



INTRA-ORAL X-RAY SYSTEM

ELITYS®

HIGH FREQUENCY TECHNOLOGY

USER'S MANUAL

CAUTION

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

Trophy Radiology constantly strives to improve its products and, therefore, reserves the right to deliver, without prior notice, machines whose characteristics differ from those described here; nonetheless, these machines are still guaranteed to comply with regulations in force. All rights reserved.

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WARRANTY CONDITIONS

It is the responsibility of the user to comply with current legislation concerning installation and operation of the equipment.

In the event of incorrect use or defective maintenance not complying with the recommended scheme, TROPHY RADIOLOGIE or its representative shall not be liable for any deficiencies, physical damage, personal injuries or non conformity that may occur as a result.

The equipment must not be used if electrical, mechanical or radiation protection components are defective, or if the operations stipulated by the maintenance programme have not been carried out.

Only TROPHY RADIOLOGIE or third parties duly authorized by TROPHY RADIOLOGIE may carry out modifications or add extensions to the installation and equipment.

Such modifications shall always be carried out in compliance with the regulations in force in the country of operation, and in compliance with normal trade practice.

If the power supply characteristics do not comply with the recommendations given in the Installation and Maintenance Manual section 4 Chapter II "Prior to Installation", the **ELITYS®** unit will not be able to provide maximum performance, and it will not be possible to guarantee normal operation.

You can obtain a complete technical file about the **ELITYS®** unit by simply requesting it from TROPHY RADIOLOGIE.

TRANSPORTATION CONDITIONS

The goods are transported at the consignee's risk.

Any disputes as to losses or damage occurring during transportation must be stated in the presence of the haulier upon delivery, and must be noted on the delivery slip.

Under no circumstances shall packaging materials manufactured by TROPHY RADIOLOGIE be used for any other purposes than transportation.

SAFETY AND PROTECTION

You have just purchased a TROPHY *ELITYS*® intra-oral X-ray system. We congratulate you on your choice, and are sure you will be fully satisfied with its use and diagnostic capabilities.

TROPHY radiology units offer high quality and advanced technology.

We recommend reading this manual carefully before using your unit, to become familiar with its operation and make the most of its performance.

Keep this manual in a safe place so that you can easily refer to it in the future.

X-rays are not innocuous and can be dangerous if used badly. You must, therefore, take precautions even when following the instructions in this manual.

X-ray units manufactured by TROPHY comply with the strictest safety standards in force throughout the world (Europe, Japan, USA, etc.). They guarantee optimum protection against radiation risks.

Nonetheless, you are handling a unit specifically designed to generate X-rays to allow medical diagnosis on a film or using RVG (a dental digital imaging system). Consequently, despite the inherent safety of our equipment, we recommend using conventional commercially-available equipment to protect yourself and your patient against scattered radiation risks.

In addition, it is vital that the assembly, extensions, adjustments, modifications and repairs be carried out by an authorized TROPHY distributor. Also, your radiology unit must be installed in premises that comply with IEC provisions and the standards in force.

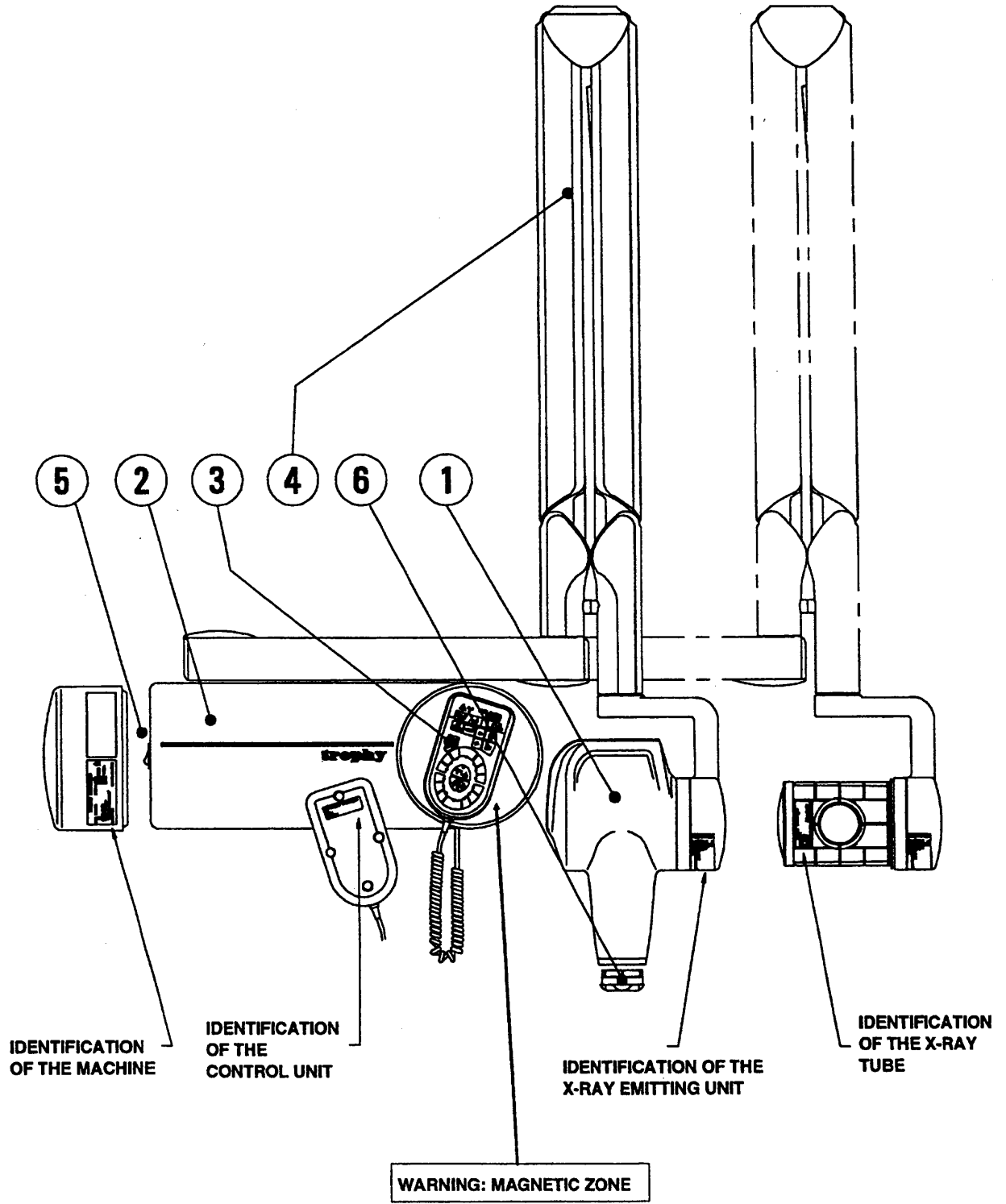
In the event of failure to comply with these instructions TROPHY shall not be held responsible for the safety, reliability and characteristics of the machine.

Your distributor will be pleased to help you with the initial use of your unit and to answer any subsequent questions you may have.

Thank you for placing your confidence in TROPHY RADIOLOGIE.

The signs "Warning" and "Ionising radiation" fixed to the front panel of the control unit mean "WARNING IONISING RADIATION".



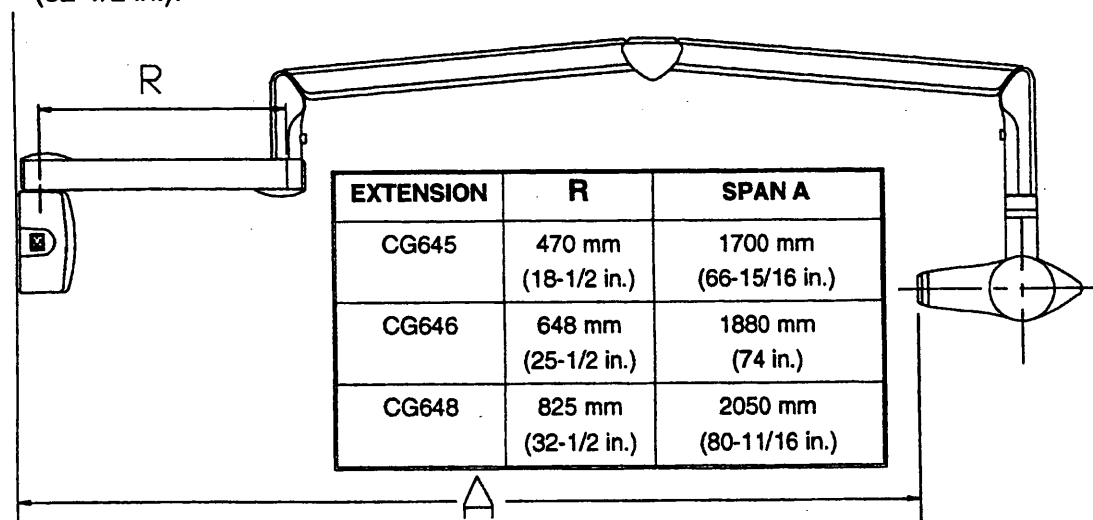


DESCRIPTION OF THE SYSTEM

Your intra-oral radiology unit is made up of:

- ① A high frequency X-ray generator comprising:
 - > a transformer and associated electronics, and an oil-bathed X-ray emitting tube
 - > a beam limiting device that limits radiation to a diameter of approximately 6 cm (2-3/8 in.) on the skin and ensures a distance of 20 cm (7-7/8 in.) between the skin and the X-ray focal spot.
 - > an angle scale and a handle to facilitate positioning
- ② A wall framework containing the high frequency generator's control electronics designed to support its mechanical stand.
- ③ A control unit for the X-ray generator, with the following features:
 - > anatomical selection and digital display of parameters (kV, mA, exposure time)
 - > a self-test of the microprocessor each time the unit is activated
 - > an alarm in the event of incorrect operation
 - > an RVG key that automatically adjusts the exposure parameters (time and mA) if you are using an RVG (RadioVisioGraphy)
- ④ A scissor arm:

The scissor arm makes it possible to position the generator easily and precisely. It is wall-mounted with an extension of 470 mm (18-1/2 in.), 648 mm (25-1/2 in.) or 825 mm (32-1/2 in.).



- ⑤ On/off switch with built-in light

□ Options

- > Separate control unit
- > Rectangular collimator ⑥, dimensions 41 x 32 mm (1-5/8 x 1-1/4 in.)
- > Separate radiography control button

USE OF THE UNIT

I. PATIENT POSITIONING

The patient should preferably be seated with the sagittal plane vertical (figure 1).

- > Radiography of the upper maxillary: the nose-ear plane must be horizontal
- > Radiography of the lower maxillary: the occlusal plane must be horizontal

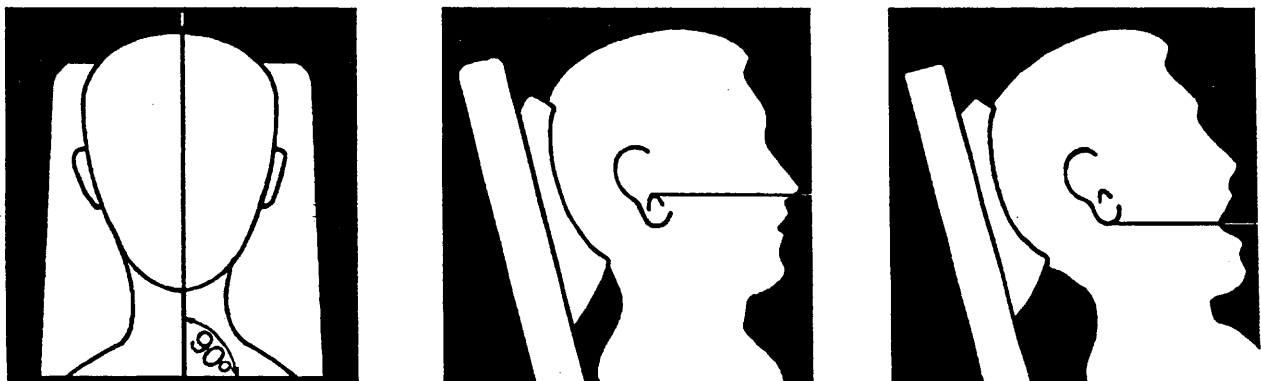


FIGURE 1 : PATIENT POSITIONING

II. GENERATOR POSITIONING

The scissor arm allows the generator to be accurately positioned for any type of exposure. The beam limiting device maintains a distance of at least 20 cm (7-7/8 in.) between the focal spot and the skin. Subsequently, either the paralleling technique (figure 2), or the bisecting technique (figure 3) can be used.

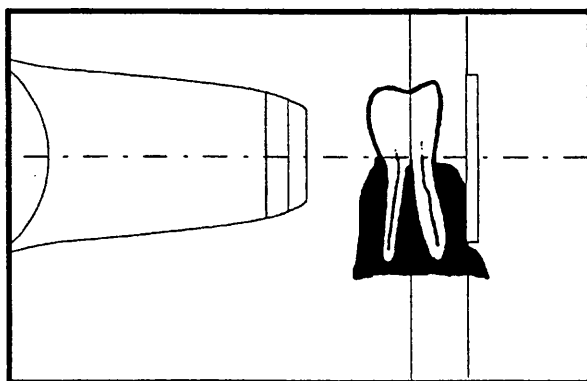


FIGURE 2 : PARALLELING TECHNIQUE

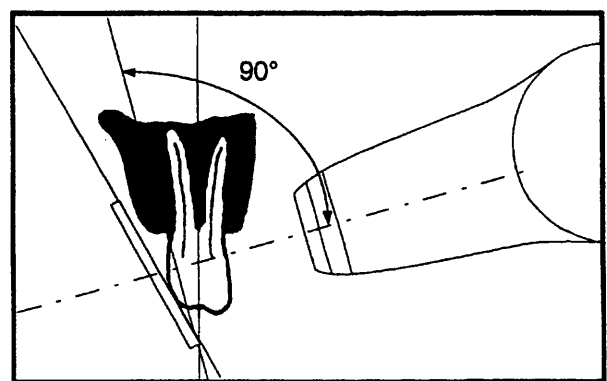


FIGURE 3 : BISECTING TECHNIQUE

III. FILM POSITIONING

Place the face of the film with no label against the area to be examined.

□ **Bisecting technique:**

Place the film and generator as shown in figure 4 (the beam is perpendicular to the line which bisects the angle between the tooth and film). The patient holds the film in position with his thumb, keeping his other fingers out of the beam.

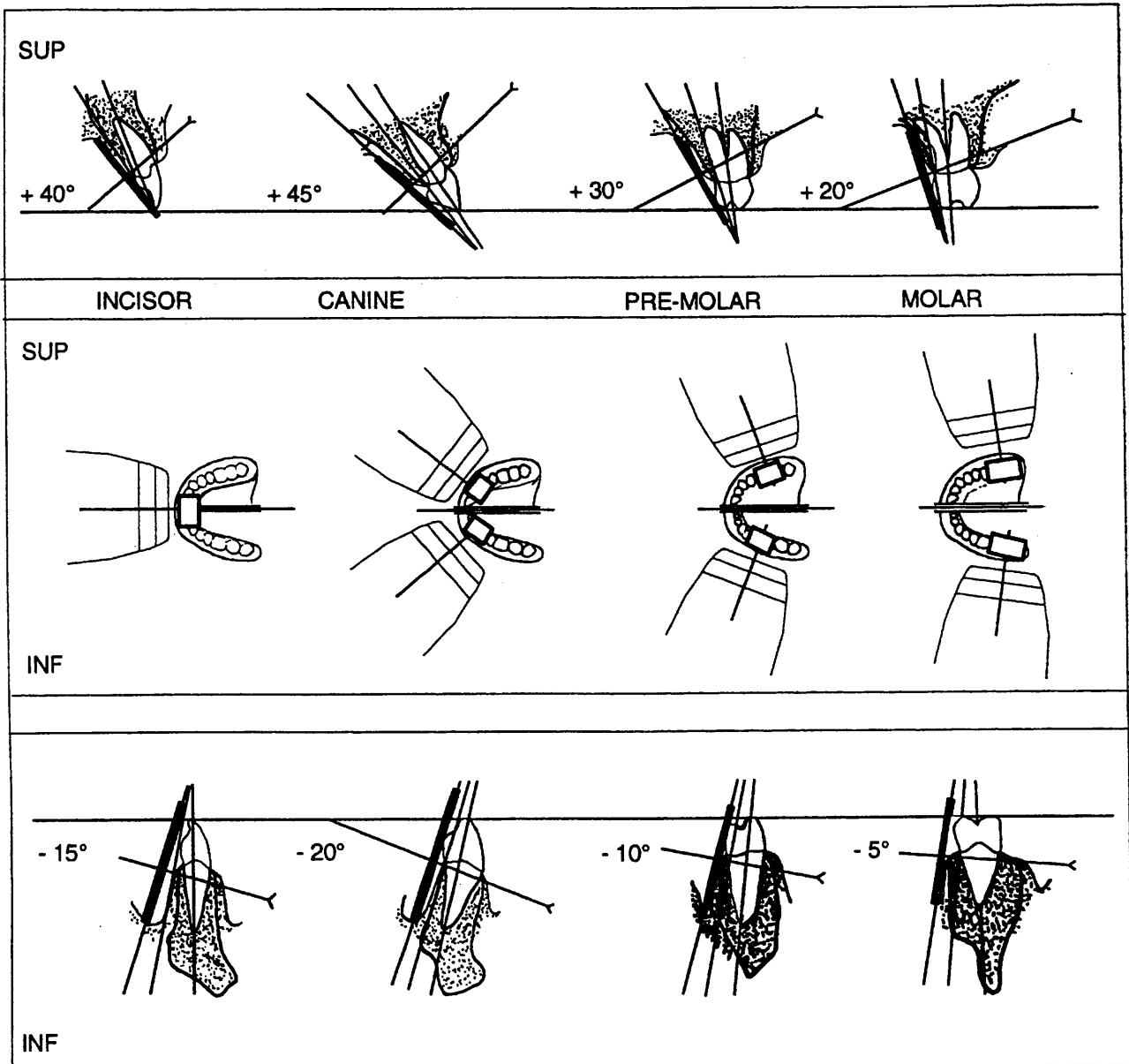


FIGURE 4 : FILM POSITIONING

Bisecting technique

□ **Paralleling technique:**

Place the film and generator as shown on figure 5 (the beam is perpendicular to the film). In this case, a film-holder should be used.

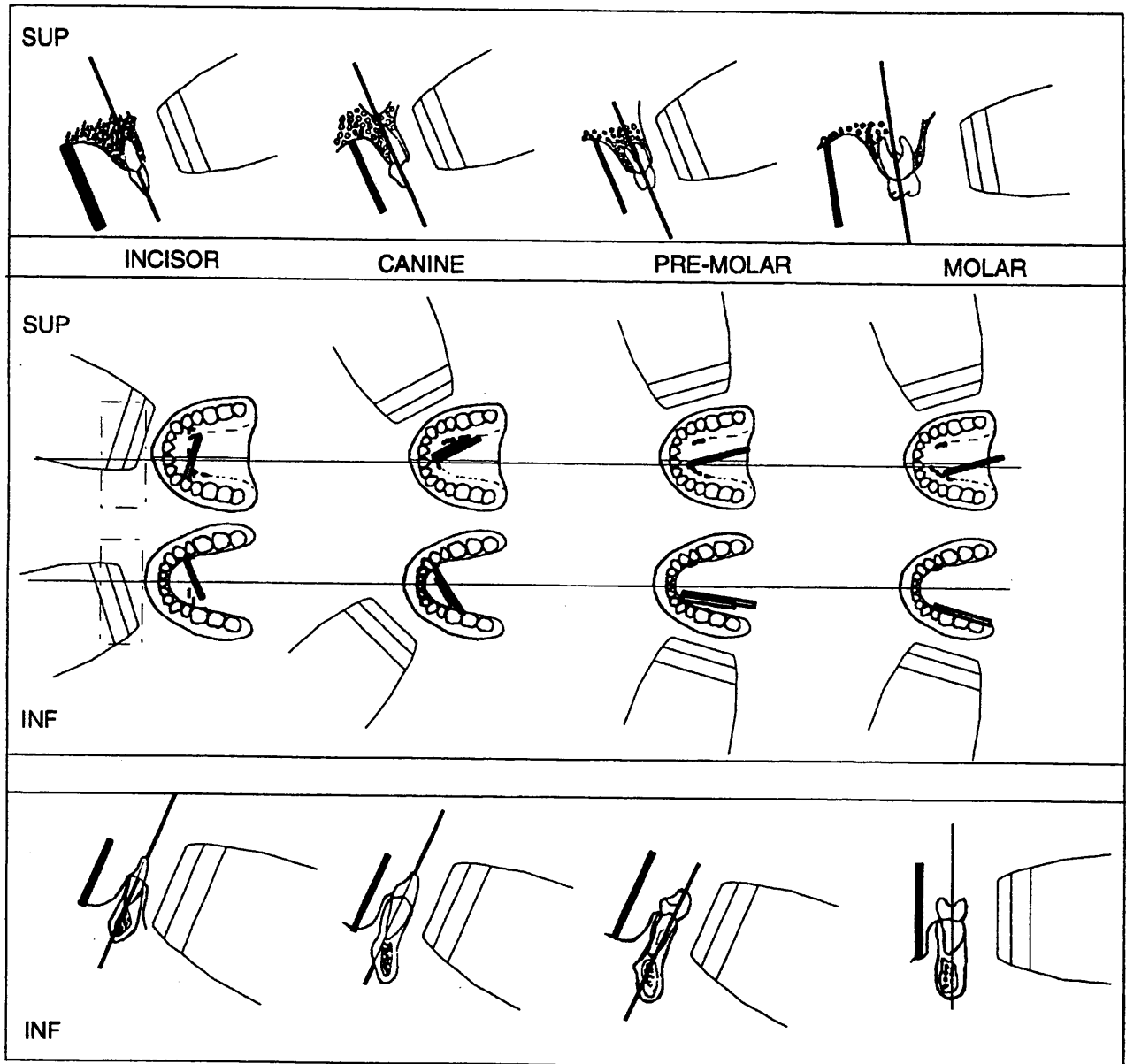
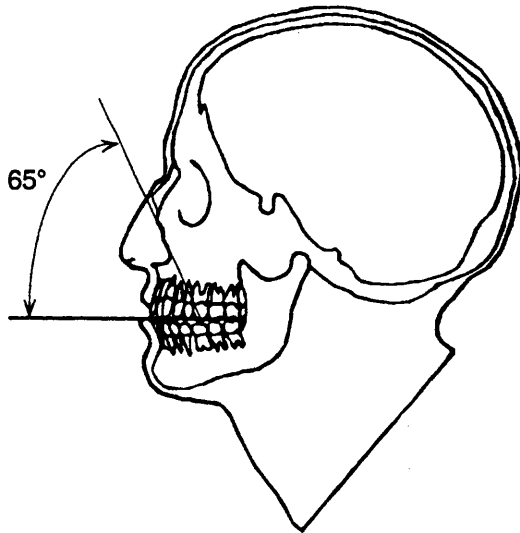


FIGURE 5 : FILM POSITIONING

Paralleling technique

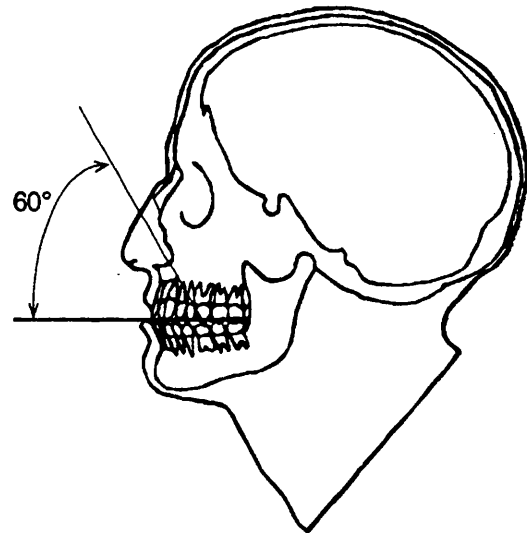
□ Occlusal films

INCISOR

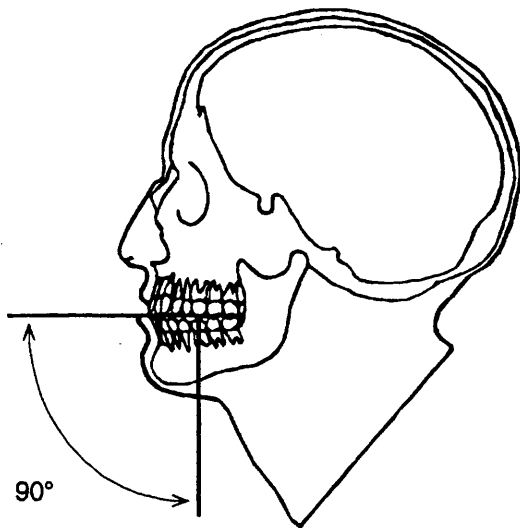


SUP

MOLAR



OCCLUSAL



INF

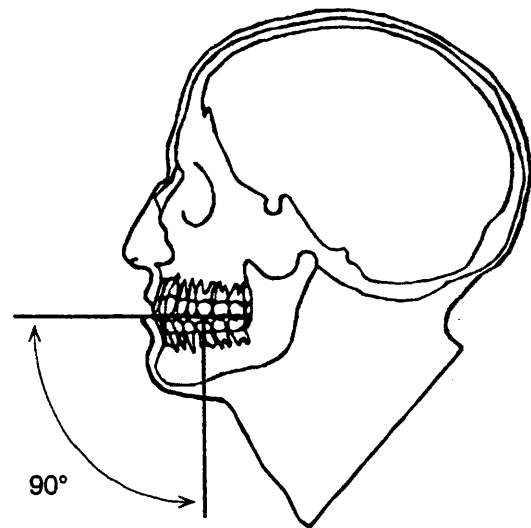
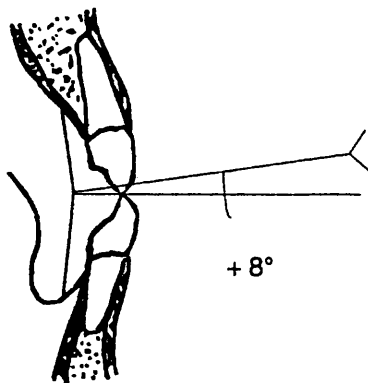


FIGURE 6 : FILM POSITIONING

Occlusal pictures

□ Bitewing films



BITEWING

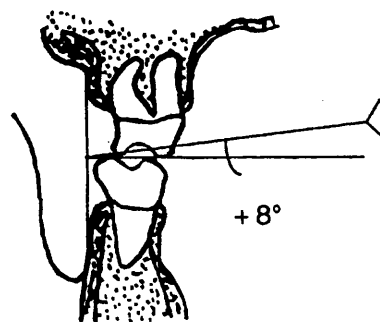


FIGURE 7 : FILM POSITIONING

Bitewing pictures

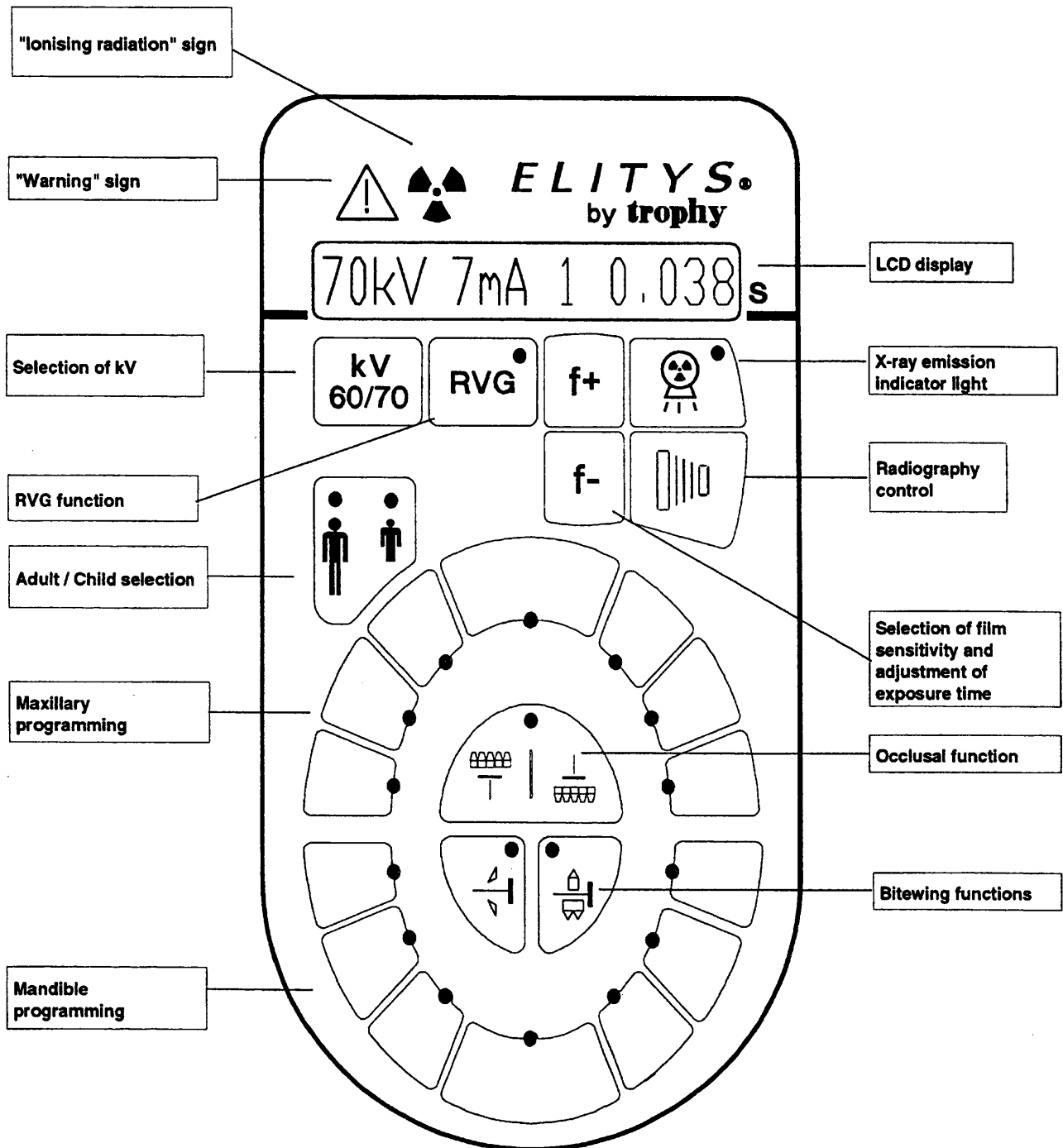


FIGURE 8 : CONTROL UNIT

IV. PREPARING THE CONTROL UNIT AND MAKING THE EXPOSURE

- ❑ When you activate the machine (using On/Off switch ⑤ page 2), the "on" button as well as the following displays light up:
 - the tooth or special exposure selector (Bitewing or Occlusal)
 - the child or adult selector
 - the display unit showing all the exposure parameters: kV, mA, type of film used and exposure time

- ❑ Programme the generator using the control unit:
 - Select the exposure mode (RVG or film) depending on the equipment used.
The display indicates:
 - 7 mA for film
 - 4 mA for RVG

 - Select the type of film using table IV page 18.
You can use the same selector to take account of the patient's size:
 - large patient (risk of under-exposed exposure): increase the film sensitivity
 - small patient (risk of over-exposed exposure): reduce the film sensitivity

 - Select the kV value:
 - 60 kV for an exposure with strong contrast
 - 70 kV for an exposure with more levels of grey (e.g. periodontal work)

 - Select the type of patient: child or adult
 - Select the tooth or exposure to carry out. The unit displays the exposure time automatically calculated by the microprocessor.

- ❑ Making an exposure:
 - Press the radiography control key. The X-ray emission indicator lights up and an audible signal is emitted.
 - Keep pressing until the X-ray emission light goes out and the audible signal stops.

WARNING:

If you stop pressing the control key before the exposure ends, a manipulator alarm will be activated. It indicates the X-ray emission was interrupted prematurely and that there is a risk the exposure may be under-exposed. The digital display alternates between display of "OP. ERROR" and the amount of selected time not used. You can stop the alarm by selecting a tooth again on the control unit.

V. ADDITIONAL CHARACTERISTICS OF THE RADIOLOGY UNIT

- **ELITYS®** uses a high frequency technology which has several advantages compared to standard systems.
 - Exposure times are shorter, reducing the risk of the patient or film moving during exposure, especially for children and the elderly.
 - The X-ray dose the patient receives is reduced by between 20 and 30%, because **ELITYS®** does not emit soft rays absorbed by the patient that do not contribute to the radiological picture.

- The choice of high voltage between 60 kV and 70 kV:
 - 60 kV for strong contrast exposures giving a clear image of the endodontal instruments or clearly showing up tooth decay
 - 70 kV for better reproduction of levels of grey (soft tissue), useful for periodontal work.

- The system provides a thermal safety device. After each exposure, this device prevents the next exposure from taking place for a period calculated on the basis of the most recent exposures and the time elapsed between them. This prevents the generator from over-heating and increases operating life.

During normal use the user will not be concerned by this function. It is only when several long exposures are carried out in succession that the device will go on standby while the generator cools (the key for the selected tooth flashes on the control unit and the display unit indicates "COOLING"). An audible signal is emitted during the cooling period. A (bimetal) thermal circuit breaker cuts off the generator at 65 °C.

- While the exposure is being taken, the exposure time counts off on the control unit display.

If the exposure is interrupted (e.g. by releasing the key) the manipulator alarm (visual and audible) is activated and the remaining exposure time is displayed. This information makes it easier to decide whether to develop the film or to start another exposure. (If the remaining time is short you can proceed with development).

To stop the manipulator alarm select a tooth or a special exposure (Bitewing or Occlusal).

- The system comprises a self-test function which is activated as follows:
 - switch the machine off,
 - press the RVG key while simultaneously switching the machine on,
 - as soon as the first light comes on, release the RVG key.

The system will test all the control unit's lights one by one, except the X-ray emission light. The audible alarm and display unit are also tested.

At the end of this test, the number of exposures carried out since the machine was put into operation is displayed.

A short beep indicates the test has ended.

To return to normal operation, select any tooth key

DEVELOPING THE FILMS

I. AUTOMATIC

Refer to the user's manual for your developing machine.

II. MANUAL

Care must be taken in developing films to obtain good quality X-rays.

- ① Remove the film from its package in a darkroom, taking care to avoid fingerprints or nail marks.
- ② Dip in a developer bath and agitate slightly for a few seconds; leave it in the bath for 5 min at 20°C, 6 min at 18°C, or 4 min at 22°C.
- ③ Rinse it in running water for approx. 20 seconds.
- ④ Dip it in the fixer bath, agitating it for a few seconds and then leave it for at least 5 min in the bath.
- ⑤ Wash it in running water. Wash the film for quite some time to ensure it can be correctly conserved.
- ⑥ Allow it to dry in dry open air, protected from dust.

Steps ⑤ and ⑥ can be done in normal daylight.

It is important to use fresh baths with the correct concentration; do not add developer to increase the bath concentration, since this will increase the contrast but reduce sharpness.

MAIN REASONS FOR POOR X-RAYS

FILM	Exposure time	Development time	Bath quality	Position
Under-exposed	too short	too short	too cold	
Over-exposed	too long	too long	too hot	
Insuff. detail		too short	too cold or oxidised	
Fuzzy				the patient moved
Off-center				poor positioning
Distortion of the picture				incorrect tubehead or film positioning

TECHNICAL CHARACTERISTICS

I. TECHNICAL CHARACTERISTICS ACCORDING TO IEC STANDARD 601-2-7

Manufacturer

TROPHY RADIOLOGIE
4, rue F. Pelloutier - Croissy-Beaubourg
77437 MARNE-LA-VALLÉE CEDEX2 - FRANCE

Models

Dental X-ray diagnosis devices, class 1, type B, intermittent use.

ELITYS®-TR: equipped with tube TRX 708 from TROPHY RADIOLOGIE

ELITYS®-C: equipped with tube OCX / 65-G from CEI

Electric power supply

230 - 240 V AC ($\pm 10\%$), 50 Hz, 5 A, apparent resistance 0,5 Ω

100 - 110 - 130 V AC ($\pm 10\%$), 50/60 Hz, 10 A, apparent resistance 0,2 Ω

Rated high voltage and maximum corresponding current

- film mode	70 kV, 7 mA
- RVG mode	70 kV, 4 mA

Current/voltage combinations for a maximum output power of

- 490 W in film mode	70 kV/7 mA
- 280 W in RVG mode	70 kV/4 mA

Rated power for exposure time of 0.1 s

- film mode	490 W
- RVG mode	280 W

Rate of use

At 70 kV, 7 mA and 0.1 s and at the maximum tank temperature: one exposure every 8 seconds.

Minimum value of the current/time product in the range of conformity:

0.14 mAs at 7mA
0.08 mAs at mA

Selection of parameters

- film mode	70 kV / 7 mA 60 kV / 7 mA
- RVG mode	70 kV / 4 mA 60 kV / 4 mA

Area of conformity to the IEC standard 601-2-7

- Reproducibility of the emitted radiation	conform
- Linearity of the emitted radiation	conform
- Precision in radiography	conform

Measurement conditions

- kV:	direct measurement using the resistance chain voltmeter method (divider bridge)
- mAs:	direct measurement in the circuit using the mAsmeter
- Exposure time:	direct measurement on the kV signal at 75% of the peak value

Dimensions and weight

Control unit	16 x 9 x 4 cm (6-5/16 x 3-1/2 x 1-9/16 in.)	0.4 kg
Wall framework	51.4 x 18.9 x 10.8 cm (20-1/4 x 7-7/16 x 4-1/4 in.)	5.2 kg
X-ray emitting unit	43.8 x 22.6 x 12 cm (17-1/4 x 8-15/16 x 4-3/4 in.)	4 kg
Scissor arm	87.3 x 13.3 x 6.3 cm (34-3/8 x 5-1/4 x 2-1/2 in.)	7.2 kg

Scissor arm

The scissor arm is equipped with gas jacks specially designed for this particular application.

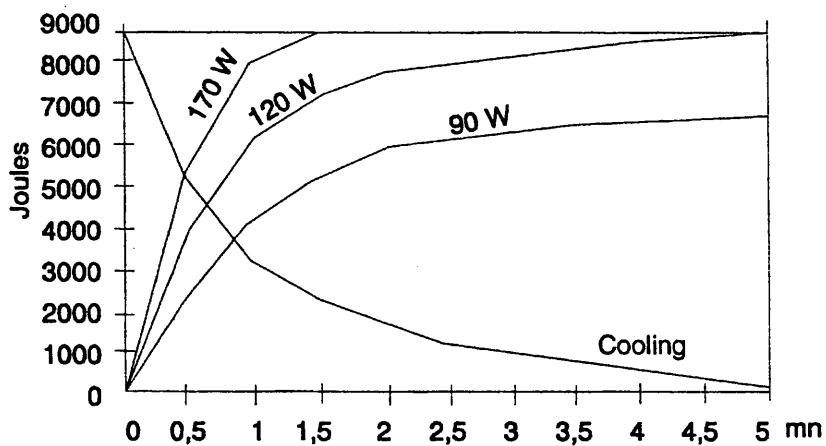
They have been proved to function correctly after more than 400,000 cycles.

EC conformity marking

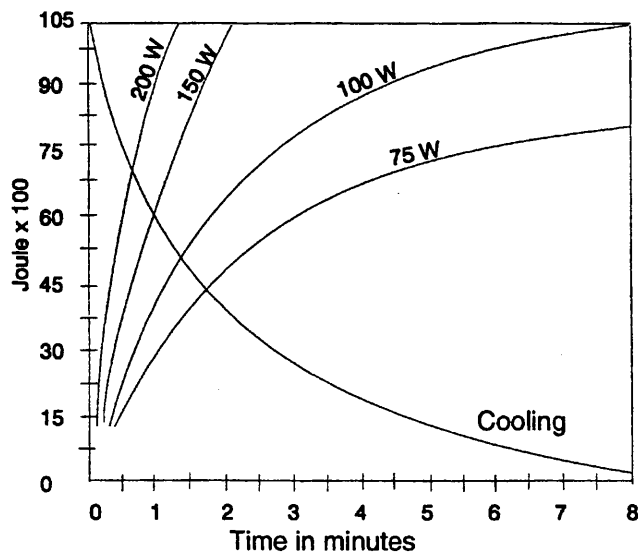
The **ELITYS**® radiology generator complies with the European directive on electro- magnetic compatibility 89/336/EEC. The EC marking on the machine refers only to this directive.

II. MAIN CHARACTERISTICS OF THE X-RAY GENERATOR

Manufacturer and type of X-ray tube	TROPHY Type TRX 708	CEI Type OCX / 65-G
Rated high voltage	70 kV	70 kV
Rated anodic power	490 W	490 W
Maximum heat accumulated in the anode	8 700 J	10 000 J
Rated value of focal spot (IEC 336/1982)	0.7 mm (.027 ")	0.7 mm (.027 ")
Reference axis for the slope of the target and indicated characteristics of the tube's focal spot	see drawing	see drawing
Target materials	Tungsten	Tungsten
Target slope	19 °	19 °
Filtration due to fixed materials	0.6 mm (.023 ") eq. Al	0.6 mm (.023 ") eq. Al



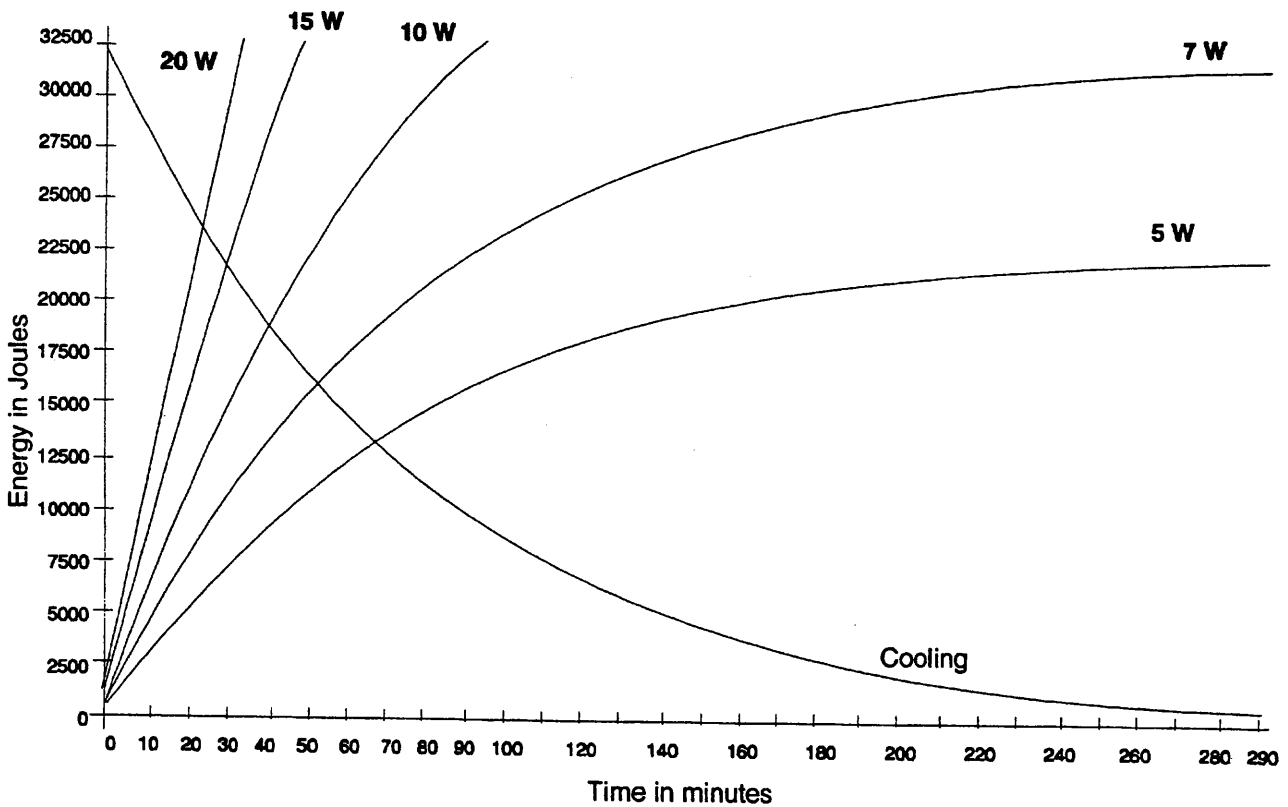
TROPHY tube type TRX 708



CEI tube type OCX / 65-G

Equipped X-ray generator

IEC standard 601-2-28	conform
Type of protection against electric shocks	Class I
Degree of protection against electric shocks	Type B
Rated value of inherent filtration	1.5 mm (.059 ") eq. Al
Rated value of additional filtration	1.0 mm (.039 ") eq. Al
Rated value of total filtration	2.5 mm (.098 ") eq. Al
Beam limiting cone, focal spot/skin distance	20 cm (7-7/8 in.)
Maximum accumulated heat	32 500 J
Maximum continuous thermal dissipation	20 W
Leaking radiation for continuous operation at 490 W for one hour (IEC 407/1973)	< 0.25 mGy



Maximum field of symmetrical radiation

6 cm (2-3/8 in.) diameter

**Heating and cooling curves of the ELI
TYS® tank**

III. TABLE OF EXPOSURE TIMES ACCORDING TO THE PROGRAMMES SELECTED

PROGRAMME	TOOTH	ANGLE	EXPOSURE TIME in seconds for film type 6 and 7 mA	
			70 kV	60 kV
ADULT MANDIBLE	41 - 42 - 31 - 32	- 15	0.150	0.273
	43 - 44 - 33 - 34	- 20	0.150	0.273
	45 - 46 - 35 - 36	- 10	0.150	0.273
	47 - 48 - 37 - 38	- 5	0.178	0.323
ADULT MAXILLARY	12 - 11 - 21 - 22	+ 40	0.178	0.323
	13 - 14 - 23 - 24	+ 45	0.178	0.323
	15 - 16 - 25 - 26	+ 30	0.232	0.423
	17 - 18 - 27 - 28	+ 20	0.260	0.472
CHILD MANDIBLE	81 - 82 - 71 - 72	- 15	0.075	0.137
	83 - 73	- 20	0.075	0.137
	84 - 74	- 20	0.075	0.137
	85 - 75	- 10	0.089	0.162
CHILD MAXILLARY	51 - 52 - 61 - 62	+ 40	0.089	0.162
	53 - 63	+ 45	0.089	0.162
	54 - 64	+ 45	0.116	0.211
	55 - 65	+ 30	0.130	0.236
BITEWING	canines-incisors	-	0.150	0.273
	molars	-	0.178	0.323
OCCLUSAL	mandible or maxillary	-	0.530	0.964

PROGRAMME	TOOTH	ANGLE	EXPOSURE TIME in seconds for film type 6 and 4 mA	
			70 kV	60 kV
ADULT MANDIBLE	41 - 42 - 31 - 32	- 15	0.088	0.159
	43 - 44 - 33 - 34	- 20	0.088	0.159
	45 - 46 - 35 - 36	- 10	0.088	0.159
	47 - 48 - 37 - 38	- 5	0.104	0.188
ADULT MAXILLARY	12 - 11 - 21 - 22	+ 40	0.104	0.188
	13 - 14 - 23 - 24	+ 45	0.104	0.188
	15 - 16 - 25 - 26	+ 30	0.136	0.247
	17 - 18 - 27 - 28	+ 20	0.151	0.275
CHILD MANDIBLE	81 - 82 - 71 - 72	- 15	0.044	0.080
	83 - 73	- 20	0.044	0.080
	84 - 74	- 20	0.044	0.080
	85 - 75	- 10	0.052	0.094
CHILD MAXILLARY	51 - 52 - 61 - 62	+ 40	0.052	0.094
	53 - 63	+ 45	0.052	0.094
	54 - 64	+ 45	0.068	0.123
	55 - 65	+ 30	0.076	0.138
BITEWING	canines-incisors	-	0.088	0.159
	molars	-	0.104	0.188
OCCLUSAL	mandible or maxillary	-	0.245	0.445

IV. CHOICE OF FILM TYPE TO USE

SUPPLIER	MODEL	FILM TYPE
KODAK	Ekta Speed	3
KODAK	Ekta Speed Plus	3
AGFA	Dentus M4	3
DENTAL UNION	Bleu Star	3
AGFA	Dentus M2	5
AGFA	Normal	6
DUPONT	Lightning fast	6
GEVAERT	Dentus Ultra Rapid	6
KODAK	Ultra Speed	6
RINN	Super Fast	6
MINIMAX	Intermediate	8
RINN	Extra Fast	9

V. CORRECTION OF EXPOSURE TIMES FOR EACH FILM TYPE

POSITION	CORRECTION	COEFFICIENT
0	- 73 %	0.27
1	- 67 %	0.33
2	- 59 %	0.41
3	- 49 %	0.51
4	- 36 %	0.64
5	- 20 %	0.80
6	0	1
7	+ 25 %	1.25
8	+ 56 %	1.56
9	+ 95 %	1.95

PREVENTIVE MAINTENANCE

To make sure the machine functions correctly, it must undergo an annual servicing (described in the Installation and Maintenance Manual) carried out by your authorised TROPHY distributor.

Between servicings, you are advised to carry out the following checks every three months:

① Generator

- > Check the certification label is legible.
- > Check there are no oil leaks.

② Mechanical support

- > Check the wall framework is securely fixed to the wall.
- > Check all the labels are legible.
- > Check the scissor arm is stable in all positions.

③ Control unit and electrical installation

- > Check the symbols are always clearly legible.
- > Check the control unit cable and the power supply cable are in good condition.
- > Check earths are correctly installed.
- > Check the radiography control key returns to its initial position after use.

④ Functioning

- > Make an exposure (bitewing and film type 5), check the audible signal can be heard and that the X-ray emission light is visible.
- > Make an exposure (Occlusal and film type 5) and release the control button before the exposure time has elapsed. Check the message "OP. ERROR" is displayed.

⑤ Timer self-test

- > Switch the machine off.
- > Press the RVG key while simultaneously switching the machine on.
- > As soon as the first light comes on, release the RVG key.

All the functions and indicator lights of the control unit will be tested one by one, except the X-ray emission light. The audible alarm and display unit are also tested. At the end of this test, the number of exposures carried out since the machine was put into operation is displayed.

- > A short beep indicates the test has ended.

IMPORTANT:

If the result of one of these checks is not satisfactory, we recommend you contact an authorised TROPHY technician for assistance. In the meantime, do not use the equipment.

⑥ Cleaning

- > Clean all accessible parts of the machine with an alcohol-based **non-corrosive** product, and avoid introducing liquids inside the machine.

⑦ Disinfecting

- > The usual disinfectant products can be used, but we recommend you protect the machine from contamination using barriers available from dental distributors.

ERROR MESSAGES

COOLING	Cooling cycle
OP. ERROR	Premature release of the radiography control. The display indicates the remaining exposure time.
kV ERROR	The generator's high voltage value is more than 10% below the required value.
POWER ERROR	No mains voltage or filament voltage.

CANCELLING THE DIFFERENT ERROR MESSAGES

- To cancel the message "**OP. ERROR**" (manipulation alarm) and the corresponding audible signal, press any key on the arch.
Manipulation alarm: premature release of the radiography control.
- To cancel the messages "**kV ERROR**" and "**POWER ERROR**" you must switch off the machine.
- The message "**COOLING**" will stop when the generator has returned to a satisfactory temperature. Do not switch off the machine.

TROUBLE-SHOOTING HINTS

PROBLEM	CAUSE	SOLUTION
Nothing lights up	Machine disconnected	Connect the machine
	Fuse F3 or F4 defective	Change the fuse(s)
	Main circuit-breaker OFF	Put it ON
Nothing lights up on the control unit	Control unit disconnected	Connect the control unit
	Fuse F1 or F2 defective	Change the fuse(s)
	Defective control unit	Replace the control unit
No X-ray emission	The generator is cooling	Wait for the "COOLING" message to disappear
	Radiography control key defective	Replace the control unit
Emission OK but exposure is too light, or even white	Wrong film type	See film type table page 18
	Generator wrongly positioned	Adjust position
	Exposure time too short	Modify the time selection
	Development time too short	Refer to development instructions
	Developer too cold	Heat it
	Developer too old	Change it
	RVG key incorrectly selected	Adjust according to equipment used
	Film wrong way round	Refer to the film positioning section
	Incorrect installation	Call a qualified technician
Emission OK, but exposure is too dark	Wrong film type	See film type table page 18
	RVG key incorrectly selected	Adjust according to equipment used
	Development time too long	
OP. ERROR	The radiography control was released before the end of exposure	Select a tooth to stop the alarm. The display shows the remaining exposure time. Decide whether to develop or to make another exposure.
kV ERROR POWER ERROR	The microprocessor has detected a problem	Stop the machine and then restart it. If the problem continues, call a qualified technician.
	Fuse F1, F2, F3 or F4 blown out	Stop the machine, change the defective fuse(s), and restart. If the problem continues, call a qualified technician.



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