VILLA SISTEMI MEDICALI

ROTOGRAPH PLUS

CE 0434

User's manual

Release 22 November 2002 (Rev. 2)

Revision history

Rev.	Date	Page/s	Modification description
0	21.07.98	-	First release
1	30.03.01	All	New "ST" version. New rotating arm without bellows. General improvement of text and picture. (Ref. RDM 5016, RDM 5018, RDM 5082)
2	22.11.02	10, 45	New intensifying screens. (Ref. RDM 5419)
3			
4			

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Contents

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This manual in English is the original version.

1. INTRODUCTION

NOTE:
The present manual is updated for the product it is sold with in order to grant an adequate reference to use properly and safely the product.
The manual may not reflect changes to the product not impacting operating modes or safety.
This manual is fully applicable for units having serial number ≥01036406.

ROTOGRAPH PLUS, manufactured by Villa Sistemi Medicali, is a radiological device which allows to carry out radiological examinations of the dento maxillo facial complex.

ROTOGRAPH PLUS is available in the following version:

- For PANORAMIC examination only (ST version)
- For PANORAMIC examination and examination of the Temporo-Mandibular Joint (TMJ)
- The latter is also available with the CEPHALOMETRIC device in order to carry out CEPHALOMETRIC (CEPH) examination.

This manual provides to the operator the instructions for proper and safe use of the appliance.

The appliance must be used strictly following the procedures described in this manual and never for activities other than those for which it was designed.

Before using the appliance, we recommend to read carefully this manual. Keep it in a safe place near the unit for future reference.

ROTOGRAPH PLUS is an electromedical appliance and may be used only under medical supervision, i.e. with the supervision of highly qualified persons with the necessary know-how regarding X-ray protection.

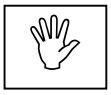
The user is responsible for complying with the legal requirements regarding the installation and operation of the equipment.

1.1 Icons appearing in the manual

Indicates a "NOTE"; the utmost attention shall be devoted to the reading of paragraphs marked by this icon.

Indicates a "WARNING"; paragraphs marked with this icon cover patient and/or operator safety aspects.

2. SAFETY INFORMATION



WARNING:
Read this chapter very carefully.

VILLA SISTEMI MEDICALI designs and manufactures equipment in compliance with safety requirements; moreover, it provides all the necessary information for correct utilization as well as warnings related to risks associated to X-ray generators.

Villa Sistemi Medicali shall not be responsible for:

- any use of the ROTOGRAPH PLUS different from that for which it has been designed,
- any damage to the equipment, the operator or the patient caused either by incorrect installation and maintenance not compliant with the procedures contained in the relevant user's and installation manuals provided with the equipment, or by incorrect operation techniques,
- any mechanical and/or electrical changes effected during or after installation, different from those reported in the service manual.

Only qualified service personnel, authorized by VILLA SISTEMI MEDICALI is allowed to perform technical interventions on the equipment.

Only authorized personnel is allowed to remove the tubehead from its support and access the internal components.

2.1 Warnings

The system has not been designed to be used in presence of vapours, anaesthetic mixtures that are flammable with air, or oxigen or nitrous oxide.

Ensure that water or other liquids do not get into the machine so as to prevent short-circuits and corrosion.

Always disconnect from mains before cleaning the machine.

Where necessary, accessories such as lead-sealed aprons must be used to protect the patient from radiations.

Only the patient and the operator may remain in the room during the execution of the radiography examination.

ROTOGRAPH PLUS has been developed for continuous use with intermittent load. The prescribed operating cycles to allow the heat accumulated by the radiogenic source to be discharged must be observed.

Although the appliance has been designed to have a reasonable degree of protection from electromagnetic interference, it must be installed at a certain distance from electricity transformer rooms, static continuity unit, portable two-way hand radios and cellular phones. The latter may only be used at a distance of over 1.5 meters from all elements of the machine.

All instruments or equipment for professional use and used near the machine must be in conformance to the electromagnetic compatibility standards.
Nonconforming instruments whose low immunity to electromagnetic fields is known must be installed at least 3 meters away from the ROTOGRAPH PLUS and be powered via an independent electric line.

ROTOGRAPH PLUS must be switched off during the entire period of use of ESU (Electro Surgery Units) units or similar equipment.

Clean or eventually disinfect the chin support, positioning handles, temples clamp support, nose rest and any other part that may come in touch with the patient.

At the end of the examination, replace the bite and the ear rods.

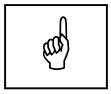
Although the X-ray dosage supplied by dental radiology appliances is on average low and distributed over a relatively small surface, the operator must take the necessary precautions and/or follow the safety procedures for both himself and the patient during an exposure. We recommend that the X-ray activation always be commanded from an X-ray protected area via remote control. If it is necessary to operate the exposure near the patient, remain at the maximum distance allowed by the remote control cable in the direction opposite to the emission of the rays, at a distance of at least 2 meters (6.6 feet) from both the radiation source and patient.

2.2 Environmental risk and disposal

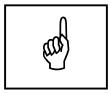
A number of machine parts contain materials and liquids that upon completion of the machine's life cycle must be disposed of at recovery centers established by the local health units.

The machine contains the following materials and/or components:

- **Tubehead:** dielectric oil, lead, copper, iron, aluminum, glass, tungsten, beryllium
- **Control box and remote control:** iron, copper, glass resin, non-biodegradable plastic casings
- **Column, rotating arm, extensions:** iron, lead, aluminum, copper, non-biodegradable plastic materials, glass resin.



NOTE:
Disassembling part of the unit must be performed by Villa Sistemi Medicali personnel or by authorized technical people.



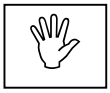
NOTE:
VILLA SISTEMI MEDICALI or its representative will not be responsible for the disposal of dismissed machines by the user and relative costs.

2.3 Symbols used

Symbol	Description
	Equipment with Type B applied parts (according to IEC 601-1)
~	Alternating Current
N	Connection to neutral conductor
L	Connection to line conductor
	Protection ground
	Functional ground
	OFF ; equipment not connected to power line
|	ON ; equipment connected to power line
	Warning: read the documentation provided with the unit
	Conformity to the CE 93/42 Directive

3. CLEANING AND DISINFECTING PROCEDURES

In order to guarantee a careful hygiene and cleaning it is advisable to follow scrupulously the procedures hereunder reported:



WARNING:
Disconnect from the mains before cleaning the unit.

- Do not allow liquids and water to enter inside the unit, to prevent from shortcircuits and corrosion of inner parts.

- Clean the painted surfaces, the accessories and the connection cables using only a damp cloth and neutral detergents. Take care to dry the parts with a dry cloth. Do not use corrosive or abrasive solvents (alcohol, gasoline, “trielina”).

- The bite rod, the centering bite and the ear centering pins must be replaced after each examination where they have been used. In addition, the bite must be disinfected by using a 2% Glutharaldeid solution, following the rules provided by the manufactures of the cleaning solution itself.

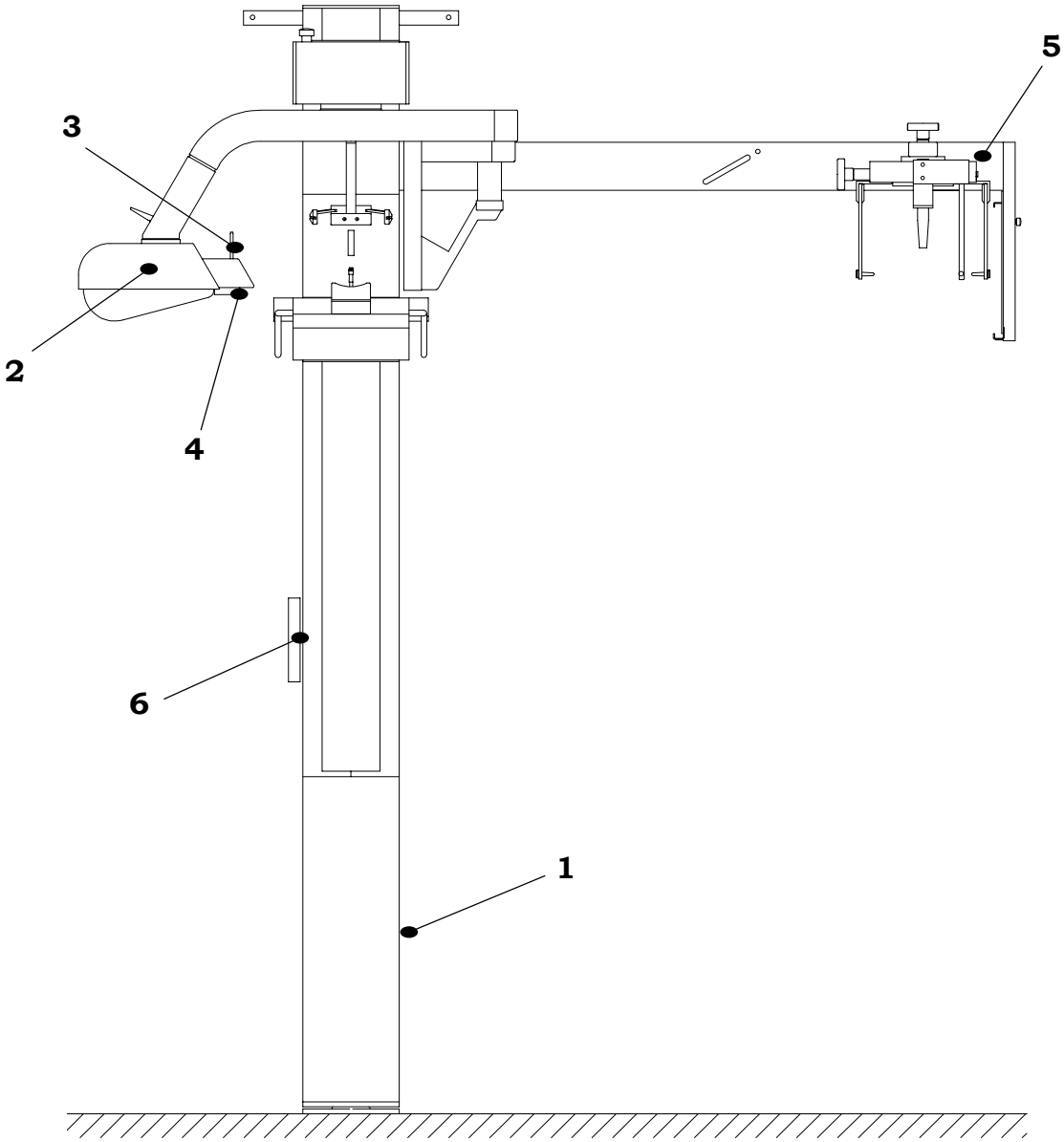
- The chin support, the patient positioning handles, the nose rest and the temple-clamp must be carefully cleaned and disinfected with a 2% Glutharaldeid solution or similar (find out what is available; e.g. Milton) after each examination where they have been used.

4. DESCRIPTION

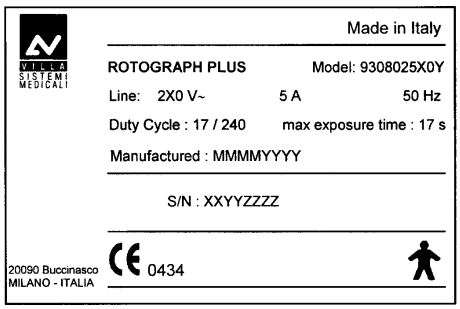
4.1 Identification labels

ROTOGRAPH PLUS is labeled with a set of labels identifying different components according to the requirements of the international standards.

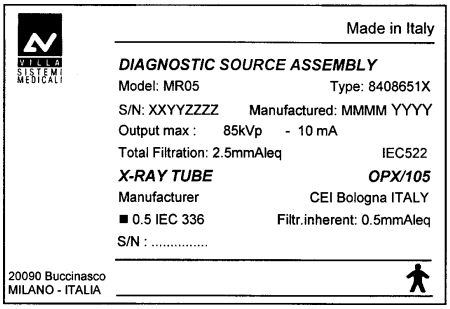
The following picture shows the position of the different labels:



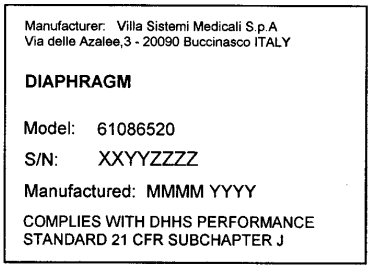
1
ROTOGRAPH PLUS label



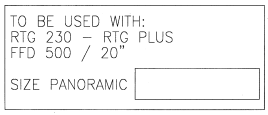
2
Tubehead label



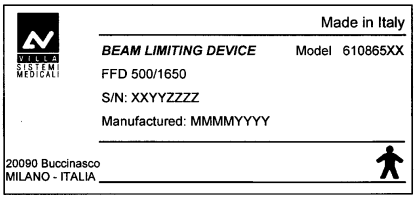
3a
Diaphgram label
(not present on "ST" version)



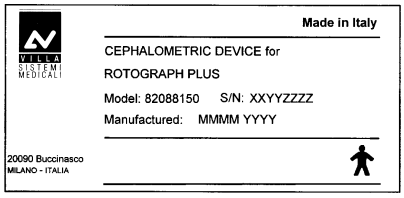
3b
Diaphgram label
(not present on "ST" version)



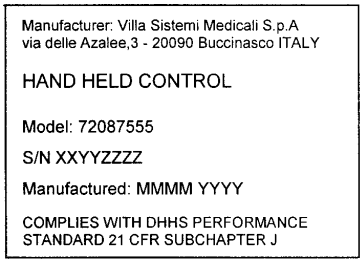
4
Collimator label



5
CEPH device label



6
Remote control label



4.2 Description

ROTOGRAPH PLUS has been designed to perform the following examinations:

- Panoramic examination (all versions)
- "SINUS" examination of the paranasal sinus (all versions)
- Examination of the Temporo-Mandibular Joints (TMJ) with open or closed mouth on a single film (not available on "ST" version)
- Cephalometric examinations (CEPH) of the skull (if equipped with the cephalometric optional device; not available on "ST" version) with 1.65 mt. (65 inches) focus-film distance and 1.5 mt. (59 inches) focus-patient distance.

All the allowed examination may be made with different parameters according to the setting of the remote-control (please refer to the specific chapter of this manual).

ROTOGRAPH PLUS is controlled by a soft touch console and equipped with an alphanumeric digital display for a clear indication of the working parameters and operative messages. The operative cycle is entirely run by a microprocessor, controlling its different modes : from programming of the emission parameters according to the chosen examination and the patient's size, to the voltage fluctuation and to the notification of possible anomalies, failures or errors.

The excellent quality radiographs thus obtained is the result of a clever design based upon the pseudo-elliptic rotation system, the original light beam-luminous cross pattern centering system, the use of green emiting Rare Earth Intensifying screens and most of all the small dimension of the focal spot.
This particular rotation system allows an orthogonal imaging of all teeth and wide image layer with an optimum focused zone of 10 mm for the incisors and 20 mm for the molars.

ROTOGRAPH PLUS, besides operating in the programmed mode, can also operate in the manual personalized mode by modification of the parameters, as described in chapter 6.

In the Panoramic and TMJ modes, with all interlock enabled, it is possible to activate the TEST push button **(31)** (see Figure 9 at the end of the manual).

The TEST functioning mode allows the operator to check the functionality of the selected examination cycle or to show to the patient the examination he will undergo (including all movements of the machine) without emitting X-rays.

The TEST push button as X-RAY button are a “dead man” buttons, which means thus if they are released during the examination cycle, the latter is interrupted stopping the movements in progress. To re-start the cycle first reset the unit by means of the key **32** (Figure 9), than start again the function which was interrupted.

The following intensifying screen - film combinations are recommended in order to obtain good quality images:

Intensifying screens		**Films**	
Type	**Supplier**	**Type**	**Supplier**
KR II	KONIKA	MG	KONIKA
KR II	KONIKA	MGH	KONIKA
Lanex Regular	KODAK	T-MAT G/RA	KODAK
Curix Ortho Regular	AGFA	T-MAT G/RA	KODAK
T 16	3M / IMATION	XDA	3M / IMATION
Medium	AGFA	HTA	AGFA
G8	FUJI	HR-G	FUJI

The above listed intensifying screens are all of the Green Rare Earth emitting type.

Use of screens and films different from those stated on the table above requires system recalibration by an Authorized Technician.

The calibration of the above mentioned combination has only an indicative value. The effective adjustment depends on different factors, such as the real dose emitted by the unit, the film development system and the user predilection for more or less devise images.

The good quality of the image does not exclusively depend on ROTOGRAPH PLUS but a great importance is to be given to the film developer; and dark room techniques.
Therefore, it is necessary:

- to perform developer maintenance as indicated by the manufacturer instructions;
- to check regularly the level of the used chemical substances, substituting them at time intervals as indicated by the manufacturer instructions, usually a direct function of the number of radiographs developed and chemicals concentration.

5. TECHNICAL FEATURES

General characteristics	
Equipment	ROTOGRAPH PLUS
Manufacturer	VILLA SISTEMI MEDICALI Buccinasco (MI) Italy
Class	Class I with type B applied parts according to IEC. 
Degree of protection	IP20
Rated line voltage	220/230/240V~
Line frequency	50Hz
Max line current at nominal voltage	5A rms momentary; 0.5A stand-by
Maximum power	1.15 kVA @ 230V
Power fuse	6.25A T
Command fuse	0.5A T
Filament fuse	0.315A F
Compensation of the mains voltage fluctuation	automatic
Apparent line resistance	0.5 Ω max
High voltage	60-85 kV (5 kV steps)
KV accuracy	± 10% @ nominal voltage ± 10%
Anodic current	10 mA
Anodic current accuracy	± 10% @ nominal voltage ± 10%
Exposure time **(Panoramic)** (with deceleration ramp)	17s adult 14s child 15s child
Exposure time **(TMJ1 + TMJ2)** (see note 1)	10.4s adult 9.4s child
Exposure interval (PAN & TMJ)	240s (1:16 duty cycle)
Film size (PAN & TMJ)	12.7x30 cm (5"x12")
Image mean enlargement (PAN & TMJ)	1.2 : 1
Inherent filtration of the PAN cassette	1mm Al eq @ 70 kV
Exposure time **(Cephalometric)** (see note 1)	0.2 ÷ 3s in 19 position

General characteristics	
Exposure time accuracy (CEPH)	± 10ms for times ≤ 0.33s0 ± 3 % for times ≥ 0.33s
Reference current time product (CEPH)	3 mAs @ 70% of the max power
Exposure interval (CEPH)	60s
Film size (CEPH)	18x24 cm (8"x10") std., 24x30 cm (10"x12") optional
Focus-Patient distance (CEPH)	150cm (59")
Focus-Film distance (CEPH)	165cm (65")
Image mean enlargement (CEPH)	1.1 : 1

NOTE 1:
These examination are not available on the "ST" version; this feature cannot be field upgraded.

Tubehead features	
Type	MR05
Manufacturer	VILLA SISTEMI MEDICALI Buccinasco (MI) Italy
Max peak tube potential	85 kV
Nominal power	0.630 kW (85kVp, 10mA)
Total filtration	2.5mm Al eq. at 85 kV
Insulation	Oil bath
Cooling	Ambient
Leakage radiation at 1 m	< 0.25 mGy/h (85 kV, 10mA, 1:16 duty cycle)
Maximum power	85 kVp, 10mA
Type of circuit	Single-phase, self-rectifying

X-ray tube features	
Manufacturer	CEI – Bologna Italy
Type	CEI OPX/105
Focus	0.5 IEC 336
Inherent filtration	0.5 mm Al eq.
Anode tilt	5°
Anode material	Tungsten
Nominal voltage	105 kVp
Filament maximum current	4A
Filament maximum voltage	8V
Anode thermal capacity	30 kJ
Weight of apparatus and parts	
Slider net weight	56 kg (123.5 pounds)
Column net weight	48 kg (106 pounds)
Tubehead net weight	24 kg (53 pounds)
CEPH device net weight	12 kg (26.5 pounds)
Control unit net weight	28 kg (62 pounds)
Slider counterweights net weight	92 kg (203 pounds)
Environmental conditions	
Maximum operating temperature range	+10° ÷ +40° (+50°F ÷ +104°F)
Operating relative humidity range	30% ÷ 75%
Transportation and storage temperature range	-20° ÷ +70° (-4°F ÷ +158°F)
Maximum transportation and storage relative humidity	< 90% non condensing
Minimum atmospheric pressure for transportation and storage	630 hPa

5.1 Standards and regulation

The ROTOGRAPH PLUS equipment is manufactured according to the following standards:

- General safety:
  IEC 601-1
  IEC 601-1-1
  IEC 601-2-7
  IEC 601-2-28
  IEC 601-2-32

- Electromagnetic compatibility
  IEC 601-1-2

- Protection from radiation
  IEC 601-1-3

CE The symbol CE grants that ROTOGRAPH PLUS complies with directives 93/42 for medical devices issued by the European Community.

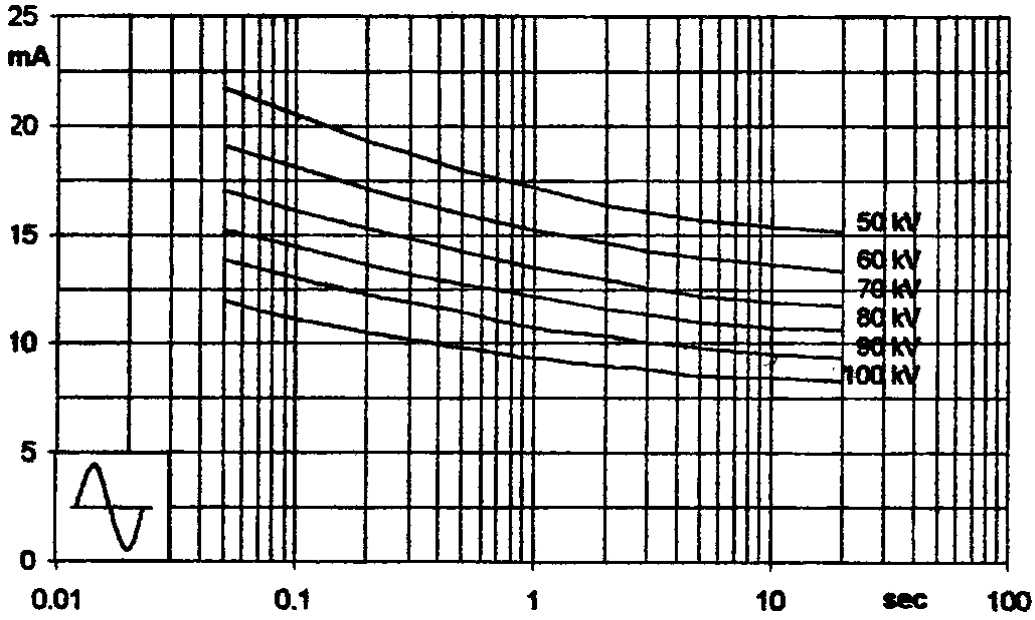
Classifications

ROTOGRAPH PLUS is an electro-medical X-ray device belonging to Class I type B as per classifications IEC 601-1, foreseen for a continuous working at intermittent load.

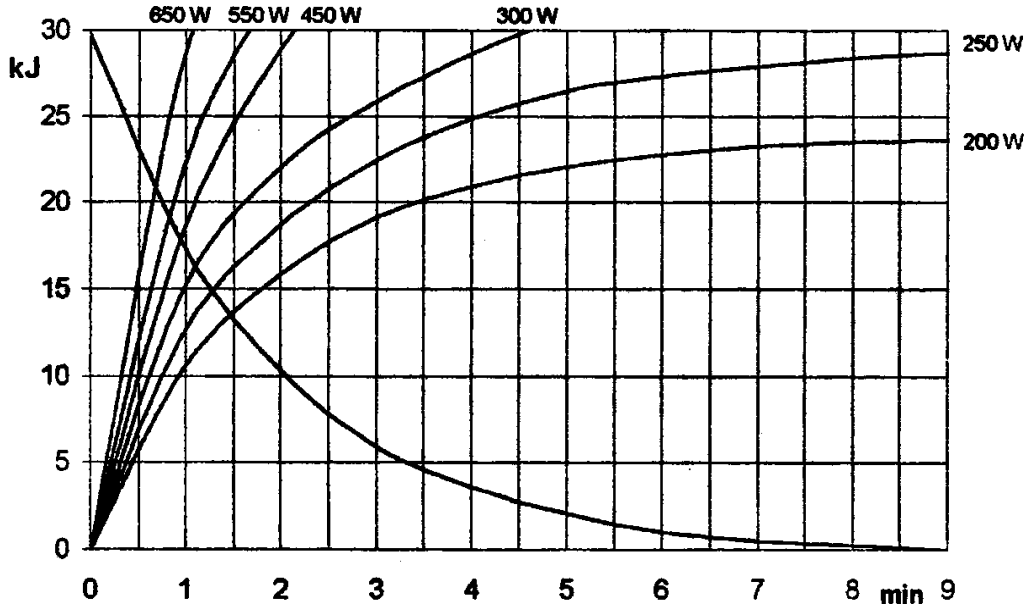
5.2 X-ray tubehead curves

Tube "CEI - OPX/105" (0.5x0.5)

Loading chard



Anode cooling chard



5.3 Technical factors measuring method

kV_p The peak tube potential is directly measured with a non invasive kVp-meter, accuracy ±3kVp. When performing the measurement, make sure that measuring probe is completely covered by the X-ray beam. A direct measurement of the high voltage can only be carried out by specialized technicians in a suitable testing laboratory as it requires disassembling of the tubehead.

mA The output current is determined by measuring with a digital multimeter, accuracy 0.5%, by connecting the probes to the connectors of A1 PCB as indicated in the Service Manual (digital multimeter set to VDC 20V, 1V=1mA).

t The exposure times are determined by using a timer/counter, having an accuracy of 0.1%, measuring the duration of part of the voltage applied to the primary side of the tubehead, during the exposure phase.

5.4 Overall dimension

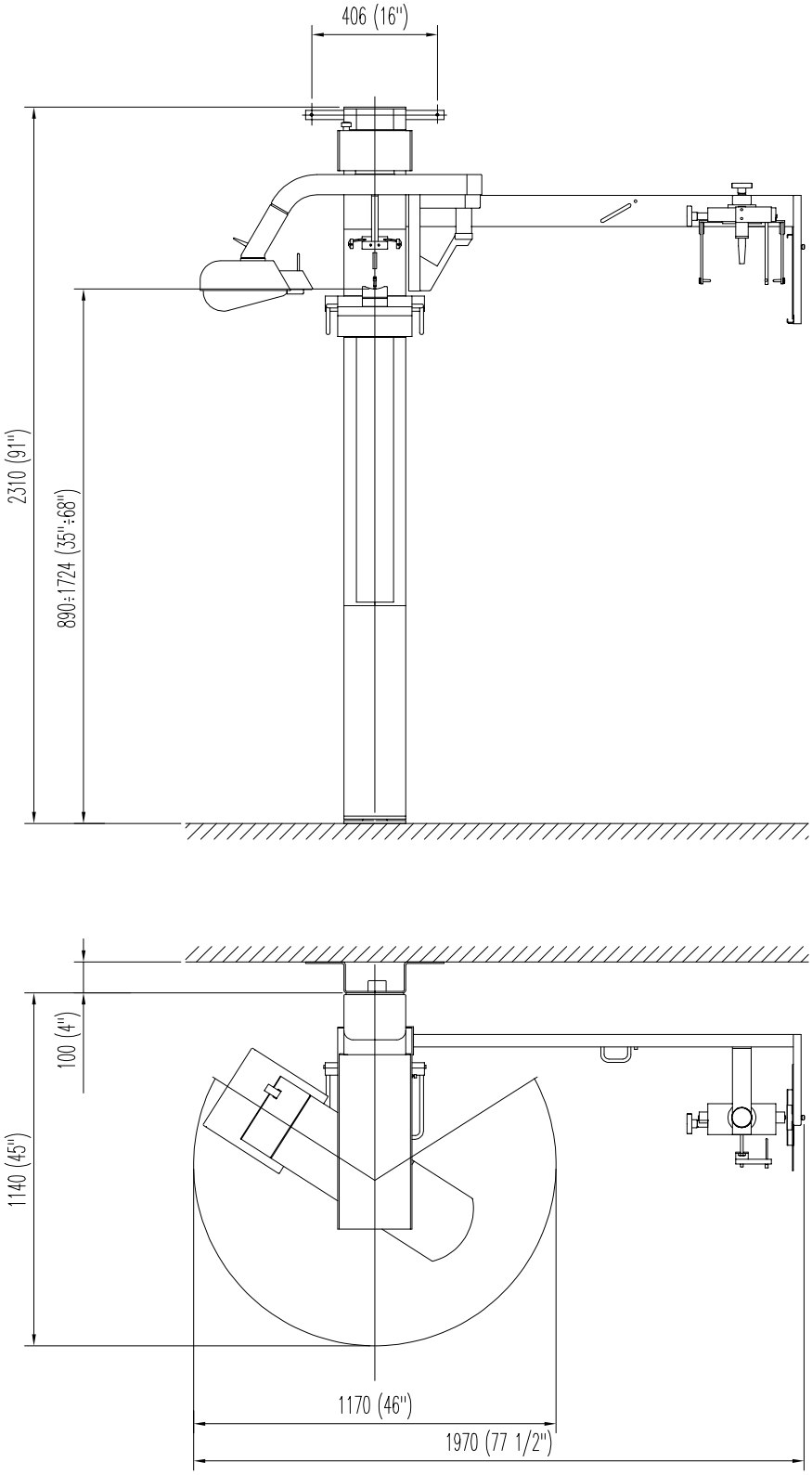


Figure 1: ROTOGRAPH PLUS overall dimension

6. OPERATING INSTRUCTIONS

NOTE:
The procedures explained in the next pages make often reference to Figure 8, Figure 9 and Figure 10 located at the end of this chapter. To easily consult this Figures, unfold pages in order to make it visible while reading other pages of the manual.

6.1 Switching on the equipment

1. Push the button on the control panel to turn the equipment ON. The "CHECK" function is so activated, verified by the lighting up of the LED'S on the remote-control and the display pixels. The software checks the enabled operating function with the corresponding LED signal.
   In the event that the equipment is not set for a proper function, the display will show the message "**Equipment not set**" and the panoramic function LED will blink. Select the chosen function and push for the second time the same button (with blinking LED): the display will now indicated the step which needs to be performed. Should there be more steps to be enabled, they will be displayed one at a time and automatically excluded after the corresponding action has been performed.
2. With the proper steps performed for the selected function (see chapters regarding the single tests), the LED stops blinking (**27**, **28**, **29** or **30** Figure 9) and the procedure will remain lit with the equipment sets as default in the following configurations:
   - ADULT with push button **33** LED lighted up
   - MEDIUM SIZE with push button **36** LED lighted up
   - Display **44** shows the kV alternatively to the exposure times.

THE UNIT IS READY

6.2 Panoramic X-ray examination

6.2.1 Preparing the equipment (refer to Figure 8 and Figure 9)

For NON "ST" version, the equipment has to be prepared for PANORAMIC examination by inserting the appropriate beam limiter, unlocking the rotating arm and inserting the film holder.

If pressing the button **27** the message "**Equipment not set**" is displayed and the relevant function LED blinks, push the button a second time in order to display the message concerning the interlock to be enabled. The messages that can be read during the Panoramic function setting and the relevant actions to perform are the following:

1. **PAN/TMJ film holder not present:** insert the X-ray cassette in the appropriate support
2. **Please rotate X-ray generator on PAN/TMJ position:** push the lever **4** and rotate the tubehead anti-clockwise until insertion of the mechanical lock is noted
3. **Rotating arm unlocked:** rotate the upper knob **5** anti-clockwise
4. **Please insert the PAN/TMJ beam limiter:** install the PAN/TMJ collimator in place of the CEPH collimator.
5. Press again the button **27**.

After completing the system SET UP, adjust the chin support as follows :

		Chin support PANORAMIC **(1)**	Chin support SINUS **(21)**
PANORAMIC	ADULT	**YES**	NO
	CHILD	**YES**	**YES**

6.2.2 Programmed/Manual exposure

After setting the unit as previously described previous point, it is now possible to choose whether to operate an exposure in a preset mode, meanings with the kV values preset by the manufacturer or to operate an examination in the manual function, with possibility to change the preset kV values.

6.2.2.1 Programmed exposure (refer to Figure 9)

Push button **33** for adult program or **34** for child's.

To check the new configuration depress push buttons Adult **33** and Child **34**, there will only be a variation on kV and time; pressing buttons Large Size **35**, Medium Size **36** and Small Size **37**, there will be a variation on kV.

The following table shows the programmed values according to the selection made:

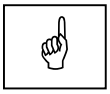
	Large Size (35)	**Medium Size** (36)	**Small Size** (37)
Adult (33)	85kV - 17sec	75kV - 17sec	70kV - 17sec
Child (34)	70kV - 14sec	65kV - 14sec	60kV - 14sec
Child (34) (with deceleration ramp)	70kV - 15sec	65kV - 15sec	60kV - 15sec

These values have been set bearing in mind the screen-film combination and consequent mA calibration, as described at chapter 4.

6.2.2.2 Manual exposure (refer to Figure 9)

To select the manually technical factors follow the next procedure:

1. Depress button **38** (kV), the button function will blink.
2. Depress buttons **41** (increase) or **40** (decrease) on the hand control selecting the desired kV value to be used. After 2 seconds, the function button LED stops blinking. The unit is now ready for the next step.



NOTE:
The kV can vary from a minimum of 60kV to a maximum of 85kV with steps of 5kV.
If, after having reached the minimum or maximum values of the kV range additional decrease or increase is requested, the following messages will be displayed: **Minimum** or **Maximum**; the minimum or maximum set kV values will subsequently be displayed.

6.2.3 Preparing the patient (refer to Figure 2 and Figure 3)

1. Ask the patient to remove all metal objects located in the zone involved in radiography (necklaces, earrings, spectacles, hair-clips, movable dental plates etc.).
   Make sure that there are no heavy articles of clothing (such as overcoats, jackets, ties, polo-neck sweaters, etc.) in the radiography zone.
2. Have the patient put on the protecting apron or similar protective devices in accordance with the regulations in force in the various countries, making sure that it does not interfere with the trajectory of the X-rays beam.
3. Bring the patient in standing position up to the chin support and, using the handle **22**, release the brake button **24** in order to position the slider so that the chin support resting plane is aligned with the patient's chin.
4. Position the patient in the skull clamp with the chin resting on the appropriate support and rest the hands on the side handles **22**; have the patient bite with the incisors in the groove of the bite block mounted on the appropriate rod **2**, making sure both upper and lower anteriors are set in the groove of the bite piece.
5. Press the centring device activation button **20**. When this is done, two crossed beams of light illuminate both the sagittal median line **45** and the horizontal line for the Frankfurt plane reference **46**.
   The centring device stays illuminated for about 40 seconds; if this time is insufficient to carry out the centring operations, the activation button **20** may be pressed again.
6. Bring the height of the skull-clamp a little above the patient's orbital bone and centre the patient until the position of perfect alignment with the Frankfurt and sagittal median lines is obtained.
   The Frankfurt plane light beam must be adjusted for height in relation to the patient's size; the adjustment is made by acting on the appropriate knob **18**.
   In order to check the patient's centring, the operator can tilt the mirror **6** towards himself, thus obtaining a front view of the patient.
   Lastly bring the patient's head into contact with the two temples clamp rods **7** by acting on the appropriate knob **9**.
7. After the head has been positioned, the patient has to make a movement with his feet towards the stand. This will give better distension of the spinal column in the cervical region, eliminating white ghosting of the spine on the radiograph in the zone of the lower incisors.
8. Check centring again, advise the patient to close mouth and eyes, ask then to swallow and bring the tongue against the palate and remain motionless for the exposure.

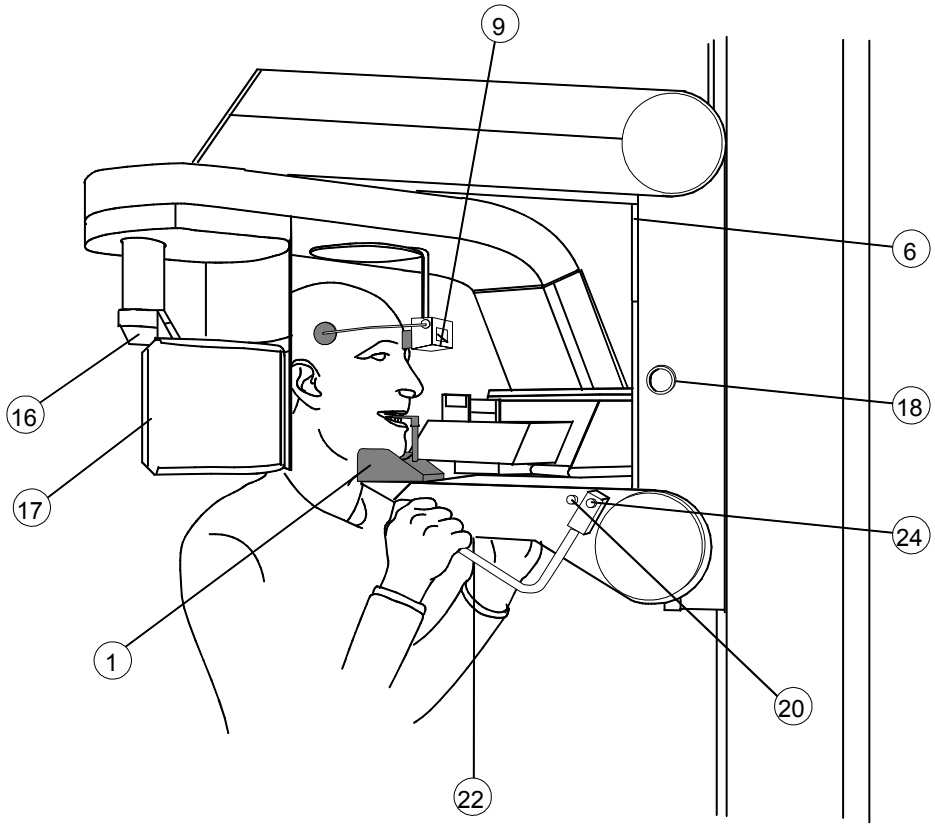


Figure 2: Panoramic position

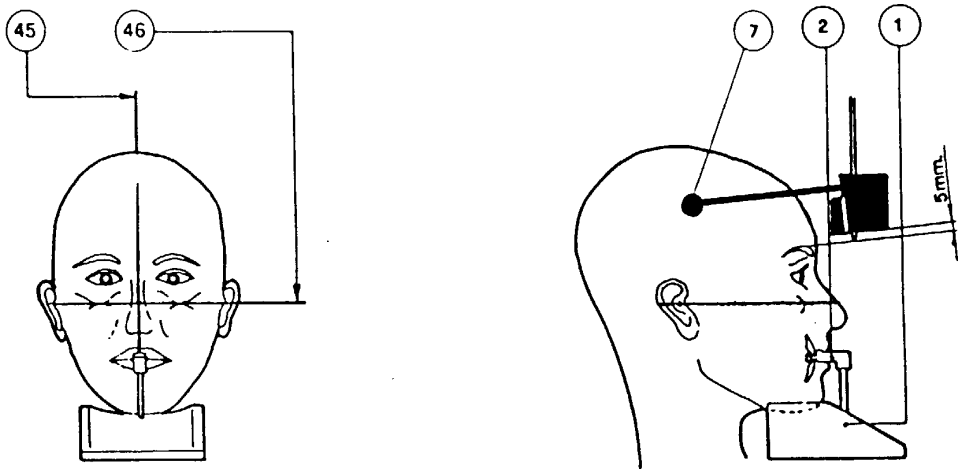


Figure 3

45 - Sagittal median line
46 - Frankfurt plane line

6.2.4 Making the exposure (refer to Figure 9)

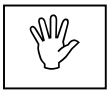
NOTE:
During the emission of X-rays protection of the operator and surrounding personnel must be in accordance with the rules in force in the respective countries.
The X-ray activation always be commanded from an X-ray protected area via remote control. If it is necessary the operator must stand at a distance of at least 2 meters (6.6 feet) away from the X-ray source and, if possible, on the opposite direction. No other persons other than the operator and the patient, are allowed to stay in the examination room during the examination.

1. Check if the exposure data are correct (paragraph 6.2.2), then press the X-ray button **42** during the whole time of the exposure as the control is a dead man type, checking the simultaneous operation of the rays signaling light **43** and the acoustic ray signal.

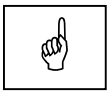
NOTE:
The start of arm rotation and the emission of rays take place with a delay of four seconds after the activation of button **42** allowing preheating of the tube filament and check all the set value.

2. After exposure, the message "**Push RESET**" will be displayed: the patient may then be released from the positioning device, the film cassette removed by pulling upwards, the return button **32** pressed to move the machine back to the starting position. After full return, the message "**OK**" will be displayed, which will disappear when the button **32** is released.
3. With Reset operation performed, and with button **32** released the following message is displayed "**Wait, please .....**" indicating a waiting time of 4 minutes to allow cooling of the tubehead anode.
4. It will now be possible to open the film cassette in the dark room and develop the film.

NOTE:
After each examination, clean carefully both chin support and temples-clamp and replace the bite.



WARNING:
If the patient should move during the exposure, stop the exposure immediately by releasing the rays control button **42** interrupting the rays emission and the arm movement.
The message "**Change film please**" will appear for a few seconds on the display and successively the message "**Push RESET**". The cassette is then to be removed and, in the dark room , a new film inserted; the return button **32** is, then, to be pressed to bring the machine in the starting position. The return end is evidenced by the message "**OK**" which will disappear when the button **32** is released.



NOTE:
If the event the film in the cassette has not been replaced, and a further exposure made, no impediment message will appear, but, due to the double exposure, the film will give no diagnostic results.

If, for external reasons or incorrect operation the X-ray emission times should exceed 17 seconds, a backup security timer will come into operation cutting out the emission after 20 seconds, the arm rotation will continue until the natural stop point.

6.3 TMJ examination (not available on "ST" version)

NOTE:
When performing TMJ examinations the rays emissions is discontinuous as it is interrupted during the transition phases between the different projections.

NOTE:
For “ST” version , pressing the TMJ1 or TMJ2 button will appear the message **“TMJ modality not enabled”**.

The TMJ functions allow to obtain 4 different images on the same film by means of two different programs. The 4 images represent the right and left condyle of the temperomandibular joint (TMJ) both with closed (TMJ1) or open (TMJ2) mouth.

With TMJ1 projection there is exposure of the film lateral portions, while the centre part will be exposed with the TMJ2 projection.

We suggest to follow the sequence TMJ1 and TMJ2.

6.3.1 Performing the TMJ1 examination

6.3.1.1 Preparing the equipment

1. The modality is selected by pressing one of the keys **29** or **30** (Figure 9); if the message "Equipment not ready" and the corresponding LED is blinking, press once again the key to visualize the message explaining which action has to be performed to finish the equipment's preparation.
2. Messages that can be displayed for TMJ1 preparation are the same as for the panoramic modality, so please refer to this section of the manual for the explanation and actions (reference to paragraph 6.2.1).
3. The equipment preparation has to be completed removing the chin's support for standard panoramic **1** (Figure 8) and replacing it with the one for sinuses' examination **21** (Figure 8).

		Chin support PANORAMIC (1)	Chin support SINUS (21)
TMJ	ADULT	NO	**YES**
	CHILD	NO	**YES**

6.3.1.2 Programmed/Manual exposure

To change from the programmed to the manual function and viceversa, proceed as described at paragraph 6.2.2 bearing in mind that the kV and time parameters in the programmed exposure are indicatively the following (numbers refer to Figure 9):

	Large Size (35)	**Medium Size** (36)	**Small Size** (37)
TMJ 1 and 2 Adult (33)	85kV - 5,20sec	75kV - 5,20sec	70kV - 5,20sec
TMJ 1 and 2 Child (34)	70kV - 4,70sec	65kV - 4,70sec	60kV - 4,70sec

Such values have been set considering the screens-films combinations and consequent mA calibration, as mentioned in chapter 4.

The times reported in the previous table are the sum of the exposure time for the right condyle with the one of the left condyle, while the arm rotation time remains the same as the one reported for the panoramic examination.

6.3.1.3 Preparing the patient (refer to Figure 4)

1. Ask the patient to remove all metal objects located in the zone involved in radiography (necklaces, earrings, spectacles, hair-clips, movable dental plates etc.).
Make sure that there are no heavy articles of clothing (such as overcoats, jackets, ties, polo-neck sweaters, etc.) in the radiography zone.

2. Have the patient put on the protecting apron or similar protective devices in accordance with the regulations in force in the various countries, making sure that it does not interfere with the trajectory of the X-rays beam.

3. Bring the patient in standing position up to the chin support and, using the handle **22**, release the brake button **24** in order to position the slider so that the chin support resting plane is aligned with the patient's chin.

4. Position the patient in the skull-clamp with the chin resting on the appropriate support and against the vertical reference rod of the same. Furthermore, position the hands on the lateral knobs **22**.

5. Press the push button **20** to light on the beam centering lights. In this way both reference lights, mid sagittal (**45**) and Frankfurt' planes (**46**), are lighted on; adjust the patient's head in such a way that mid sagittal light is on the respective anatomical plane while the Frankfut's one is parallel to the corresponding plane. Horizontal beam (Frankfurt plane **46**), if needed, can be height adjusted in relation to the patient's dimensions; the adjustment is made by acting on the appropriate knob **18**. In order to check the patient's centring, operator can tilt the mirror **6** towards himself, thus obtaining the a front view of the patient.

6. After the end of the patient's centring, bring the height of the skull-clamp a little above the patient's orbital bone and close the skull-clamp leaving the two temple clamp roads **7**, by acting on the appropriate knob **9**. This will help the patient to hold the correct position during the examination.

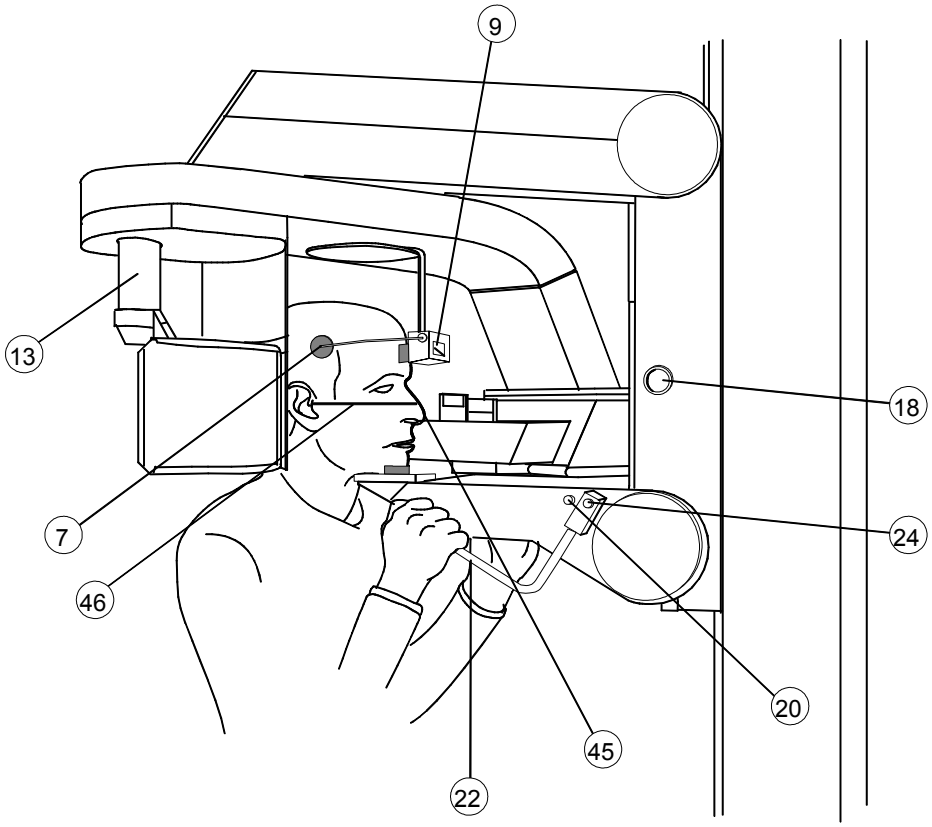


Figure 4: TMJ1 position

6.3.1.4 Performing the exposure (refer to Figure 9)

1. With the LED of push button **29** lit up, check if the exposure data are correct (paragraph 6.2.2), then press the X-ray button **42** during the whole time of the exposure as the control is a dead man type, checking the simultaneous operation of the rays signaling light **43** and the acoustic ray signal.

NOTE:

- X-ray emission starts with a delay of four seconds after the operation of the exposure push button, in order to allow the preheating time of the tube filament and check all the set values.
  Arm's rotation will start a little in advance regarding the emission.
- On TMJ examination, the X-ray emission does not last for all the rotation, but it is interrupted corresponding with the central middle part of the mouth. As a consequence, both acoustic and visual emission signals are interrupted in accordance with the emission.
- X-ray push button is a "dead man type"; this means that the emission and arm's rotation are interrupted if the push button is released. **The push-button must be held pressed also during the above emission interruption.**
- **In case of patient's moving during arm's rotation, the exam has to be interrupted releasing the emission push-button; in this way both emission and rotation will be interrupted.** On the display will appear the message "Change film" and, after about two seconds, "Press reset" alternating. The cassette has to be removed and loaded with a new film on the dark room. The return button 32 is, then, to be pressed to bring the machine in the starting position. The return end is evidenced by the message "OK" which will disappear when the button 32 is released.

NOTE:
In the event that the film in the cassette not being substituted, and a further examination made, no error message will appear, but, due to a double exposure, the film will give no diagnostic result.

2. At the end of second emission step, on the display of the hand held control the message "Press Reset" will appear. The return button **32** is, then, to be pressed to bring the machine in the starting position. The return end is evidenced by the message "OK" which will disappear when the button **32** is released.

6.3.2 Performing the TMJ2 examination

6.3.2.1 Preparing the equipment

1. Select TMJ2 modality by pressing the push-button **30** (Figure 9).
2. Leaving the film used on the previous examination on the cassette, rotate the film holder from PAN/TMJ position to the TMJ2, rotating anticlockwise the knurled knob **13** (Figure 5).

NOTE:
Operator has to evaluate the needs to increase the kV selection of one step; from some clinical results; this will increase image's quality. Eventually, use a manual programming mode.

6.3.2.2 Preparing the patient (refer to Figure 5)

1. Open the skull-clamp support **7** by acting on the appropriate knob **9**.

2. If not already use for TMJ1, place a standard bite on the chin support.

3. Instruct the patient to open the mouth up to the maximum, maintaining the mandible fixed and lining on the chin support; patient's chin has to stay against the vertical plane of the chin support. As a consequence, patient's head will be slightly rotated backward.

4. Instruct the patient to place the inferior scissors teeth against the lower part of the bite used for the panoramic examination; this procedure will help the patient to stay in a correct position during the exposure.

5. Press push-button **20** to light on the centring device. In this way, both mid sagittal **(45)** and Frankfurt plane **(46)** will light on. Adjust the patient's head in order to have the vertical light beam **45** to lean on the corresponding anatomical reference. In order to check the patient's centring, operator can tilt the mirror **6** towards himself, thus obtaining the a front view of the patient.

WARNING:
Do not align the patient to the Frankfurt plan; in the case the patient will be re-positioned again with the Frankfurt' plane horizontal, it is possible that the condiles will fall out from the exposed area of the film.

6. After the end of the patient's centring, bring the height of the skull-clamp a little above the patient's orbital bone and close the skull-clamp leaving the two temple clamp roads **7**, by acting on the appropriate knob **9**. This will help the patient to hold the correct position during the examination.

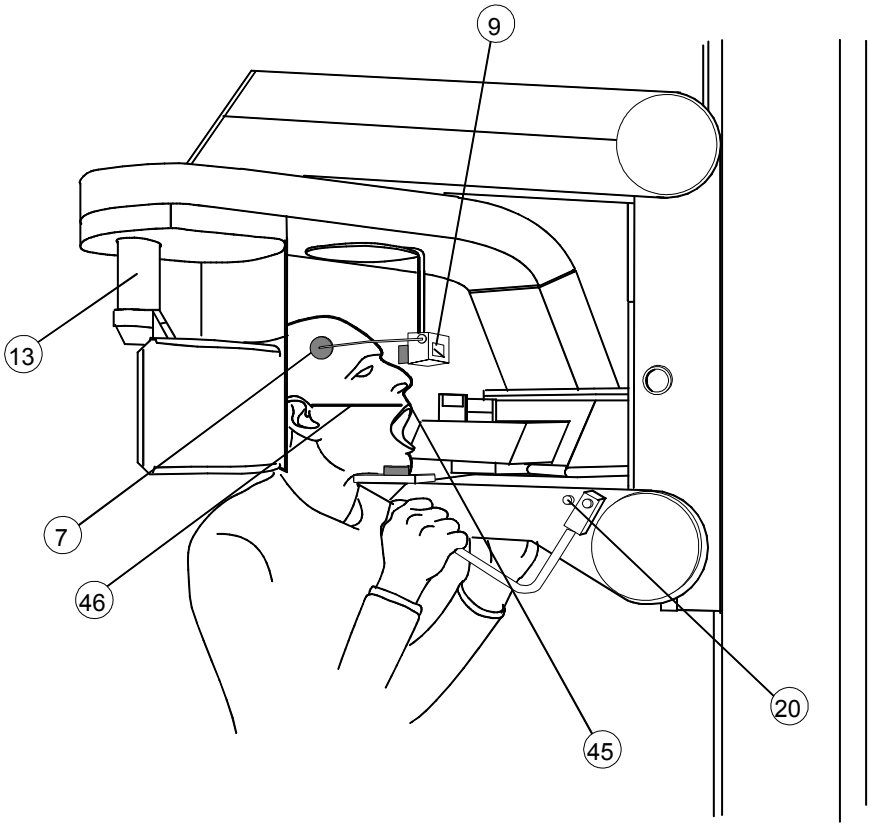


Figure 5: TMJ2 position

6.3.2.3 Performing the exposure (refer to Figure 9)

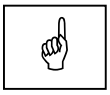
1. After having the modality selected and with LED **30** on signalling the correct machine set, press X-ray push-button **42** on the hand held control.

NOTE:

- In the event of the x-ray control button being activated before the correct placement of the cassette, the message "Please rotate film holder to TMJ2 position" will be displayed.
- X-ray emission starts with a delay of four seconds after the operation of the exposure push-button, in order to allow the preheating time of the tube filament and check all the set values. Arm's rotation will start a little in advance regarding the emission.
- On TMJ examination, the X-ray emission does not last for all the rotation, but it is interrupted corresponding with the central middle part of the mouth. As a consequence, both acoustic and visual emission signals are interrupted in accordance with the emission.
- X-ray push button is a "dead man type"; this means that the emission and arm's rotation are interrupted if the push button is released. **The push-button must be held pressed also during the above emission interruption.**
- **In case of patient's moving during arm's rotation, the exam has to be interrupted releasing the emission push-button; in this way both emission and rotation will be interrupted.** On the display will appear the message "Change film" and, after about two seconds, "Press reset" alternating. The cassette has to be removed and loaded with a new film on the dark room. The return button **32** is, then, to be pressed to bring the machine in the starting position. The return end is evidenced by the message "OK" that will disappear when the button **32** is released.
- In the event that the patient will move during TMJ2 exposure and after TMJ1 mode already executed, it is not mandatory to repeat also TMJ1 exposures. **This modality has to be repeated if, for diagnostic reasons, both open and closed moth results has to be on the same film.**

2. At the end of the TMJ2 examination, on the display of the hand held control the message "Press Reset" will appear. The return button **32** is, then, to be pressed to bring the machine in the starting position. The return end is evidenced by the message "OK" that will disappear when the button **32** is released. At this point the message "Wait please…." will appear, indicating that the automatic pause to allow anode cooling down procedure is acting. At the end of this procedure, the LED of the last examination performed will light on. The cassette holder has automatically placed itself to the TMJ1 position.

3. It will be now possible to remove the film cassette and, in the dark room, open it and develop the film.



NOTE:
If for external reasons or incorrect operation the emission times should exceed 5 seconds, a safety backup timer intervention will come into operation, interrupting emission but the arm rotation will continue until the end.

6.4 Sinus examination

The SINUS examination aim is to show the structure located in the sinomaxillary area.

6.4.1 Preparing the equipment

The equipment setting is like the one described at point 6.2.1 as the only difference between the Panoramic Exposure and the Sinus one is due to the different chin support used: the chin support to be used in the Sinus examination is as follows (numbers refer to Figure 8 at the end of this manual):

		Chin support PANORAMIC (1)	Chin support SINUS (21)
SINUS	ADULT	NO	**YES**
	CHILD	NO	**YES**

6.4.2 Programmed/Manual exposure

To change from the programmed function to the manual one and viceversa, proceed as described at point 6.2.2 bearing in mind that the kV and Time (seconds) parameters in Sinus exposure are like the Panoramic ones.

6.4.3 Preparing the patient

1. Proceed operating as for points 6.2.3. steps 1, 2 and 3.
2. Position the patient in the skull clamp with the chin resting on the appropriate support and against the vertical reference rod of the same and rest the hand on the side handles but, instead of biting with the incisors the centring bit, as in the Panoramic exposure, the examination has to be carried out with a closed mouth.
3. Proceed operating as for points 6.2.3. steps 5, 6, 7 and 8.

6.4.4 Performing the exposure

Proceed as for point 6.2.4, following the relevant notes.

6.5 Ceph examination (not available on "ST" version)

6.5.1 Preparing the equipment

If depressing button **28** (Figure 9)the message "**Equipment not set**" is displayed and the function LED blinks, press a second time the button, so as to obtain reading of the message regarding the interlock to be enabled.
The following are the messages that can be read during preparation of the Cephalometric function and the concerned operations to follow:

1. **Rotating arm unlocked:** rotate anticlockwise the upper knob **5** (Figure 8).
2. **Please rotate X-ray generator on CEPH position:** release lever 4 and rotate anticlockwise the tubehead until insertion of the mechanical locks is noted.
3. **Please insert the CEPH beam limiter:** remove the PAN/TMJ collimator if present and insert the appropriate CEPH collimator.

NOTE:
In CEPH examination different types of collimators are used according to the X-ray cassette size; the available collimators are:

- **Standard size in inch:** 10"x8" asymmetrical (**L.L.**)
  *Optional: 8"x10" symmetrical (**P.A.-A.P.**), 8"x10" asymmetrical (**L.L.**), 12"x10" symmetrical (**P.A.A.P.**)*
- **Standard size in cm:** 18x24 asymmetrical (**L.L.**)
  *Optional: 18x24 symmetrical (**P.A.-A.P.**), 24x18 asymmetrical (**L.L.**), 30x24 symmetrical (**P.A.-A.P.**)*

The first value of the above mentioned collimator sizes refers to the horizontal dimension of the film.

4. Loosen knob **50** (Figure 10), raise pin **51** (Figure 10) so that the skull-clamp unit can be adjusted according to the examination to be made, i.e. latero-lateral, postero-anterior, antero-posterior, put back the pin and lock knob **50**.
5. Load in the dark room the film holder cassette, the size of which is indicated on the collimator. Insert it in the cassette holder unit **53** (Figure 10), in the correct position according to the installed collimator, following the position indicated on the cassette holder panel; lock it lowering the upper guide by mean of the special knob.

NOTE:
During a CEPH exposure, no chin support of any kind is needed.

6.5.2 Programmed/Manual exposure

After having set the equipment as described in the previous point, it is now possible to chose whether to operate an exposure in the pre-programmed mode, i.e. with the kV and time values set by the manufacturer according to the size or to operate a manual function, i.e. with the possibility to change the set values.

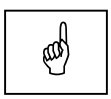
6.5.2.1 Programmed exposure (Latero-Lateral) (refer to Figure 9)

Change the previous examination be made in manual exposure, to pass to the pre-programmed exposure press on of the program button: Adult **33** or Child **34**.

To program the new configuration operate on push button Adult **33** and Child **34**, and on push buttons Large Size **35**, Medium Size **36** and Small Size **37**; in the different programmed configurations there are only variations in the exposure time but not in the kV values. The following shows the pre-programmed values according to the combination made for a Latero Lateral exposure:

	Large Size (35)	**Medium Size** (36)	**Small Size** (37)
Adult (33)	80kV - 1sec	80kV - 0,8sec	80kV - 0,7sec
Child (34)	80kV - 0,7sec	80kV - 0,5sec	80kV - 0,4sec

Such values have been set bearing in mind the screens-film combination and subsequent mA calibration as reported in chapter 4.



NOTE:
The kV and time values for Postero-Anterior or Anterior-Posterior examination must be manually set as indicated on the table of next paragraph.

6.5.2.2 Manual exposure (refer to Figure 9)

Should a manual exposure be chosen, there will be the possibility to change both the kV and time values operating as hereunder described:

1. Press the button kV **38** or time **39** the enabling button will light up.
2. Depress buttons **41** (increase) or **40** (decrease) on the hand control selecting the desired kV value to be used. After 2 seconds, the function button LED stops blinking. The unit is now ready for the next step.

NOTE:
The kV can vary from a minimum of 60kV to a maximum of 85kV by steps of 5kV.
The time (second) can have one of the following values:

0.20 - 0.23 - 0.26 - 0.30 - 0.33 - 0.36 - 0.40 - 0.45 - 0.50 - 0.60
0.70 - 0.80 - 0.90 - 1.00 - 1.30 - 1.60 - 2.00 - 2.50 - 3.00

If, after having selected the maximum or minimum value of kV or seconds, a further increase or decrease is erroneously asked, the following messages **Minimum** o **Maximum**; will be displayed. Afterwards the set minimum or maximum value of kV or seconds will appear on display.

To take a Postero-Anterior (**PA**) or Anterior-Postero (**AP**) projection you must set kV and Times as specified in the following table taking into consideration the screens-films combinations and consequent mA calibration as reported at chapter 4.

	Large Size (35)	**Medium Size** (36)	**Small Size** (37)
Adult (33)	80kV - 2sec	80kV - 1,6sec	80kV - 1,3sec
Child (34)	80kV - 1,3sec	80kV - 1sec	80kV - 0,8sec

6.5.3 Preparing the patient (refer to Figure 10)

1. The patient must be prepared as per point 6.2.3. steps 1and 2.
2. Open the skull-clamp rods **60**, to maximum aperture by means of knob **61**.
3. Move the nose-rest unit **54** outwards as far as possible after releasing it by means of knob **59**.
4. Raise the nose-rest rod **57** as much as possible and rotate the Frankfurt plane alignment rod **55** outwards.
5. Bring the patient to the skull-clamp unit in erect position and position the centre of the skull-clamp rods (previously disinfected) in the auricular opening. To do this turn the slider by means of handle **62** and the brake release button **63**.
6. Fastern the patient's head between the rods so that the points enter the auricular opening (Figure 6).
7. Bring up the nose-rest **54** and adjust the patient's Frankfurt plane (plane passing through the auricular openings and the lower part of the orbital cavity) according to the plane defined by the centre points **58** and the alignment rod **55** when the latter is fully downward (Figure 6).
8. Exclude alignment rod **55** by rotating it outwards and bring up the nose rest unit **53**, at the same time adjusting rod **57** until contact with the front-to-nasal (Figure 7).

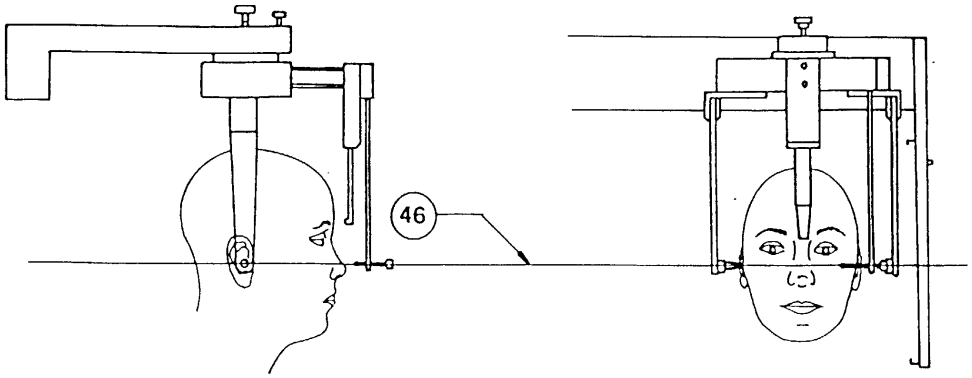


Figure 6

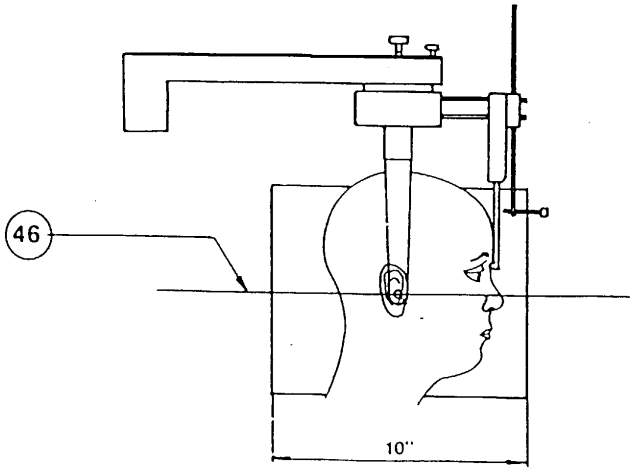


Figure 7

6.5.4 Performing the exposure (refer to Figure 9)

NOTE:
During the emission of X-rays protection of the operator and surrounding personnel must be in accordance with the rules in force in the respective countries.
The X-ray activation always be commanded from an X-ray protected area via remote control. If it is necessary the operator must stand at a distance of at least 2 meters (78 ¾ inches) away from the X-ray source and, if possible, on the opposite direction. No other persons other than the operator and the patient, are allowed to stay in the examination room during the examination.

1. Check if the exposure data are correct (paragraph 6.2.2), press the rays button **42** during the whole time of the exposure as the control is a dead man type, checking the simultaneous operations of the X-ray signalling light **43** and the acoustic ray signal.
   Should the X-ray Cassette not be inserted, the message "CEPH FILM HOLDER NOT PRESENT" will be displayed.

NOTE:
The start of arm rotation and the emission of rays take place with a delay of four seconds after pressing button **42** allowing preheating of the tube filament and check all the set value.

2. After exposure, release the patient from the positioning device, remove the film cassette and proceed to open the cassette and develop the film in the dark room. The following message will be displayed "**Wait, please .....**" which identify an automatic countdown of 1 minute allowing the cooling of the tubehead anode.

NOTE:
After each examination, replace the ear centering pins.

WARNING:
Should the patient move during the exposure, stop the exposure immediately by releasing the rays control button **42** thus stopping the rays emission.
The message "**Change film please**" will be displayed for a few seconds, it will then be opportune to remove the cassette and insert a new film in the dark room.

NOTE:
Should the film in the cassette not be replaced and a subsequent exposure carried out, no impediment message will be displayed, but due to the double exposure the film will give non diagnostic results.

If for external reasons or incorrect operation the rays emission times should exceed 3 seconds, a backup security timer will come into operation cutting out the emission after 5 seconds.

6.6 Messages on display (refer to Figure 8 and Figure 9)

As described in chapter 4, ROTOGRAPH PLUS is entirely controlled by a microprocessor that, besides controlling the emission parameters and the line voltage fluctuation, indicates the different equipment's operating modes by means of appropriated messages on display **44**, the eventual anomalies and mistakes. The following table shows the different messages that could be displayed, their cause and relevant actions.

Message displayed	Reference	Cause	What to do
Minimum	6.2.2.2 and 6.5.2.2	With control button **40** it has been required a value lower than the allowed one	Select a correct value
Maximum	6.2.2.2 and 6.5.2.2	With control button **41** it has been required a value higher than the allowed one	Select a correct value
Wait, please.....	6.2.4, 6.3.1.4, 6.3.2.3 and 6.5.4	X-ray exposure has been performed	Waiting time (4min) for PAN or TMJ exposures, 1min CEPH exposures
Equipment not set	6.2.1, 6.3.1.1 and 6.5.1	Not all interlocks are enabled	Press a second time the function button to display the interlock to be enabled
PAN/TMJ film holder not present	6.2.1. step 1	Missing of the PAN film holder cassette **17** in the relevant support	Insert the cassette in the relevant support **16**
Please rotate film holder to PAN/TMJ1 position	NO reference	The film holder cassette support **16** is not in the correct position	Rotate the knurled knob **13** clockwise to position the cassette
Rotating arm unlocked	6.5.1. step 1	The arm is in PAN/TMJ condition	Rotate clockwise the arm upper knob **5**
CEPH film holder not present	6.5.4	CEPH X-ray has been requested without the cassette being inserted	Set the cassette in the special support
Please rotate X-ray generator on PAN/TMJ position	6.2.1	The X-ray generator is in CEPH position	Operating on the lever **4** rotate the X-ray generator clockwise
Please rotate X-ray generator on CEPH position	6.5.1. step 2	The X-ray generator is in PAN/TMJ position	Operating on the lever **4** rotate the X-ray generator anti-clockwise
Please insert the PAN/TMJ beam limiter	6.2.1	The CEPH collimator is in or there is no collimator inserted	Insert the PAN/TMJ collimator

Message displayed	Reference	Cause	What to do
Please insert the CEPH beam limiter	6.5.1. step 3	The PAN/TMJ collimator is in or there is no collimator inserted	Insert the CEPH collimator
CEPH modality not enabled	NO reference	CEPH control button **28** pressed and unit not equipped with this device	Press the button of another examination (NOT CEPH)
Please unlock rotating arm	6.2.1	The arm is in CEPH position	Rotate the upper knob **5** anti-clockwise
Please rotate film holder to TMJ2 position	6.3.2.3	After having requested a TMJ2 exposure, the film holder is not in the correct position	Rotate the film holder anti-clockwise operating on the knurled knob **13**
Line voltage too low	NO reference	Line voltage outside the -10% of the nominal value	**(1)** Make sure the line voltage is within the ±10% of the nominal value.
Line voltage too high	NO reference	Line voltage outside the +10% of the nominal value	**(1)** Make sure the line voltage is within the ±10% of the nominal value.
Impossible to regulate the line voltage	NO reference	There is a continuous voltage fluctuation during the cathode pre-ignition phase	Call Technical Assistance
Push "RESET"	6.2.4, 6.3.1.4 and 6.3.2.3	A PAN or TMJ cycle has been interrupted while in progress	Press the RESET button **32**
OK	6.2.4, 6.3.1.4 and 6.3.2.3	The arm return run is completed	Release button RESET **32**
TMJ modality not enabled	NO reference	TMJ examination has been requested on a unit not equipped with this feature	Press the button of another examination (NOT TMJ)
Memory data corrupted! Call Technical Assistance	NO reference		Call Technical Assistance
NO ANSWR	NO reference		Call Technical Assistance
Out of Order N° 1 ! Call Technical Assistance	NO reference		Call Technical Assistance

(1) If line voltage is outside the specified range (± 10%), contact the local power company in order to take the necessary corrective actions. **Villa Sistemi Medicali S.p.a. will not bear any cost for proper line set-up.**

6.7 Identification and correction of defects in dental radiographs exposure

6.7.1 Defects due to wrong patient positioning

- **Incisor too wide and indistinct**

  The patient does not grip the bite block with the incisors or bends the rod towards the outside of the equipment.

  Corrective action:
  Reposition the patient, also checking alignment of the Frankfurt plane through the centring device. Please refer to the note on the centring (see paragraph 6.2.3. steps 3, 4 and 5)

- **Incisor too small and indistinct**

  The patient is positioned with an error opposite to point "a" above.

  Corrective action:
  Refer to point "a" above

- **Radiograph with white central zone**

  The patient's spinal column prevents the rays from passing because it is too compressed.

  Corrective action:
  Recheck alignment of Frankfurt plane, and try to stretch the cervical tract of the column as much as possible by correcting slider height and shifting the patient's feet towards the stand; (see paragraph 6.2.3. steps 3, 4, 5 and 6)

- **Dental arch not symmetrical**

  The sagittal median line does not correspond to the reference centring light.

  Corrective action:
  Reposition the patient (see paragraph 6.2.3. step 6)

- **Upper apical zone too dense**

  The patient is not keeping his lips tightly together and is not holding the tongue against the palate.

  Corrective action:
  See point 6.2.3. step 8.

6.7.2 Defects due to wrong setting of radiological data and dark room

- **Under-exposed or over-exposed film**

  The number of kV set are not adequate for the patient's build, more likely an error in development.

  Remedy: repeat the examination with a different value: see paragraph 6.2.4. If the error happens again, call the **Technical Assistance**

- **Film completely black**

  The film has been exposed to light or undergone radiation.

  Remedy: check efficiency of the dark-room and do not keep new film near the source of X-rays

- **Veiled film**

  The edges of the film not involved in the dental arch are not fully transparent, with absence of definition on whole film.

  Remedy: do not use expired films, check the efficiency of the safe light in the dark-room and do not keep films near to sources of radiation

- **Film with branched striations**

  The film has accumulated electrostatic charges owing to rapid rubbing against its casing, or the intensifying screens have not been treated with antistatic liquid.

  Remedy: clean the screens with the appropriate liquid

- **Film with indistinct detail but good contrast**

  The film is not well pressed between the intensifying screens.

  Remedy: change the cassette and the plate felt

- **Completely white film**

  It has not been exposed to X-rays or wrong development.

  Remedy: verify the X-rays emission by checking light and acoustic signal (light **43** Figure 9), If the defect persist, check the development process. If still not corrected, call for **Technical Assistance**.

6.7.3 Defects in the film due to equipment

- If the film exhibits zones not fully radiated or even completely white, it almost certainly means a defect of alignment between beam of X-rays and film or partial or total absence of radiation: in this cases call the **Technical Assistance**

- In case of Ceph examinations with absence of evidencing of patients profile in a latero-lateral sense, have the filter setting checked by the **Technical Assistance.**

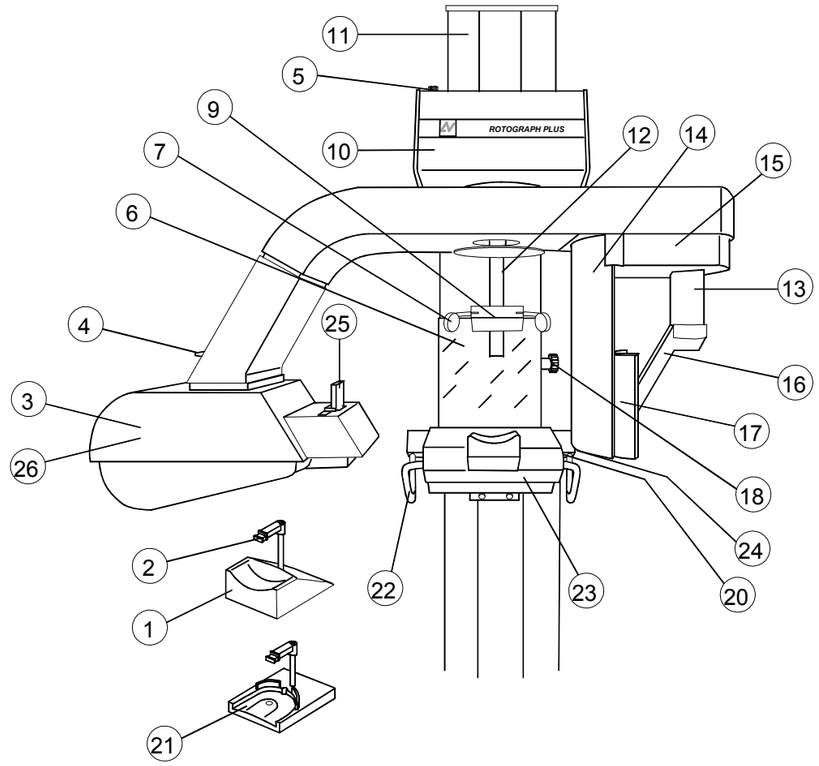


Figure 8: Stand

1. "PANORAMIC" chin support
2. Bite Block
3. Tubehead
4. Tube rotation release-lever for panoramic-ceph position
5. Arm locking pin
6. Centering mirror
7. Skull / Temple clamp support
9. Skull / Temple clamp control knob
10. Motor group unit
11. Column
12. Slider
13. Release handle for positioning cassette in PAN/TMJ modes
14. Slit assembly
15. Rotating arm
16. Film cassette support
17. Film cassette
18. Horizontal light beam height control knob
20. Light cross beam button
21. Chin support TMJ, SINUS. Also used as an accessory to raise children's chin by sandwiching it with the standard Panoramic chin support
22. Patient positioning handle and slider
23. Support unit of the motor group
24. Brake release button
25. Collimator for PAN/TMJ/CEPH
26. Focus position point

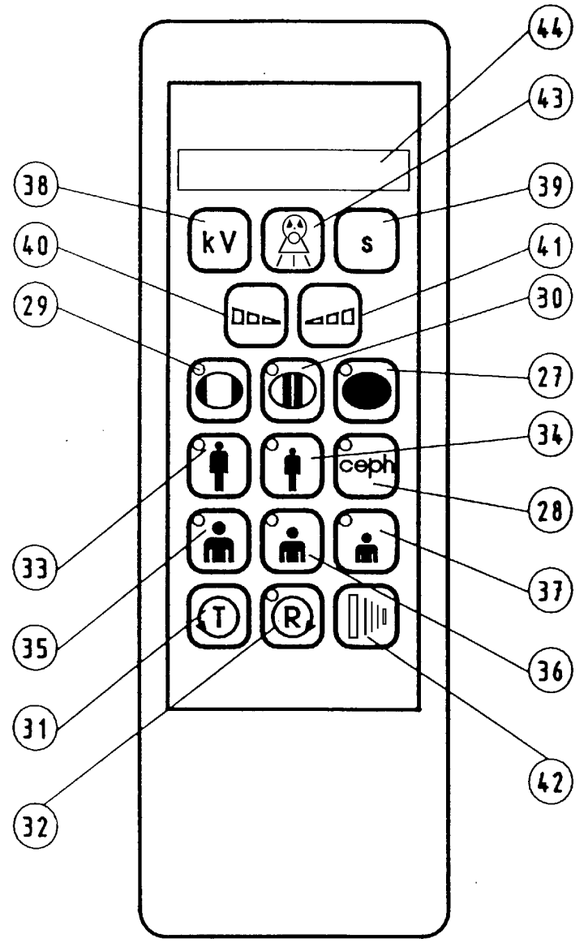


Figure 9: Remote control

27	Panoramic mode Selection	36	Medium Size Selection
28	CEPH mode Selection	37	Small Size Selection
29	TMJ1 mode Selection	38	kV Selection
30	TMJ2 mode Selection	39	Push-button Multifunctional
31	Test mode ("dead man" button)	40	Decrease kVangles or times(CEPH)
32	RESET ("dead man" button)	41	Increase kV angles or times(CEPH)
33	Adult Selection	42	X-rays push-button ("dead man" button)
34	Child Selection	43	X-rays emission pilot LED
35	Large Size Selection	44	Alphanumeric display

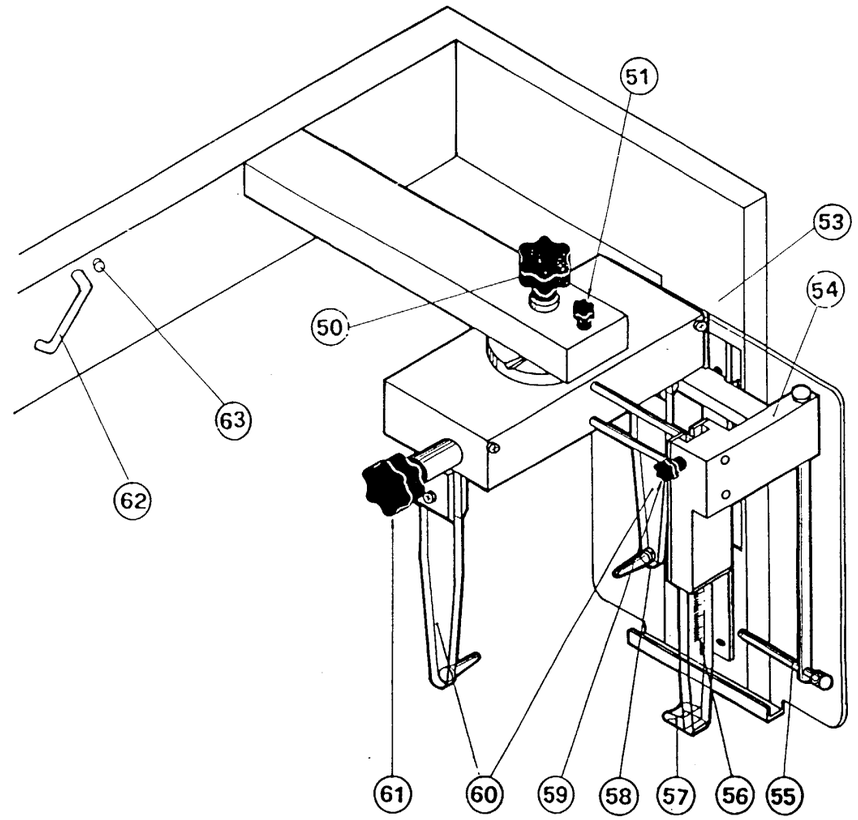


Figure 10: Skull-clamp unit for cephalometry

50. Skull-clamp unit release knob
51. Reference pin for skull-clamp
53. Cassette support unit
54. Nose-rest unit
55. Frankfurt plane reference rod
56. Scale referred to nose, for repetition of exposure
57. Nose-rest rod
58. Centring ring
59. Nose-rest block knob
60. Skull-clamp unit rod
61. Distance regulating knobs for skull-clamp unit rods
62 Handle for arm positioning according to the patient tallness
63 Break button

7. MAINTENANCE

As for all the electrical devices, in addition to proper use this unit also requires periodical checks and maintenance. This precautions will insure a safe and efficient performance of the device.

The preventive maintenance consists of checks that can be carried out directly by the operator or by the authorized service personnel.

The checks that can be carried out directly by the operator are the following:

Interval	Type of check
Daily	- check that the tubehead does not have oil leakage - check that the cable of the remote control is not damaged - check that the unit does not show damages that may affect the protection against radiation - check that no metallic noise are generated by the column or the rotating assembly.
Once a week	- check that the metal ropes of the column are not damaged or broken (the ropes can be seen on the side of the column) - while performing exposure, release the X-ray push button and check that the beeper stops beeping immediately.
Every 6 months	- check that the label are not damaged and well attached.

WARNING:
If any of the above checks give negative results, the operator must contact the authorized service personnel.

MAINTENANCE LOG-BOOK

This log-book has to be filled in by the authorized VILLA SISTEMI MEDICALI engineer after installation and after performing the preventive or corrective maintenance visits.

Installation: Date ..... Technician .....

Maintenance: Date ..... Technician .....

Cause .....

Maintenance: Date ..... Technician .....

Cause .....

Maintenance: Date ..... Technician .....

Cause .....

Maintenance: Date ..... Technician .....

Cause .....

Maintenance: Date ..... Technician .....

Cause .....

Maintenance: Date ..... Technician .....

Cause .....

Maintenance: Date ..... Technician .....

Cause .....

Final test table

This table is reserved to Qualified and Trained Service Technician

Data setted on Hand Control for Rotograph PLUS S.N. .....

Voltage supply for rotation motor A1 V1 ..... R39 A1 V1 ..... R40

Decelerating ramp for Central OPG R41 ..... sec

S0 =	On		Off		S3 =	On	Off	
S2 =	On		Off		S5 =	On	Off	
S4 =	On		Off		S8 =	On	Off	
S6 =	On		Off		S9 =	On	Off	
SA=	On		Off					

S1 =	ITA		ENG		FRA		ESP	DEU
S7 =	0	1	2	3	4	5	6	7

Angular Control Settings

S5 Machine Control Functions

Adult OPG Values	Adult TMJ1	Adult TMJ 2
T1= 2.00 sec	T1= 2.00 sec	T1= 2.00 sec
A2= . . . . . .Degrees	A1= . . . . . .Degrees	A1= . . . . . .Degrees
A3= . . . . . .Degrees	A2= . . . . . .Degrees	A2= . . . . . .Degrees
A4= . . . . . .Degrees	A5= . . . . . .Degrees	A5= . . . . . .Degrees
A5= . . . . . .Degrees	A6= . . . . . .Degrees	A6= . . . . . .Degrees
T2= 18 sec ± 10%	T2= 16 sec ± 10%	T2= 16 sec ± 10%
T3= 17 sec ± 10%	T3= 5,20 sec ± 10%	T3= 5,20 sec ± 10%

Child OPG	Child TMJ 1	Child TMJ 2
T1= 2.00 sec	T1= 2.00 sec	T1= 2.00 sec
A2= . . . . . .Degrees	A1= . . . . . .Degrees	A1= . . . . . .Degrees
A3= . . . . . .Degrees	A2= . . . . . .Degrees	A2= . . . . . .Degrees
A4= . . . . . .Degrees	A5= . . . . . .Degrees	A5= . . . . . .Degrees
A5= . . . . . .Degrees	A6= . . . . . .Degrees	A6= . . . . . .Degrees
T2= 16 sec ± 10%	T2= 16 sec ± 10%	T2= 16 sec ± 10%
T3= 14 sec ± 10%	T3= 4,70 sec ± 10%	T3= 4,70 sec ± 10%
T2= 16 sec ±10% with decel.		
T3= 14 sec ±10% with decel.		

S/N	Diaphragm (PAN)	Diaphragm (18x24 asym.)	Diaphragm (10x8” asym.) . . . . .
S/N	Diaphragm (18x24 sym.)	Diaphragm (8x10” sym.)	Diaphragm (24x18 asym.) . . . . .
S/N	Diaphragm (8x10” asym.)	Diaphragm (30x24 sym.)	Diaphragm (12x10” sym.) . . . . .

Control
Villa Sistemi Medicali S.p.a.

. . . . . Date . . . . . .

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