Select *AEC density adjustment* on the *User preference settings*.



Set the optical density by touching the arrows. The default value is 0.



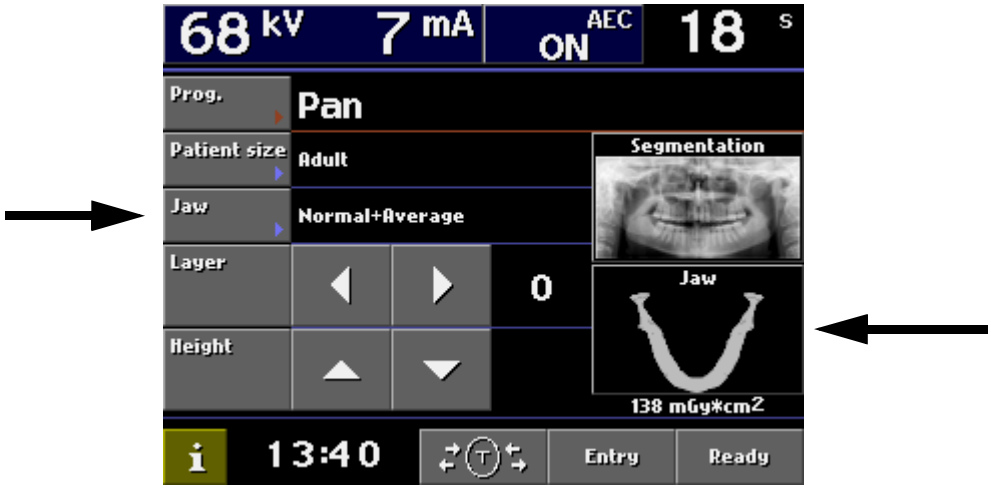
Touch *OK* to confirm your selection.

NOTE **If the optical density is not selected the previously selected density will be used.**

Patient size selection

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.

Touch the *Jaw* field or the Jaw icon on the main display to select the kV and mA parameter values. If the patient size *Child* is selected the unit will automatically reduce the parameter values.



NOTE **After the exposure has been taken, the selected exposure parameters remain on the main display. The default values will appear again on the main display after you have selected a different jaw size.**

Verifying the function of AEC

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 default values (e.g. 68 kV/8 mA). 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 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 another exposure. The AEC function should now adjust the exposure values downwards.

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.

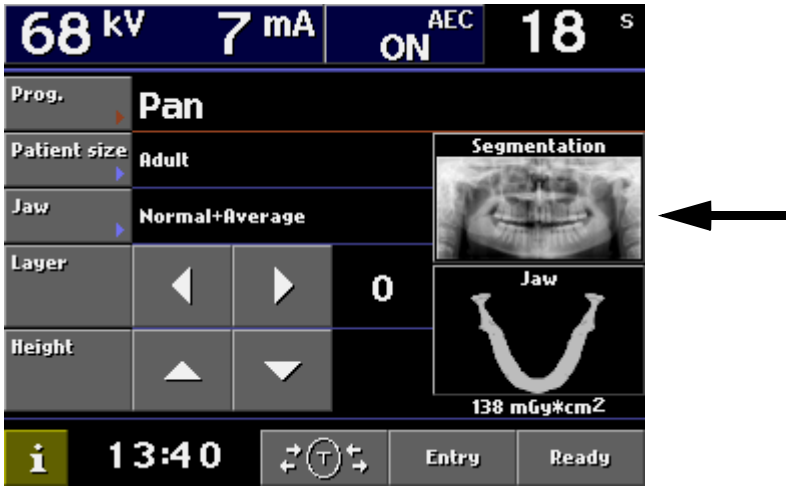
Large patient: the range varies from -5 to +6 units compared to the original values.

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.

7.1.1 Selecting segmentation

This function allows you to take exposures of different jaw segments. It will reduce the radiation dosage as only diagnostically interesting areas need to be X-rayed.

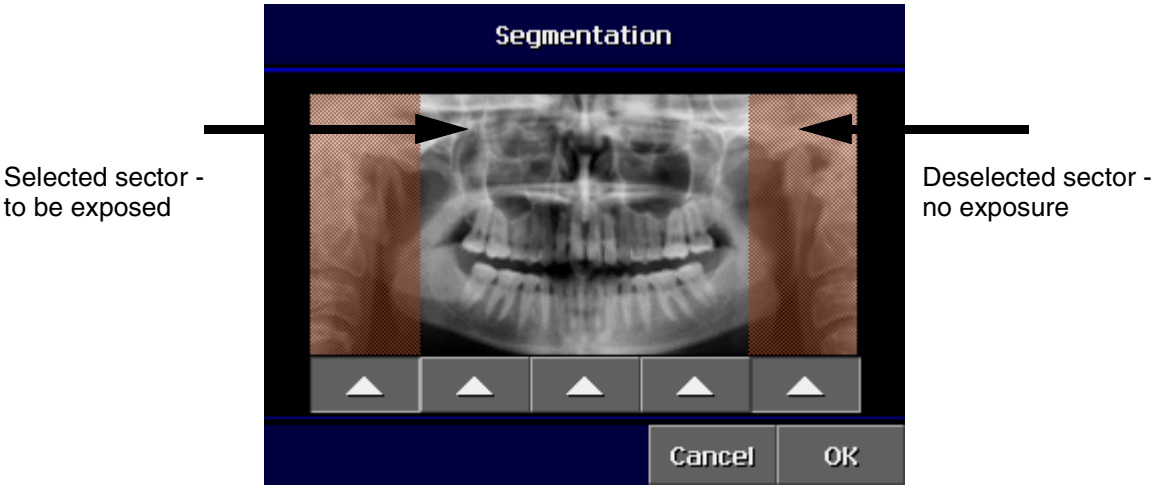
Touch the *Segmentation* field on the main display.



The *Segmentation* display appears. The display shows an icon which is divided into five vertical sectors. The segment arrows on the display refer to the five vertical sectors.

Touch the corresponding arrow field(s) to **deselect** the sector(s) that should not be exposed. The sectors which will **not** be exposed will turn dark. The sectors which will be exposed remain white.

Touching the arrow of the deselected sector again will change the colour of the sector back to white.

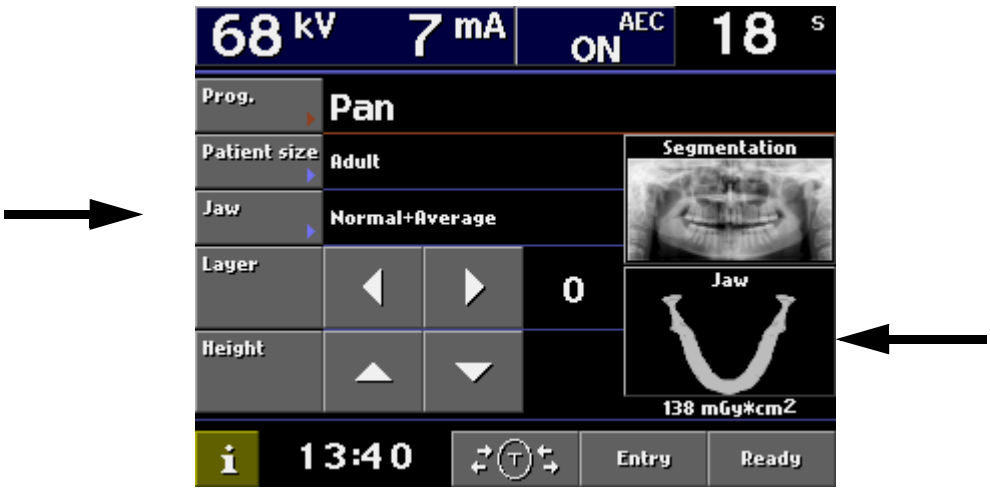


Confirm the selection and return to the main display by touching *OK.*

7.1.2 Selecting jaw size

This function allows you to adjust the form of the focal trough to accommodate patients with different jaw shapes and sizes.

Touch the *Jaw* field on the main display, or alternatively, tap the jaw icon on the right side of the display.



The following display appears. The marking on the jaw icon demonstrates the image layer position.

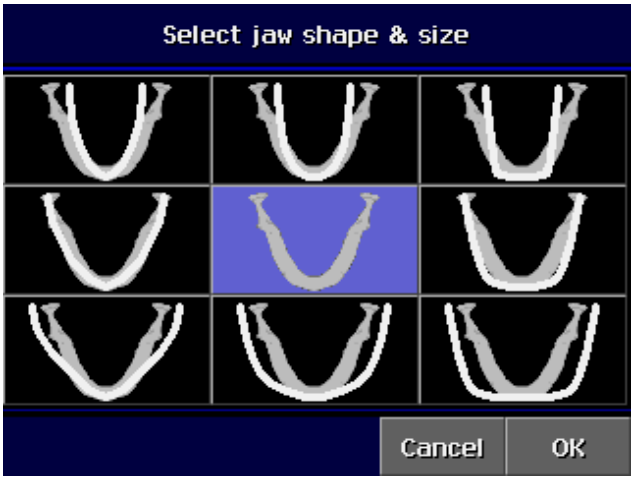
Select the correct jaw shape and size for the patient to be X-rayed by tapping the corresponding icon.

Jaw size:

Narrow

Average

Wide

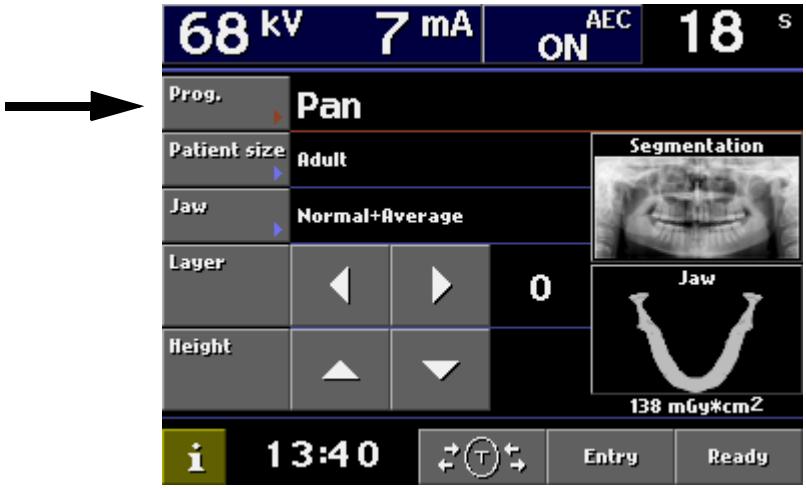


Jaw shape: V-shaped Normal Square

Confirm the selection and return to the main display by touching *OK*.

7.2 Selecting temporomandibular joint (TMJ) exposure program

To select the temporomandibular joint (TMJ) exposure program first touch the *Prog.* field on the main display.

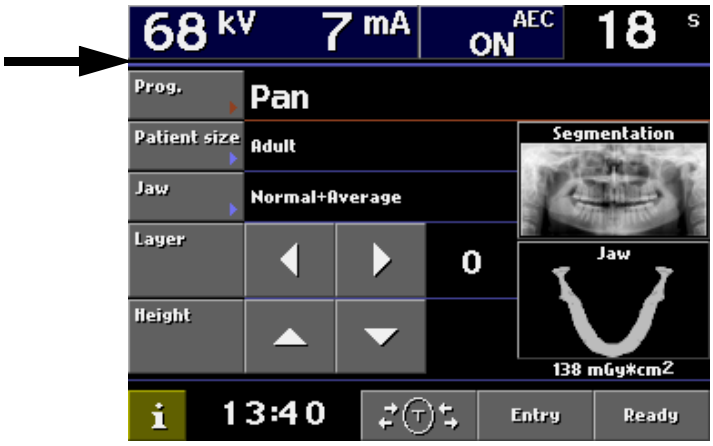


The *Select program type* display shown below appears. Select program *TMJ*. When you have selected the required TMJ exposure program the main display will be shown again.

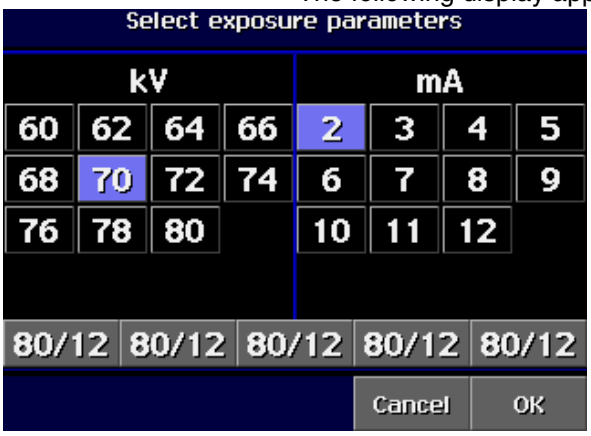
NOTE **The exposure program Ceph will appear on the list in case the X-ray unit is equipped with Cephalostat.**

7.2.1 Selecting kilovolt/milliampere values and jaw size

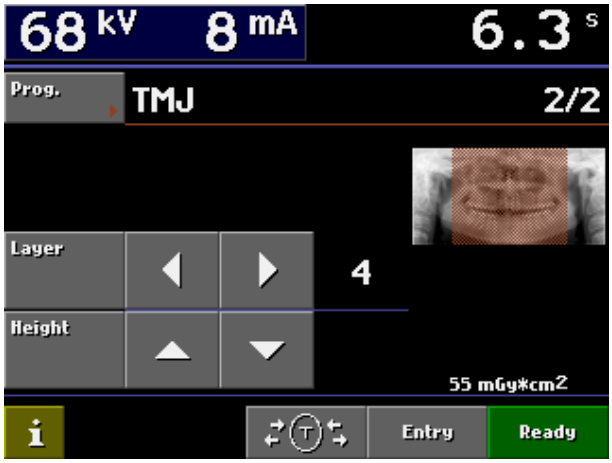
Touch the *kV/mA* field on the main display.



The following display appears.



The kV/mA values can be adjusted before the second TMJ exposure.



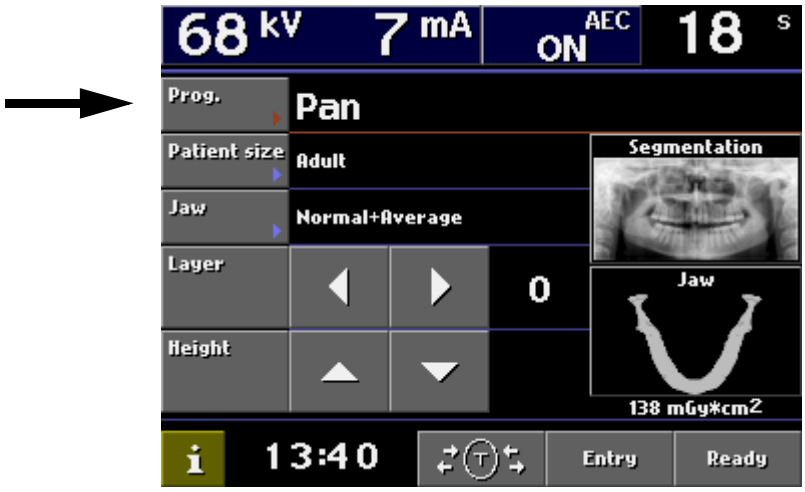
Select the correct exposure values for the patient being X-rayed according to the build of the patient.

The exposure values for TMJ exposures are given in section “10 TEMPOROMANDIBULAR JOINT EXPOSURE” on page 34.

Confirm the selection and return to the main display by touching *OK.*

7.3 Selecting sinus exposure program

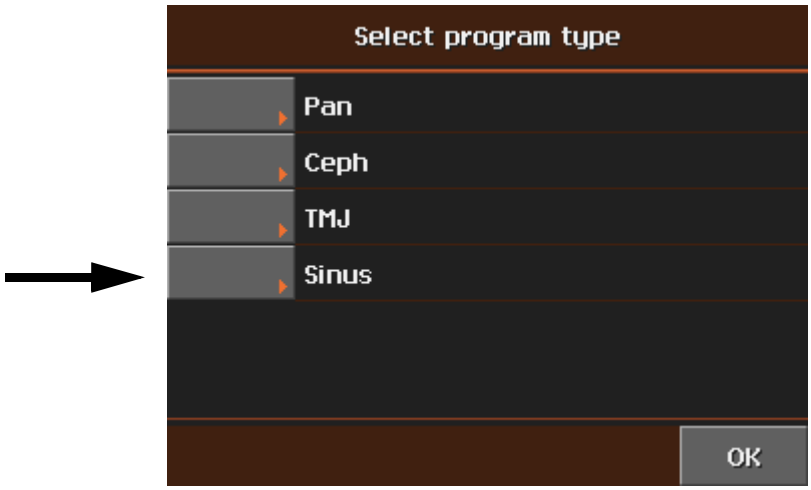
To select the sinus exposure program first touch the *Prog.* field on the main display.



The *Select program type* display shown below appears. Select program type *Sinus.*

NOTE **The exposure program Ceph will appear on the list**

in case the X-ray unit is equipped with Cephalostat.



When you have selected the sinus exposure program the main display will be shown again.

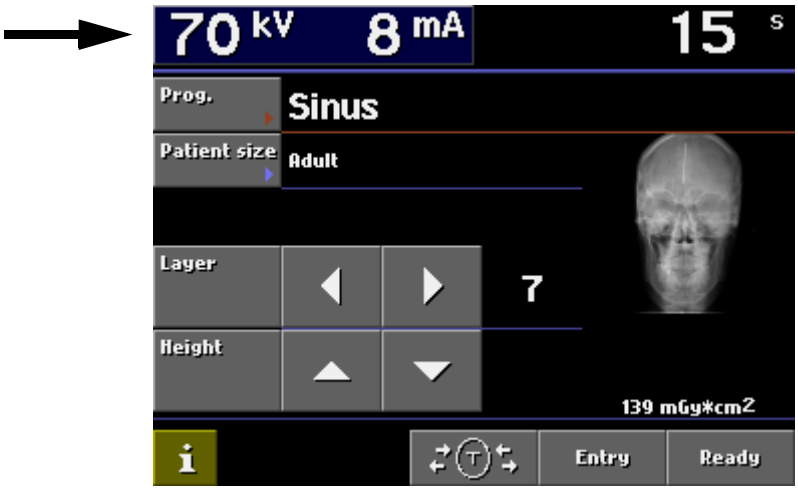
7.3.1 Selecting patient size

To change the patient size from adult to child, touch the *Patient size* field on the main display. To change the setting back to adult, touch the *Patient size* field again.

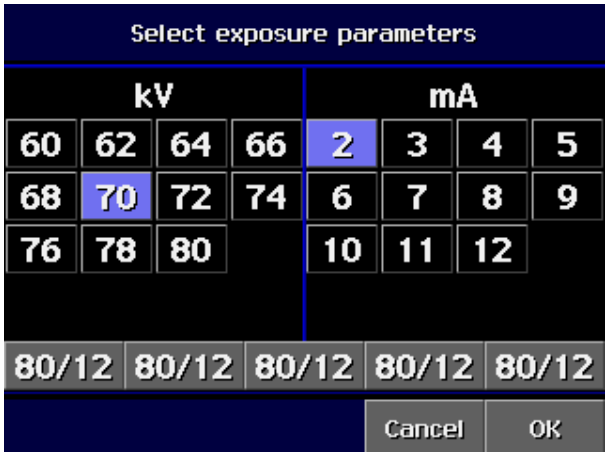
If the patient is a child or a very small adult select the *Child* setting, otherwise select *Adult*. When you select the child setting the width and height of the exposed area will be slightly reduced.

7.3.2 Selecting kilovolt/milliampere values

Touch the *kV/mA* field on the main display.



The following display appears.



Select the correct exposure values for the patient being X-rayed according to the build of the patient. The exposure values for sinus exposures are given in section “11 SINUS EXPOSURE PROGRAM” on page 39.

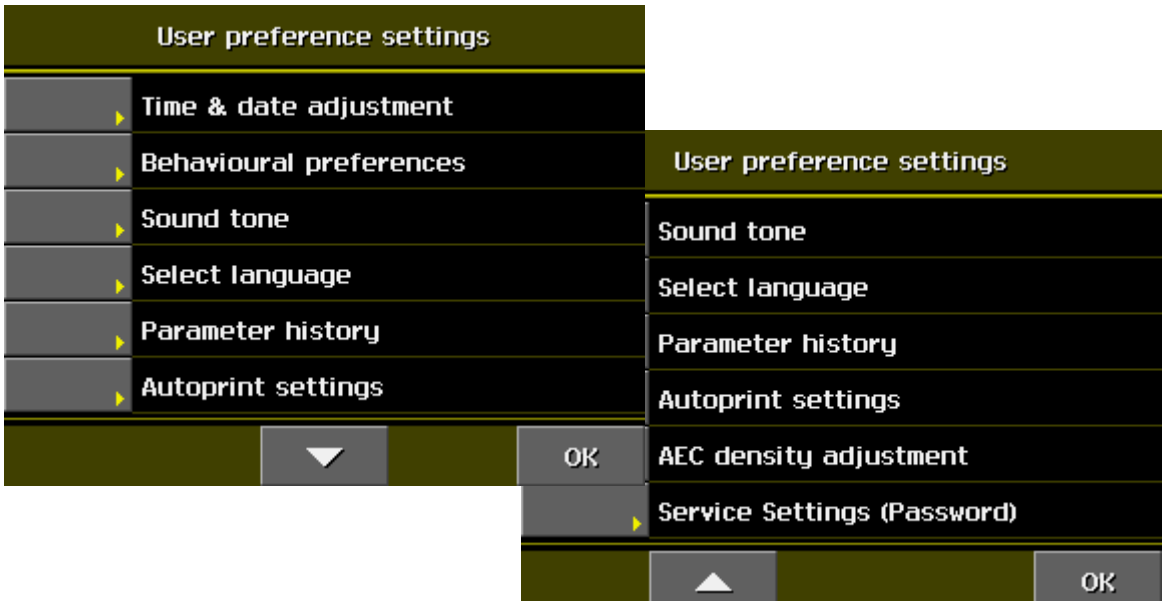
Confirm the selection and return to the main display by touching *OK.*

7.4 User preference settings

The control panel has a number of additional functions for special requirements. Some of the special functions (*e.g. Time&date adjustment*, *Behavioural preferences* and *Parameter history*) can be entered by the user, whereas *Service settings* is for the use of service personnel only. This section describes the user specific special functions.

To enter the list of the *User settings*, first touch the ***i*** field.

The following display appears. Touch the arrow to scroll up and down the list.

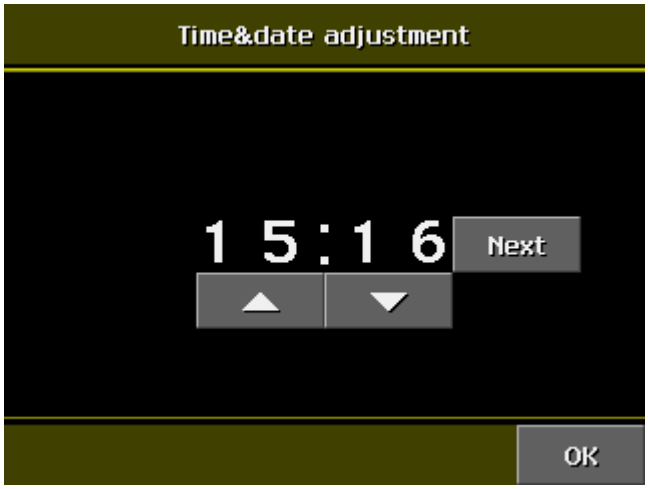


To return to the main display, touch *OK.*

7.4.1 Time&date adjustment

NOTE **The time is set at the factory to the local time. Change the time to show correct time/date before using the unit.**

Touch the *Time&date adjustment* on the User settings display. The following display appears. Each time you touch the *Next* field different clock digits will start to flash.



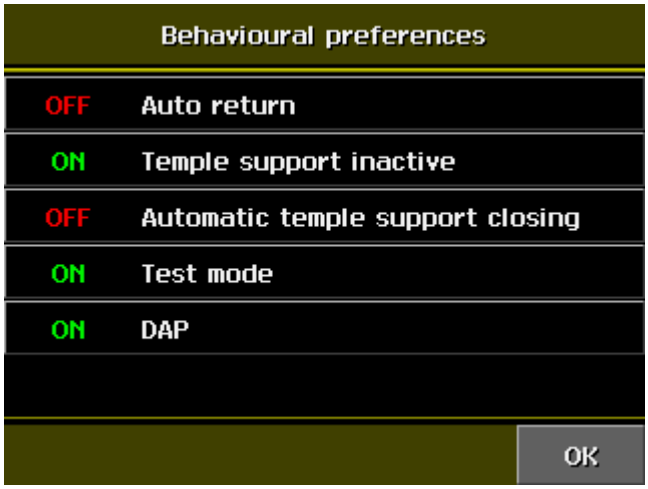
First the *minutes* start to flash. Use the arrows to set the correct time. Touch *Next* to confirm your selection. Subsequently, the *hours* start to flash. Proceed as above.

After you have set up the time, the date display appears. Make your selection (days, months and years) by using the arrows and confirm by touching the *Next* field.

Touch the OK field to exit the clock setting mode when you have finished setting the time.

7.4.2 Behavioural preferences

Select *Behavioural preferences* on the User preference settings display. The following display appears.



You can enable/disable the following functions by touching the required function. Confirm your selection by touching *OK* and **restart** the X-ray unit.

Auto return

The X-ray unit can be set so that the rotating unit will automatically return to the entry position at the end of an exposure.

Temple support inactive

The X-ray unit can be used without temple support when the temple support motor is inactivated. After enabling the Temple support inactive -function, remove the temple supports.

Automatic temple support closing

The temple supports will automatically close when the ***T*** field or the *Ready* field on the main display is touched.

Test mode

The test mode enables the X-ray operation without generating radiation (e.g. demonstration purposes).

DAP

By selecting *DAP* (Dose Area Product) the radiation dose of each exposure will be displayed after the exposure is completed. The program measures the highest possible radiation dose the patient is exposed to in each exposure with the exposure values (kV, mA, time). In case the patient does not cover the whole exposure field (e.g. Ceph exposure), the real radiation dose is lower.

7.4.3 Sound tone

Select *Sound tone* on the User preference settings display to adjust the warning sound of the radiation. Use the arrows to adjust the warning sound volume.

Confirm your selection by touching *OK.*

7.4.4 Select language

Select *Select language* on the User preference settings to set the desired language of the Graphic user interface (GUI).

Confirm your selection by touching *OK.*

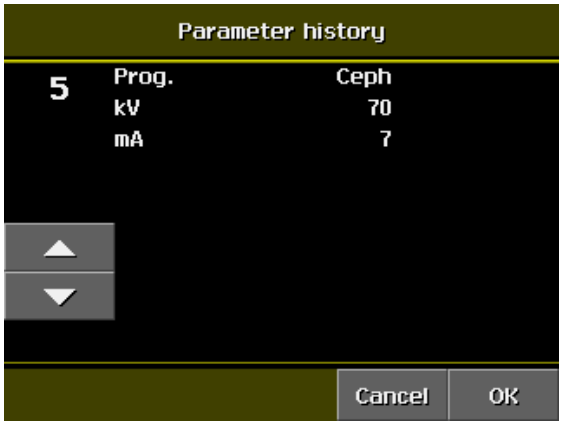
7.4.5 Parameter history

Select the *Parameter history* on the User preference settings display.

The exposure settings selected for the previous 25 exposures are stored in the memory. This information is stored in *Parameter history*. Touch the arrows to scroll backwards and forwards through the memory.

Touch *OK* if you wish to take another exposure using the stored settings shown on the display. The rotating unit will move to the ready position so that the exposure can be taken.

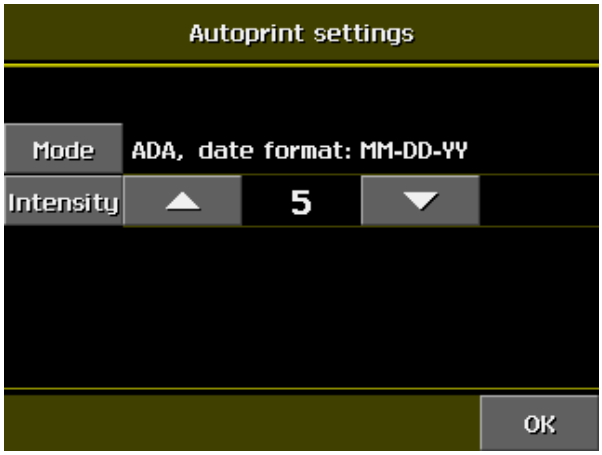
Touch *Cancel* if you do not wish to take an exposure using the stored settings. The unit will return to the normal mode.



7.4.6 Autoprint settings

NOTE **The autoprint settings can be modified only when accessed via *Panoramic* mode (Panoramic program on the main page).**

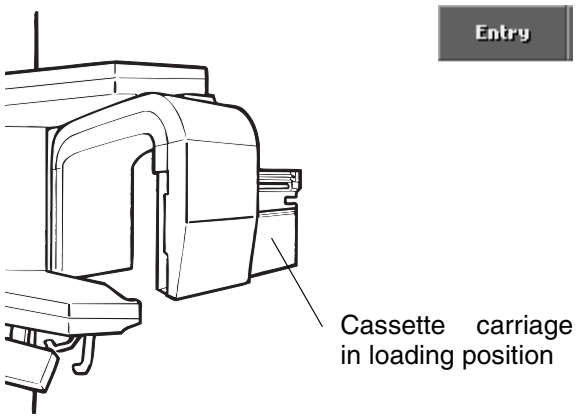
Select the *Autoprint settings* on the User preference settings display. The following display appears.



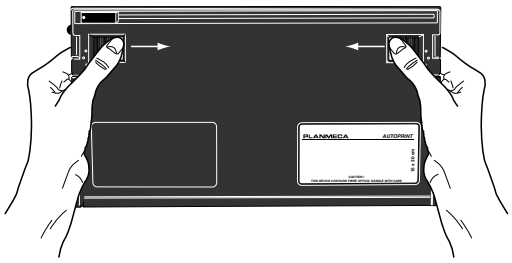
The exposure serial number can be marked to the film. Touch the *Mode* field to select either the ADA or ISO/FDI orientation.

Adjust the intensity by touching the intensity arrows.

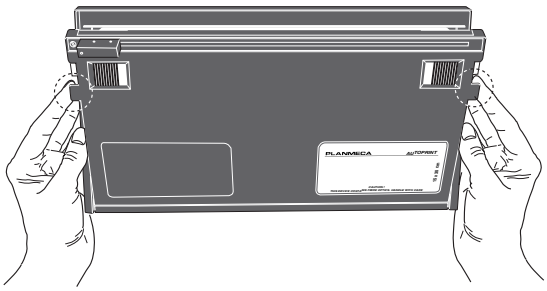
8 LOADING THE CASSETTE

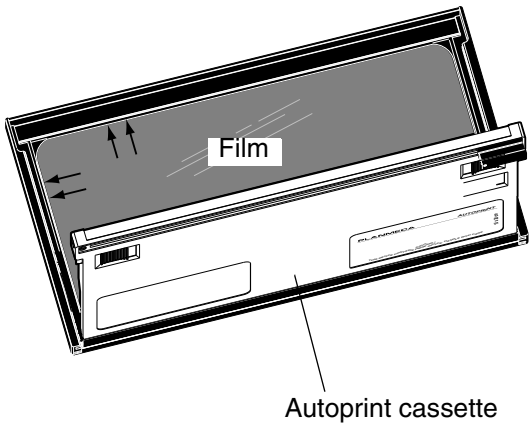


Touch the *Entry* field to move the cassette carriage to the loading position if it is not already in that position.



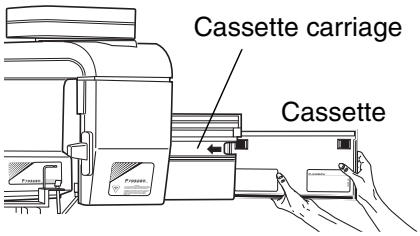
In the darkroom, push the latches inwards to open the cassette door (see figure beside) and place a film in the cassette. Handle the film in accordance with the manufacturer's instructions and be careful not to damage the intensifying screens.



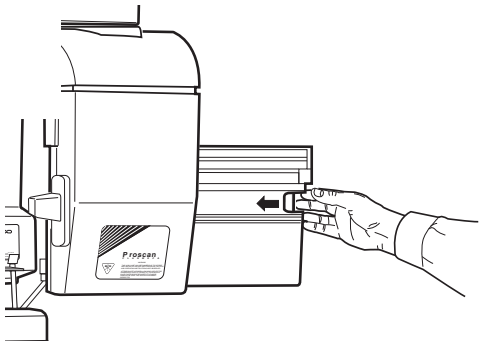


When you are using the Autoprint cassette position the film so that it touches the inner left-hand and upper edges of the cassette. With the regular cassette position the film so that it touches the bottom edge. The film must be on the intensifying screen.

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.



8.1 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

NOTE **Make sure that the Test mode has been enabled on the Behavioural preferences display before the demonstration.**

When the Test mode function is enabled no radiation is generated when you press the exposure button. The C-arm will move normally but no radiation will be generated and no radiation warning signals will be given, i.e. this is a "dummy run" function for training and demonstration purposes. For example, you might want to demonstrate the C-arm movements before taking exposures of children or nervous patients.

NOTE **Disable the function after the demonstration.**

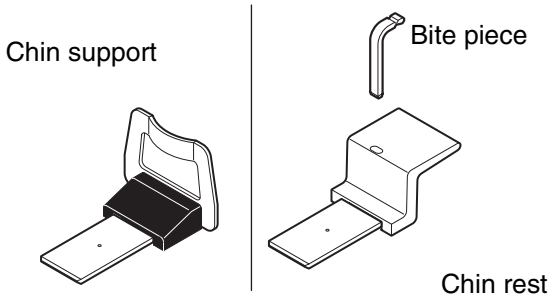
9 PANORAMIC EXPOSURE

Normal panoramic exposure

Area exposed in CHILD mode

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 reduced.

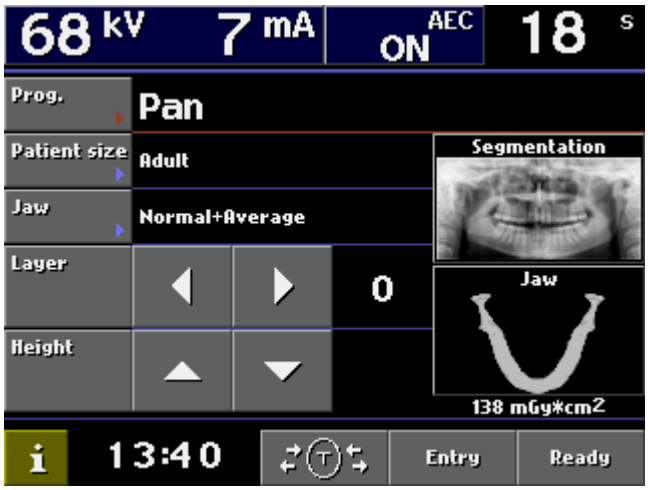


Use the chin rest for this procedure. Insert a new bite piece into the hole in the top of the rest.

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.

Select the panoramic program, see section "7.1 Selecting panoramic exposure program" on page 9.



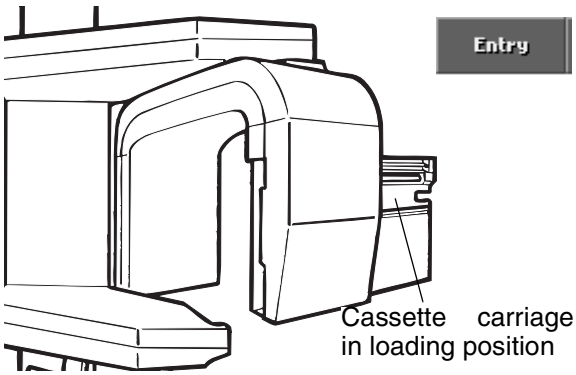
If the patient is a child or a very small adult select the *Child* mode by touching the *Patient size* field.

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.

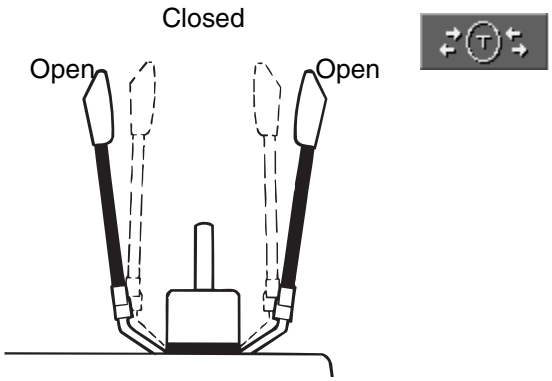
PANORAMIC EXPOSURE VALUES
Based on Kodak Ektavision film and Kodak Ektavision screen

PATIENT	kV VALUE	mA VALUE
Child	60	4
Adolescent	62	5
Small adult	64	6
Average-sized adult	68	7
Large adult	70	9

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



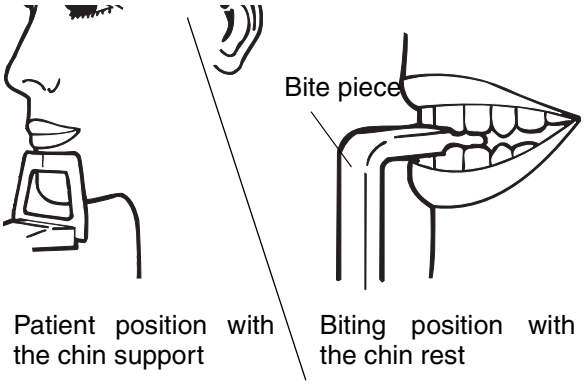
Touch the *Entry* field to move the rotating assembly to the entry position and the cassette carriage to the loading position if they are not already in that position.



Touch the temple support field on the main display 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.

Touch either of the height adjusting arrows 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.



Patient position with the chin support

Biting position with the chin rest

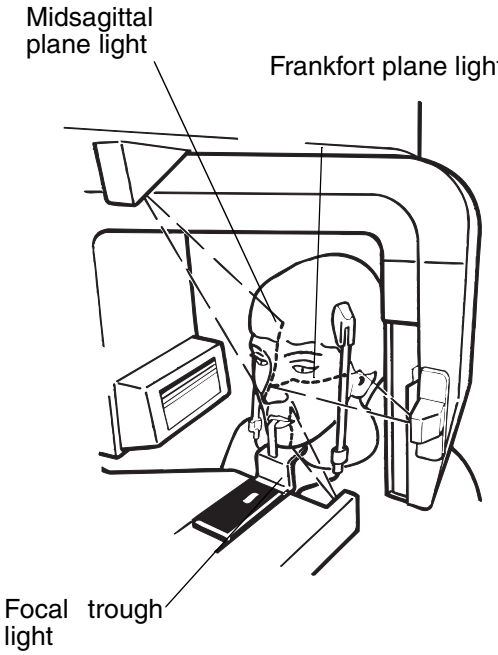
Ask the patient to step forward, grasp the patient handles, stretch up and place their chin on the chin rest. Slide the bite piece up or down until the patient is able to bite it. The incisal edges of the maxillary and mandibular teeth must be in the groove in the bite piece.

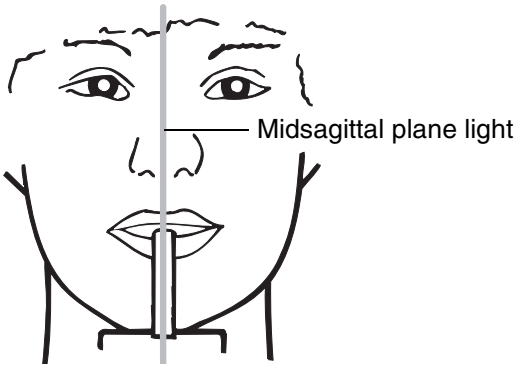
When you are using the chin support, position the patient so that the chin, just below the lower lip, touches the top bar of the chin support.

Touch the temple support field to close the temple supports.

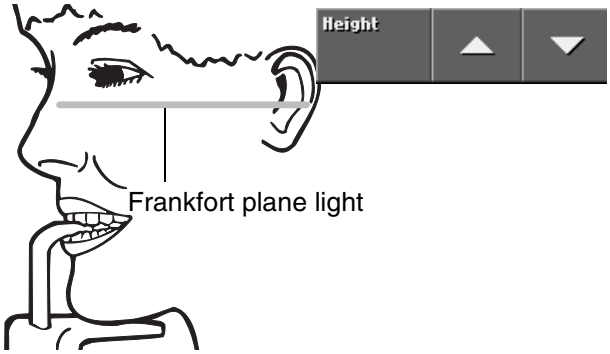
Stand behind the patient and make sure that the patient's shoulders are level and the neck muscles relaxed.

Touch either of the *Layer* arrows 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 arrows to adjust the position of the patient positioning mechanism. If the lights go out before you have positioned the patient touch either arrow a second time to switch the lights on again.

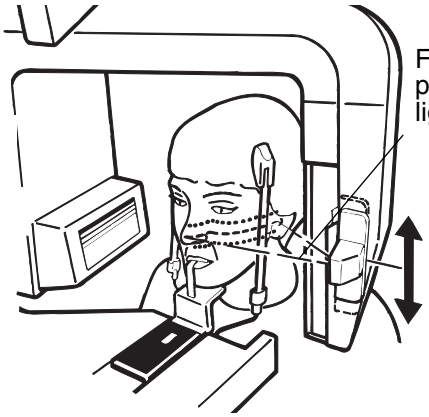




Position the patient's head so that the midsagittal plane coincides with the midsagittal plane light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.



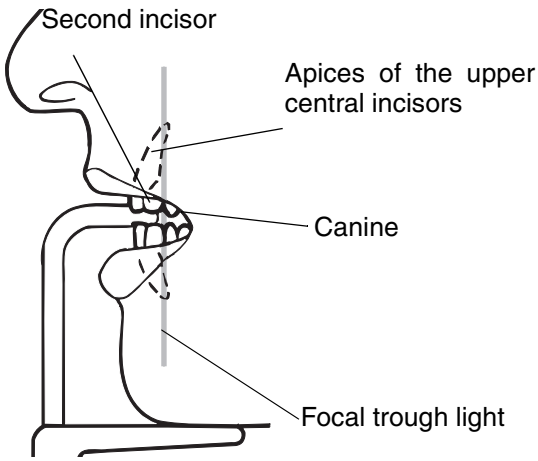
Position the patient's head so that the Frankfort plane coincides with the Frankfort plane light beam. To do this support the back of the patient's head with your hand and then adjust the tilt of the patient's head by raising or lowering the vertical carriage with these keys. The patient's back should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



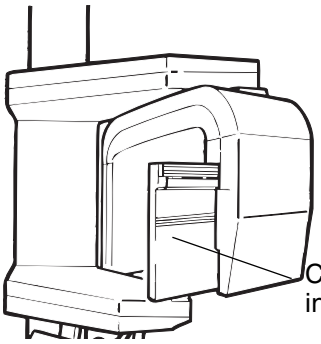
Note that the Frankfort plane light, located on the side of the cassette drive assembly, can be slid up and down to accommodate different head sizes.

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

To do this touch and hold either of the *Layer* arrows 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 left arrow moves the patient forwards, and the right arrow 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.

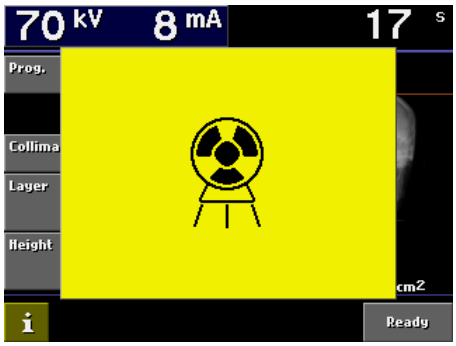


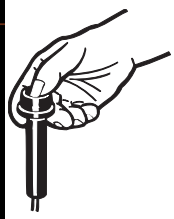
Cassette carriage in ready position

Touch the *Ready* field 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.





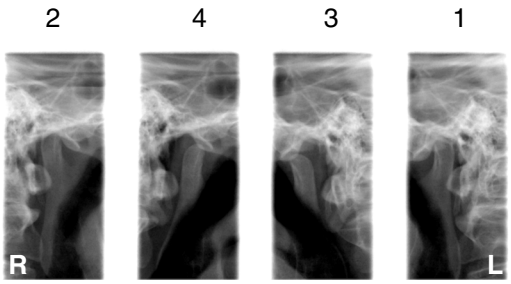
Press and hold down the exposure button on the remote control for the duration of the exposure (18 seconds). The rotating assembly will move through one exposure cycle. During the exposure cycle the radiation warning light will come on and you will hear the radiation warning tone. When the rotating assembly 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 "7.4.2 Behavioural preferences" on page 23, the rotating unit will return to the ready position before the temple supports open.**

Touch the *Entry* field to drive the rotating assembly to the entry 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.

10 TEMPOROMANDIBULAR JOINT EXPOSURE

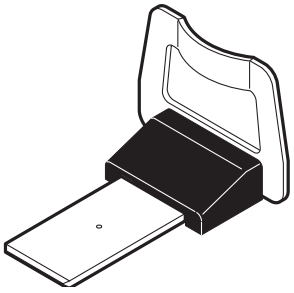


Closed view | Open views | Closed view

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 (TMJ) with the Planmeca Proline XC 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.

Select the TMJ exposure program on the *Select program type* display, see section "7.2 Selecting temporomandibular joint (TMJ) exposure program" on page 17.

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 TMJ exposure is 4kV higher than the corresponding panoramic exposure.

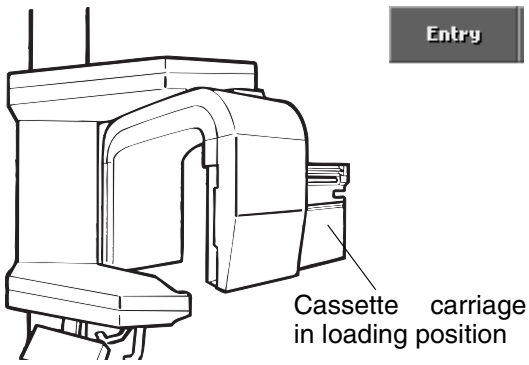
10.1 First exposure - jaw closed

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

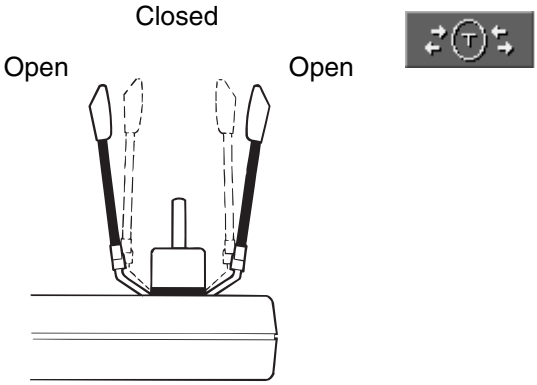
Note that there are two sets of kV values. One set for the closed jaw and a second set for the open jaw. If you are using a different film screen combination you may have to adjust the exposure values.

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

PATIENT	kV VALUE		mA VALUE
	Jaw closed	Jaw open	
Child	64	62	4
Adolescent	66	64	5
Small adult	70	68	6
Average-sized adult	74	72	8
Large adult	78	76	10



Touch the *Entry* field 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.



Touch the temple support field 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.

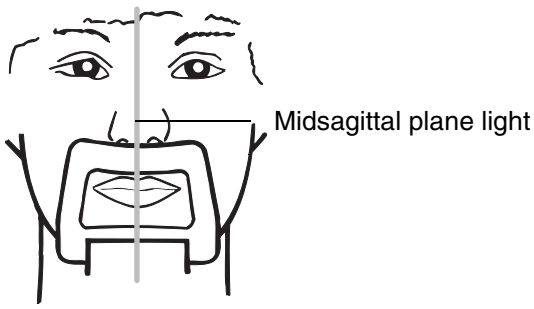
Touch either of the height adjusting arrows to adjust the height of the vertical carriage until the opening in the chin support is approximately level with the patient's mouth.

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.

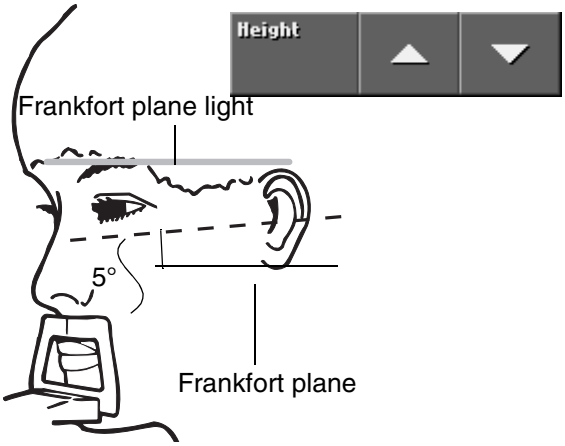
Touch the temple support field to close the temple supports.

Touch either of the *Layer* arrows to switch the three patient positioning lights on so that the patient can be positioned.

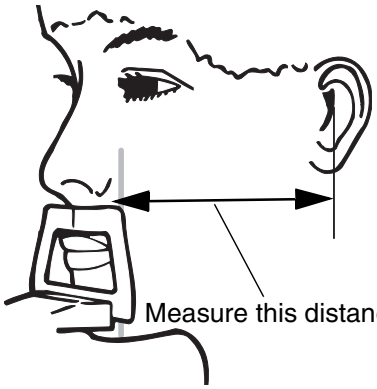
Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed. Make sure the patient's back is straight.



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.



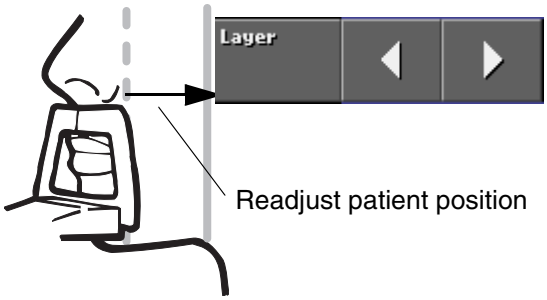
Position the patient's head so that the Frankfort plane is tilted down 5°. To do this support the back of the patient's head with your hand and, using the Frankfort plane light as a reference line, adjust the position of the patient's head by raising or lowering the vertical carriage with the height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



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.

POSITIONING GUIDE FOR TEMPOROMANDIBULAR JOINT EXPOSURES

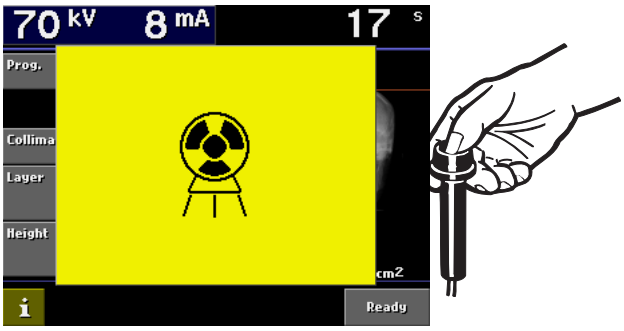
Distance from light beam to auditory meatus	Adjustment to the position of the patient
80 mm	+8 mm
85 mm	+4 mm
90 mm	0 mm
95 mm	-4 mm
100 mm	-8 mm
105 mm	-12 mm
110 mm	-16 mm



Touch either of the *Layer* arrows to readjust the position of the patient according to the measurements given in the table.

Touch the *Ready* field to drive the unit to the ready position. The indicator light will come on.

Ask the patient to stand as still as possible.

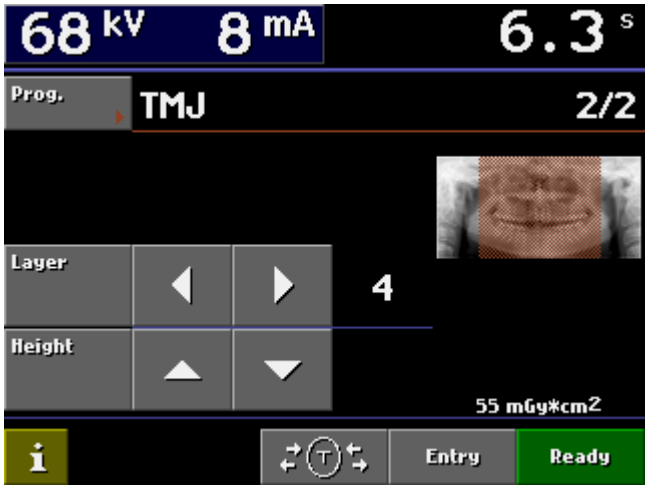


Move two meters (seven feet) from the unit. Protect yourself from unnecessary radiation.

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.

10.2 Second exposure - jaw open

Reduce the kV value by 2kV for the open jaw exposure. Refer to exposure table on page 34.

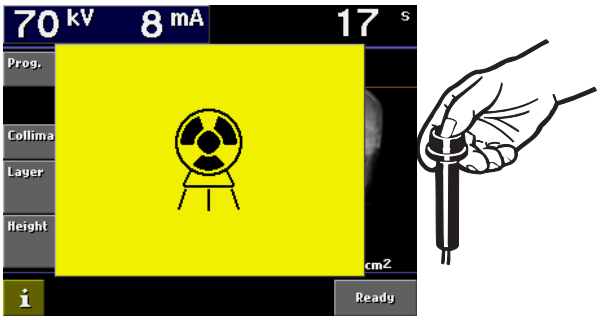


Touch the *Ready* field to drive the cassette carriage to the ready position so that the open jaw exposure can be taken.

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.



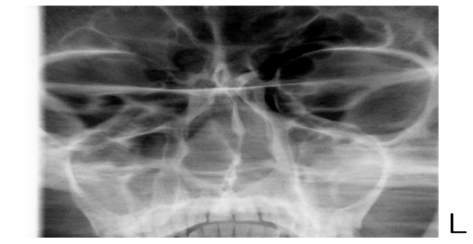
Press and hold down the exposure button on the remote control for the duration of the second exposure. When the rotating assembly has completed the second exposure cycle the temple supports will automatically open. The patient can now be guided from the unit.

NOTE **If the automatic carriage return is activated, see section "7.4.2 Behavioural preferences" on page 23, the rotating assembly will return to the ready position before the temple supports open.**

Touch the *Entry* field to drive the rotating assembly to the entry 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.

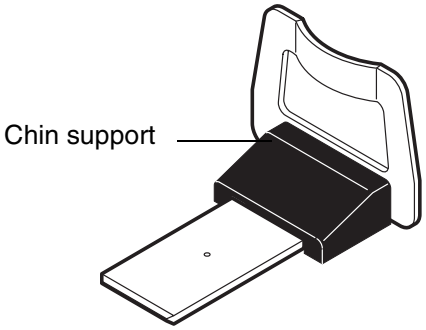
11 SINUS EXPOSURE PROGRAM



Sinus 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 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.

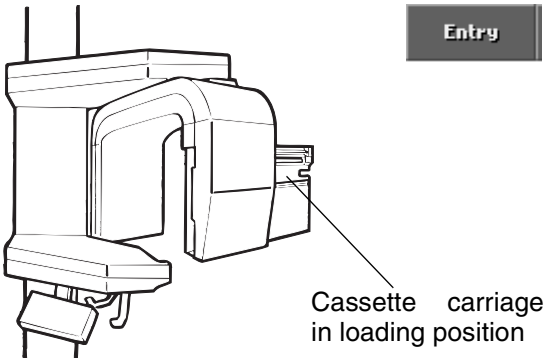
Select the sinus exposure program on the *Select program type* display, see section “7.3 Selecting sinus exposure program” on page 19.

Select the *Child* mode on the main display if the patient is a child or a very small adult.

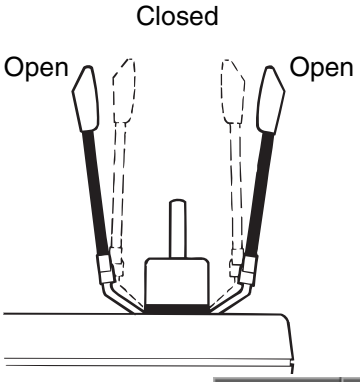
Select the correct exposure values for the patient being X-rayed according to the values in the following table. Note that the kV value for a sinus exposure is 4kV higher than the corresponding panoramic exposure.

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

PATIENT	kV VALUE	mA VALUE
Child	64	4
Adolescent	66	5
Small adult	68	6
Average-sized adult	72	8
Large adult	76	10



Touch the *Entry* field 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.



Touch 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.

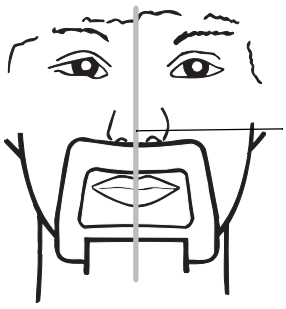
Touch either of the height adjusting arrows to adjust the height of the vertical carriage until the opening in the chin support is approximately level with the patient's mouth.

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.

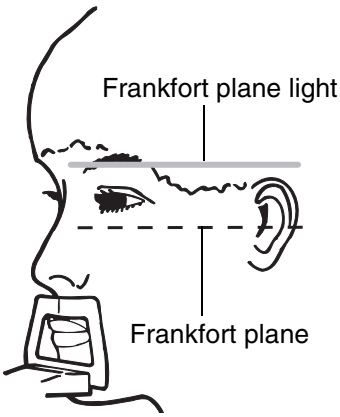
Press the temple support key to close the temple supports.

Touch either of the *Layer* arrows to switch the three patient positioning lights on so that the patient can be positioned.

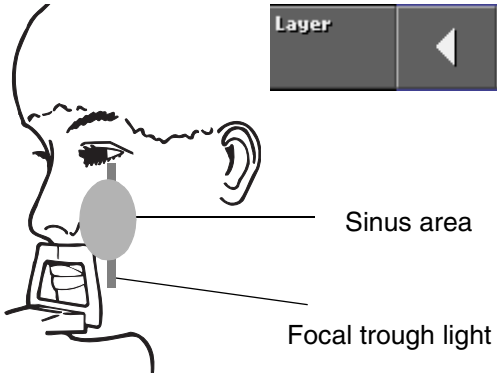
Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed.



Position the patient's 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.

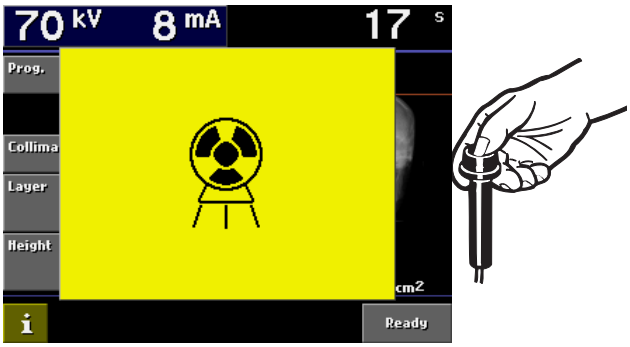


Position the patient's head so that the Frankfort plane coincides with or, if you are unable to slide the light far enough down, is parallel to the Frankfort plane light beam. To do this support the back of the patient's head with your hand and then adjust the tilt of the patient's head by raising or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



Touch 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.

Touch the *Ready* field 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 "7.4.2 Behavioural preferences" on page 23, the rotating assembly will return to the ready position before the temple supports open.**

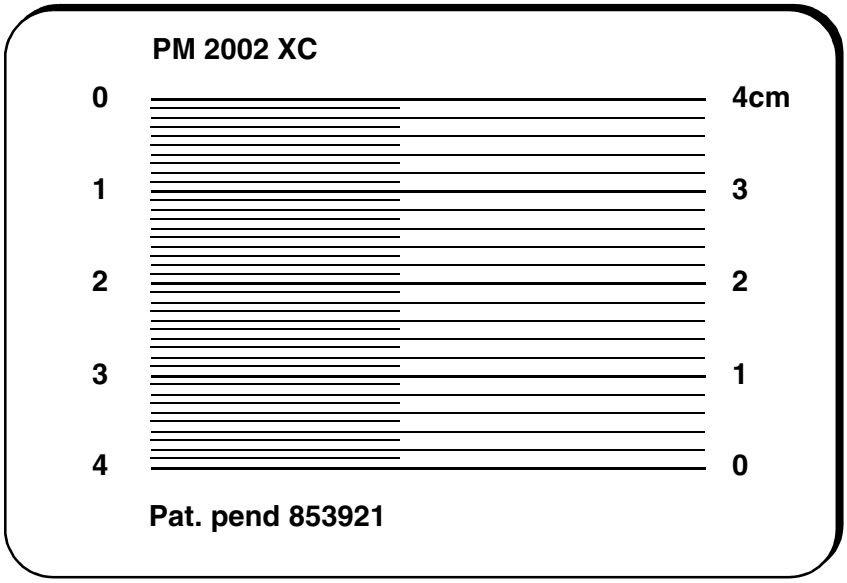
Touch the *Entry* field to drive the rotating assembly to the entry position and the cassette carriage to the loading position. This is not necessary if the cassette carriage is set to return to the loading position automatically.

Remove the cassette from the unit and process the film.

12 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.

13 TROUBLESHOOTING

13.1 Help codes

The following is a list of help messages. Touch the OK field to clear teh help message from the display.

HELP CODE	HELP MESSAGE EXPLANATION
Help 1	The AEC setting on the main display is set to OFF. To adjust the AEC density parameter the AEC on the main display must be set to ON.

13.2 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.

Touch *OK* 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. If the error is still present, please contact your service technician and report the error code with any other symptoms.

ERROR CODE	ERROR MESSAGE EXPLANATION
Error 0	The exposure switch was released too early during exposure. 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.
Error 1	Short loss of power or drop in line voltage. Equipment has been switched off and immediately on again which is detected as a short line voltage drop by the equipment. After switching off the equipment, about 5 seconds should be waited before switching on. If this occurs during an exposure remove the partially exposed film, place a fresh film in the cassette and take another exposure.
Error 7	The rotating unit is not in the ready position. Check that the program selection is completed. Touch the *Ready* field to move the rotating unit to the ready position and take an exposure.
Error 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.
Error 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.
Error 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.

ERROR CODE	ERROR MESSAGE EXPLANATION
Error 16	The patient has not bees selected.
Error 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.
Error 22	Temple support 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, see section “7.4.2 Behavioural preferences” on page 23. The unit can be used without temple supports. Remove the supports and call your service technician.
Error 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.
Error 24	Primary collimator 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.
Error 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.
Error 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.
Error 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.
Error 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.
Error 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 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.
Error 40	The rotation does not reach the end limit 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.
Error 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.
Error 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.

ERROR CODE	ERROR MESSAGE EXPLANATION
Error 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.
Error 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.
Error 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.
Error 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.
Error 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.
Error 58	The emergency stop swith is pressed down.
Error 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.
Error 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 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.
Error 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.
Error 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.
Error 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.
Error 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.
Error 73	Keyboard processor program error. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Error 74	Keyboard processor operating improperly. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Error 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.
Error 91	Keyboard processor stack overflow. Turn off the unit first for 30 seconds. If the error is still present, please contact your service technician.
Error 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 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.

15 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 XC Panoramic X-ray technical manual for complete servicing information.

16 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 XC 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 - plastic	 Aluminium, galvanized steel, lead PUR, other plastics	 X X X	 X	 X
Motors		(X)		
Component boards		(X)		
Cables, transformers	Copper, steel, transformer oil	X X		X
X-ray tube				X
Packing	Wood, cardboard, paper	X X X		
Other parts			X	

17 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: 2.5- 18 s as indicated ±10% Cephalometric: 0.2 - 5 s ±10%
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: 163 - 170 cm (64” - 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 fax: +358 20 7795 555

OPTIMUM SPACE REQUIREMENTS:

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

18 USER'S STATEMENT FOR PLANMECA PROLINE XC 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

±10%

18.1 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

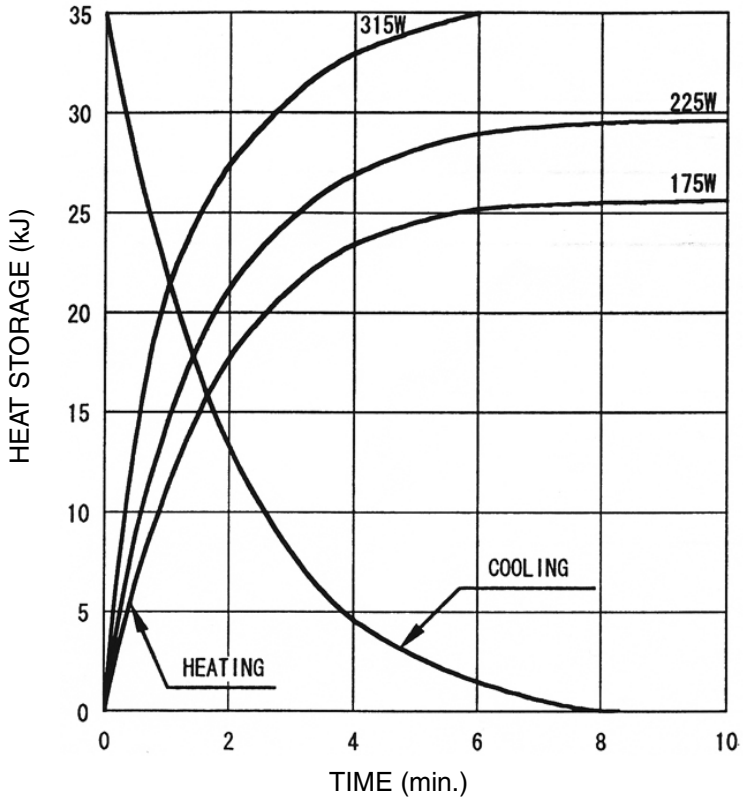
Nominal anode input power of the X-ray tube

1344 W

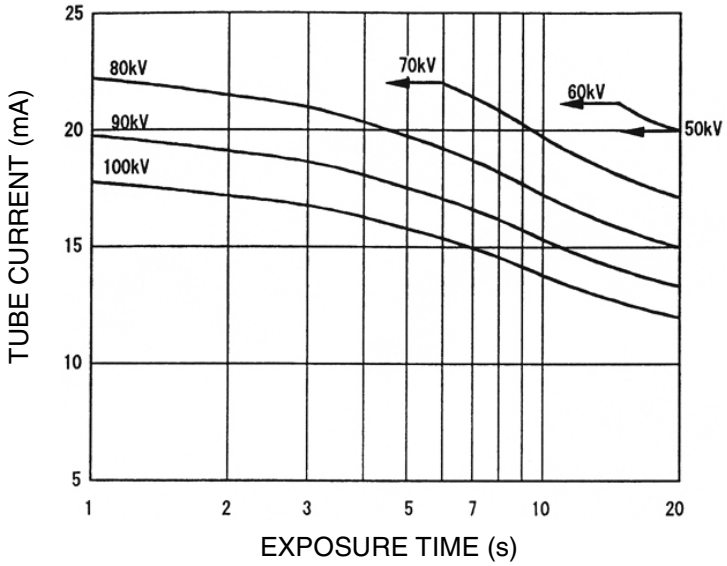
Maximum anode heat content of the X-ray tube

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

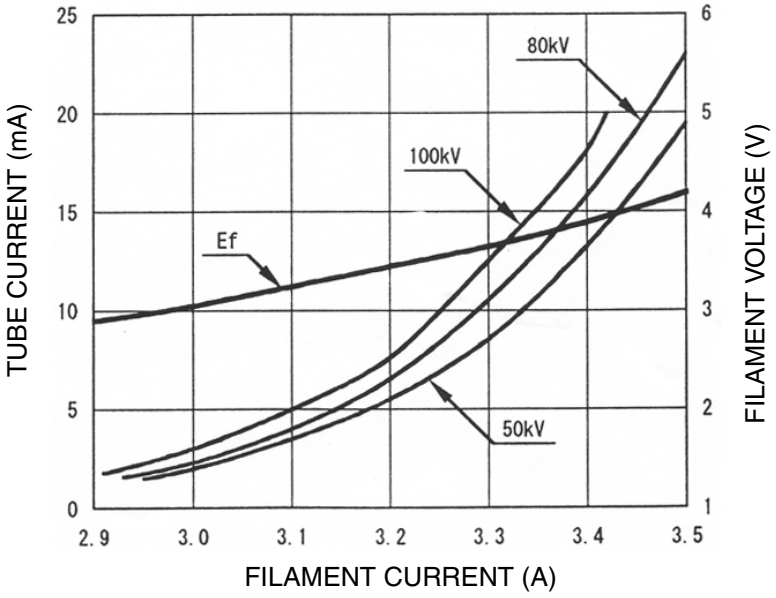
Target angle with respect to the reference axis

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

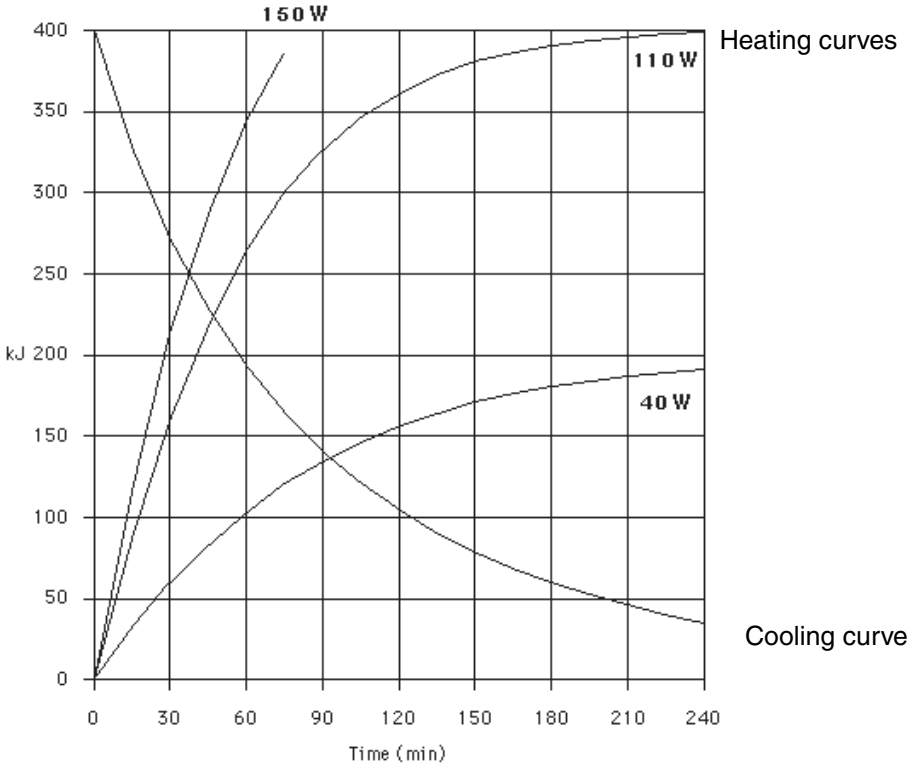
Emission & filament characteristics of the X-ray tube



Maximum X-ray tube assembly heat content

400 kJ

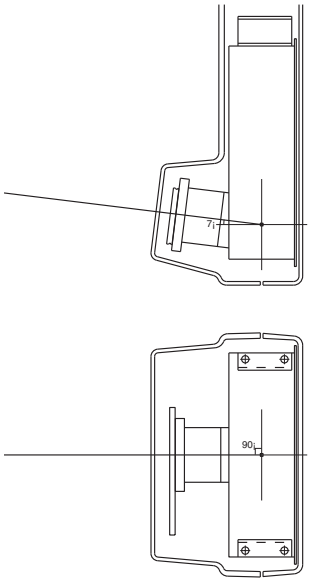
X-ray tube assembly heating/cooling curve



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

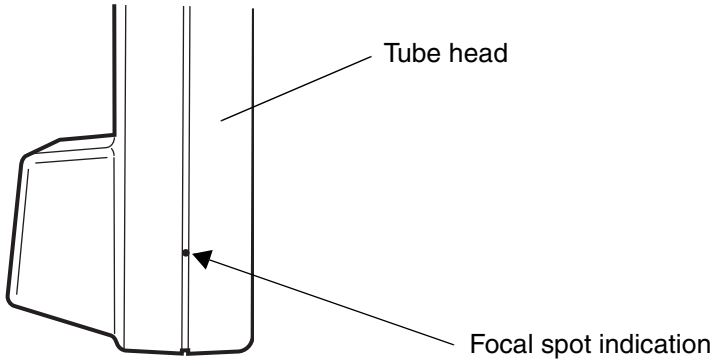
Values of loading factors concerning leakage radiation

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



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