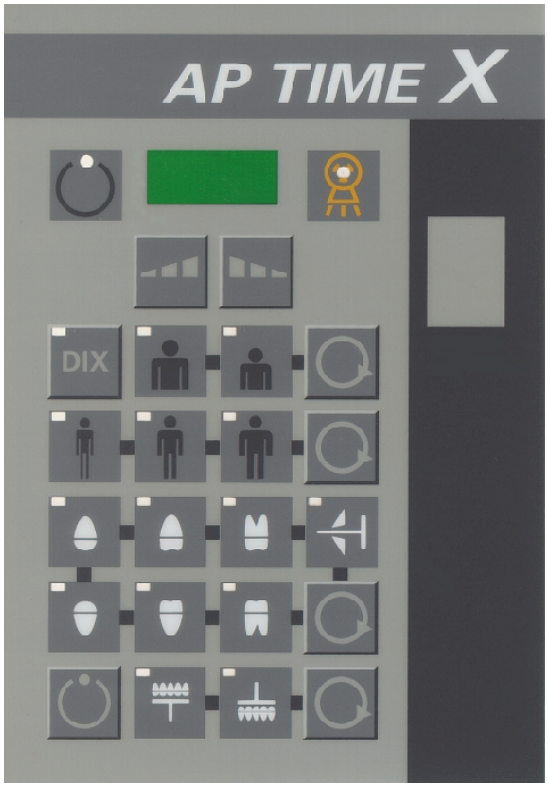
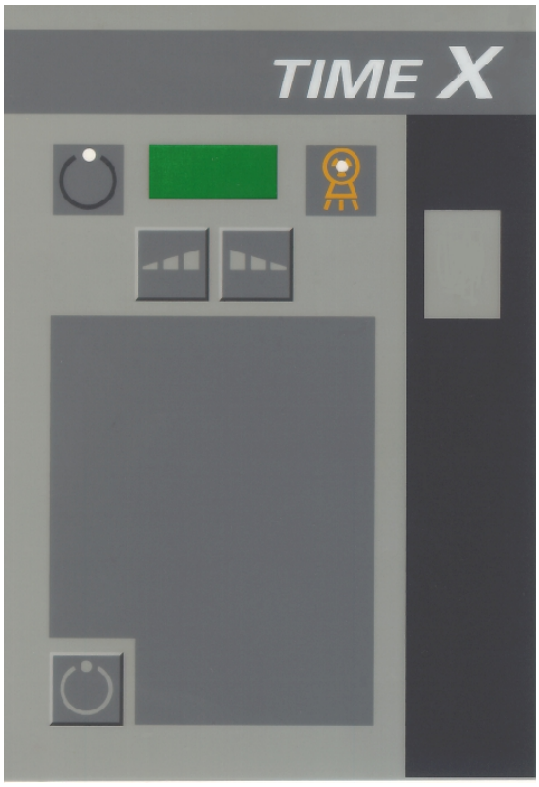
VILLA SISTEMI MEDICALI

EXPLOR-X 70

with AP TIME X – TIME X timer

(120V version)





Service manual

Release 16 March 2001 (Rev. 1)

Contents

1. INTRODUCTION

NOTE:
The present manual is updated for the product it is sold with in order to grant an adequate reference in performing diagnostics and repair operations normally carried out by the service engineer.
The manual may not reflect changes to the product not impacting service operations.

The intra-oral X-ray equipment Explor-X 70, manufactured by VILLA SISTEMI MEDICALI S.p.A., performs high-quality intra-oral radiographs, ensured by the repeatability of examination combined with reduced exposure times and with the small focal spot.

Explor-X 70 is conceived to perform only intra-oral X-ray.

The equipment displays the following features:

- High-quality radiographs
- Easy to use
- Ergonomic design.

The functioning of the system is microprocessor controlled, thus ensuring high repeatability of exposure times, and is composed of the following parts:

- Timer: AP TIME X or TIME X complete with single stud mount wall plate
- Extension arm:
  - Square: 30cm (11 3/4"), 55cm (21 5/8"), 75cm (29 1/2"), 90cm (35 7/16")
  - Oval: 30cm (11 3/4"), 60cm (23 5/8"), 75cm (29 1/2"), 90cm (35 7/16")
- Scissors arm
- 70kV 8mA tubehead.

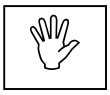
NOTE:
The extension and scissors arms may be provided in both square and oval versions; a square extension arm can only be combined with a square scissors arm, and the same holds for the oval versions.

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 Explor-X 70 equipment different from that for with 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 or its representative 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 equipment must be used in compliance with the procedures contained in the present manual and shall never be used for purposes different from those envisaged by it.

Before performing any maintenance intervention, the equipment must be disconnected from the input line voltage by means of the relevant magnetic-thermal switch.

The utmost attention must be paid during the installation and calibration phase with the equipment connected to the line, since components directly supplied by the input line are accessible.

Explor-X 70 is a medical imaging equipment and must therefore be used only under the supervision of qualified medical staff, having the necessary knowledge in the field of protection against radiation.

The user bears legal responsibility related to the possession, installation and use of the equipment.

Explor-X 70 is designed for continuous operation with intermittent load; compliance with the envisaged utilization cycles is therefore required.

Although the equipment has been designed to ensure a satisfactory degree of protection against electromagnetic interference, in compliance with IEC European regulations, the unit must be positioned at an adequate distance from electric power transformation plants, UPS, amateur and cellular telephone transmitters and receivers. The use of cellular telephone communication devices is allowed only at a distance higher than 1.5m (59") from any element of the equipment.

Any other instrument or equipment for professional use placed near the Explor-X 70 must comply with Electromagnetic Compatibility regulations. Non-complying instruments, known to have a low immunity to electromagnetic fields, must be installed at a distance of at least 3m (118") from the Explor-X 70 and must be supplied through a dedicated power line.

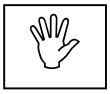
Explor-X 70 must be switched off during the use of High Frequency surgical device or similar instruments placed near the equipment.

The equipment has not been designed to be used in the presence of anaesthetic mixtures inflammable with air, oxygen or nitrous oxide.

Parts of the apparatus which may be in contact with the patient must be regularly cleaned following the instructions provided in this manual.

Although the X-ray doses provided by modern equipment are reduced on average, during exposure the operator must take all the necessary precautions and/or protection measures for the patient and for himself, in compliance with existing regulations.

The film must be introduced in the patient's mouth either manually or by means of the relevant holders; it must never be held by the operator, and only the patient may hold it if required.



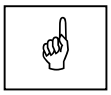
WARNING:
For safety purposes, it is forbidden to overload the extension arm and the scissors arm in an anomalous way, e.g. by hanging down from them.

2.2 Environmental risk and disposal

The equipment contains - in some of its parts - solid and liquid substances which must be disposed at the recycling centers appointed by local regulations at the end of the equipment's life cycle.

In particular, the equipment contains the following materials and/or components:

- **Tubehead:** non-biodegradable plastic materials, metal, glass, dielectric oil, lead, tungsten.
- **Other parts of the equipment:** non-biodegradable plastic materials, metal, printed circuits, iron and plastic materials



NOTE:
VILLA SISTEMI MEDICALI is not responsible for eventual disposal of the apparatus or parts thereof and for the related expenses.

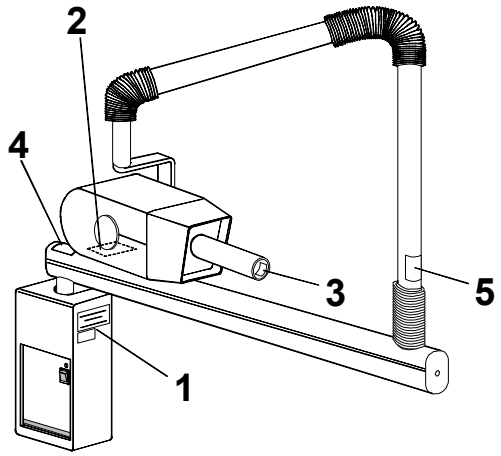
2.3 Symbols used

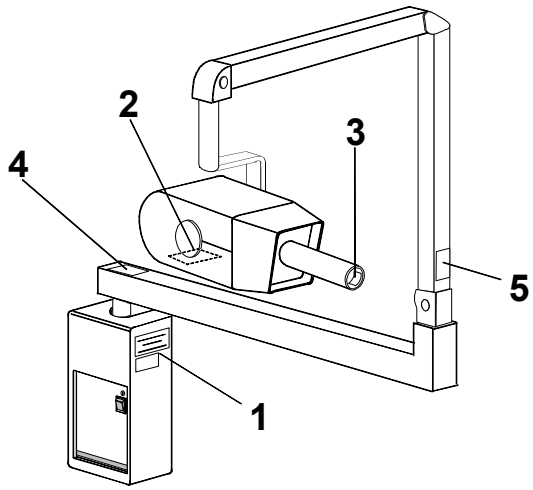
Besides the symbols present on the keyboard (see chapter 5 of User's Manual), in this manual and on the Explor-X 70 the following symbols are used:

Symbol	Description
	Equipment with Type B applied parts
~	AC
N	Connection to neutral conductor
L	Connection to line conductor
	Protection grounding
	Functional grounding
	OFF ; equipment not connected to power line
	ON ; equipment connected to power line
	Exposure enabling; enabled exposure status is revealed by the glowing of the relevant green symbol.
	Focal spot in compliance with IEC 336
	X-ray emission

3. DESCRIPTION

3.1 Identification labels





1a
System timer features label

Made in Italy

Type: EXPLOR X 70

Line: 120 V ~ 8.2 A (at 132V ~) 60 Hz

X RAY CONTROL Model: 836037XX

Technique factors:

Time: from 0.04 to 3.2 s kVp: 70 mA: 8

S/N: 23XXYYYY Manufactured: *MMMM YYYY*

THIS PRODUCT COMPLIES WITH FDA RADIATION PERFORMANCE STANDARDS 21 CFR SUBCHAPTER J, IN EFFECT AT DATE OF MANUFACTURE

20090 Buccinasco
MILANO - ITALIA

1b
ETL certification label

ETL LISTED
CONFORMS TO UL STD 2601-1
2001443
CERTIFIED TO CAN/CSA STD C22.2 NO. 601.1

2
Tubehead features label

Made in Italy

TUBE HOUSING ASSEMBLY Model: 84604596

kVp:70 mA:8 Total filtration: 2 mm Aleq

S/N: 31XXYYYY Manufactured: ***MMMM YYYY***

X RAY TUBE Model D082 B

Manufacturer Toshiba JAPAN

Focus:0.8 Inherent filtration:0.5 mm Aleq

S/N: .....

THIS PRODUCT COMPLIES WITH FDA RADIATION PERFORMANCE STANDARDS 21 CFR SUBCHAPTER J, IN EFFECT AT DATE OF MANUFACTURE

20090 Buccinasco
MILANO - ITALIA

3
Beam limiting device features label

Made in Italy

BEAM LIMITING DEVICE Model: 61604059

DIAMETER 6 cm AT SSD 20 cm

S/N: **40XXYYYY**

Manufactured: *MMMM YYYY*

THIS PRODUCT COMPLIES WITH FDA RADIATION PERFORMANCE STANDARDS 21 CFR SUBCHAPTER J, IN EFFECT AT DATE OF MANUFACTURE

20090 Buccinasco
MILANO - ITALIA

4
Extension arm features label

5
Scissors arm features label

Made in Italy

Model AAAAAAAA

Serial number

BBXXYYYY

20090 BUCCINASCO
MILANO - ITALIA

Settled for

EXPLOR-X 70

3.2 Functions, Models and Versions

The Explor-X 70 intra-oral X-ray equipment is composed of the following parts:

3.2.1 Extension arm and scissors arm (Square or Oval)

The scissors arm is an arm with double joint, enabling linear and upward extension. The tubehead remains balanced in all positions.

NOTE:
The scissors arm is intended to operate correctly with a minimum angle of 20°; hence, its use requires an opening angle larger than 20°.

A horizontal extension arm can also be added; it is available in different sizes to meet all possible requirements.
Both the extension arm and the scissors arm may be either square or oval.

NOTE:
A square extension arm can only be combined to a square scissors arm. The same holds true for oval arms configurations.

3.2.2 Tubehead

Its 70 kVp voltage and 8 mA current reduce exposure times and the amount of radiation absorbed by the patient. The tubehead is equipped with a collimator with a 20cm (7 7/8”) focus to skin distance and a 6cm (2 3/8”) beam diameter at the cone output. The tubehead is connected to the arm by means of a sliding contact, allowing 360° horizontal rotation and 290° vertical rotation.

3.2.3 Timer

The Explor-X 70 may be equipped with two different types of timer:

- **AP TIME X**

  AP TIME X is a microprocessor-controlled digital timer allowing both manual and automatic selection of exposure times.
  Automatic selection allows to choose among 54 pre-set times according to the type of patient (adult or child), his/her size (small, medium, large) and to the type of tooth.
  Fixed times available for manual selection are 32 and may range from 0.04 seconds minimum to 3.20 seconds maximum.
  The key feature of this timer is automatic time compensation according to input line voltage variations within a range of 120V ± 10%.

- **TIME X**

  TIME X displays the same features as the AP TIME X timer, with the exception of automatic and digital anatomic selection. In other words, this timer allows only manual selection of exposure times.

NOTE:
A configuration with remote X-ray switch, outside the examination room, is also available.
The equipment provides two separate contacts for possible connection to external signalling devices. One contact reveals that the equipment is functioning and ready to use, whereas the second reveals X-ray emission. The connection modality and the requirement for signalling devices are provided in paragraph 5.2.

3.3 Configurations

3.3.1 Standard configuration

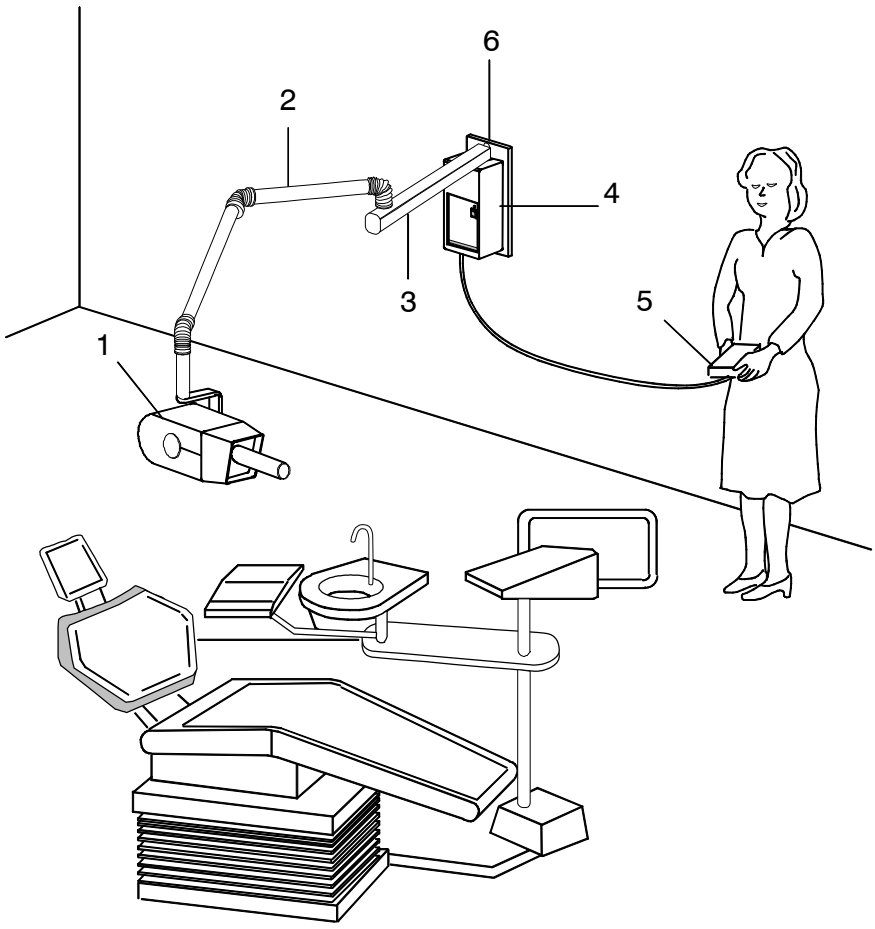


Figure 3-1

1 Tubehead
2 Scissors arm
3 Extension arm
4 Wall plate + Timer
5 X-ray button
6 Single stud center wall plate

3.3.2 Remote timer configuration

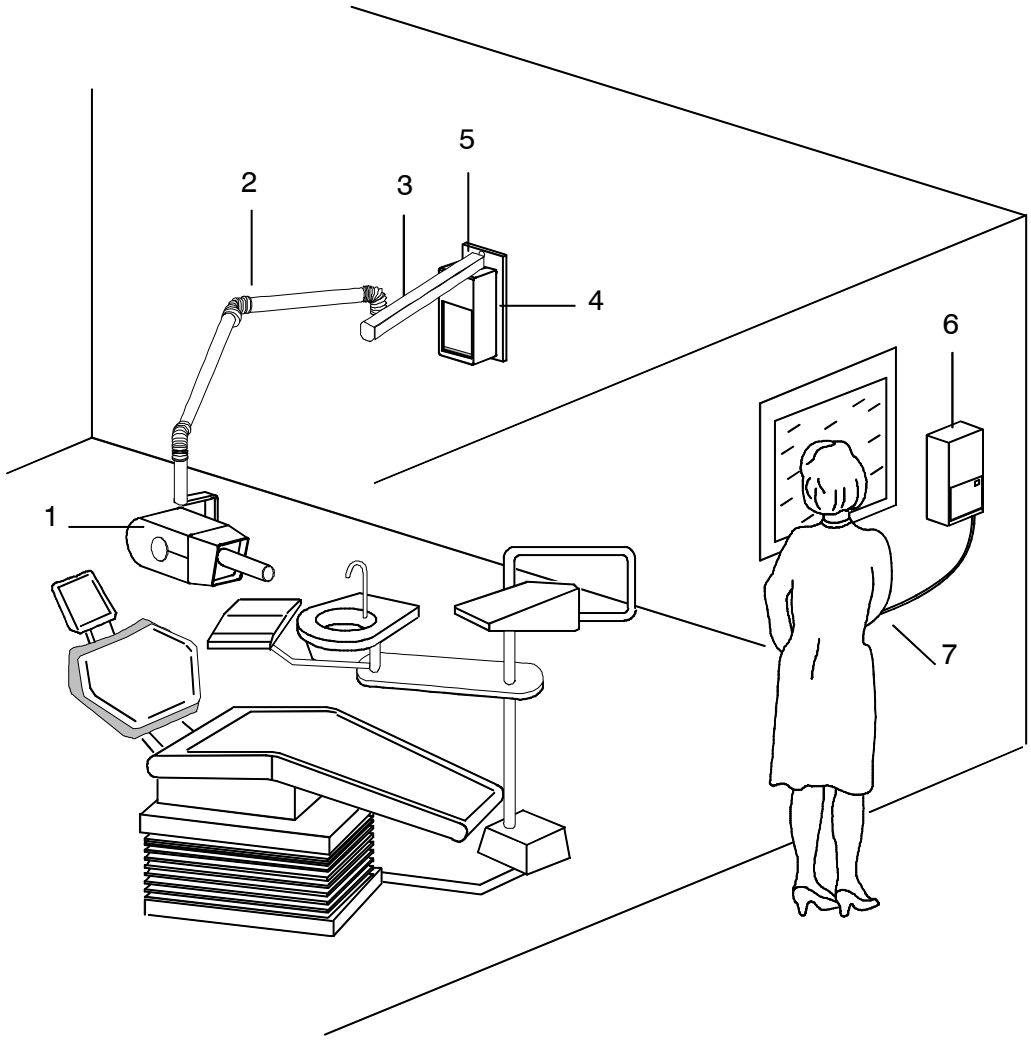


Figure 3-2

1 Tubehead
2 Scissors arm
3 Extension arm
4 Wall plate
5 Single stud center wall plate
6 Remote timer
7 X-ray button

3.3.3 Mobile stand configuration

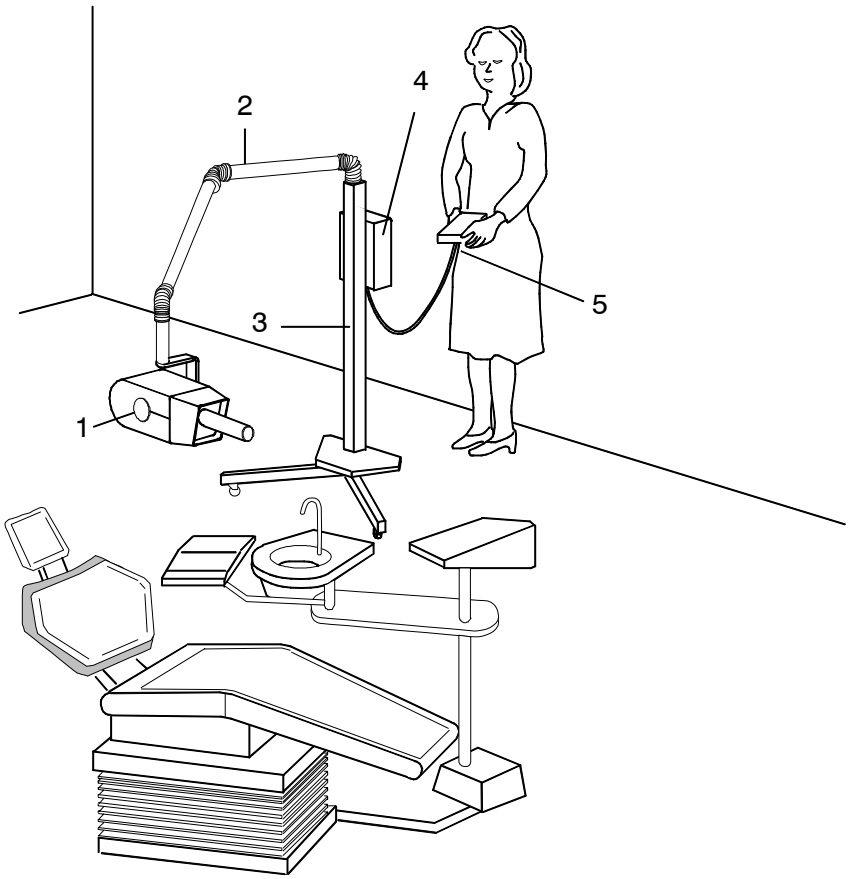


Figure 3-3

1 Tubehead
2 Mobile stand scissors arm
3 Mobile stand
4 Timer
5 X-ray button

3.3.4 Configuration with remote X-ray button

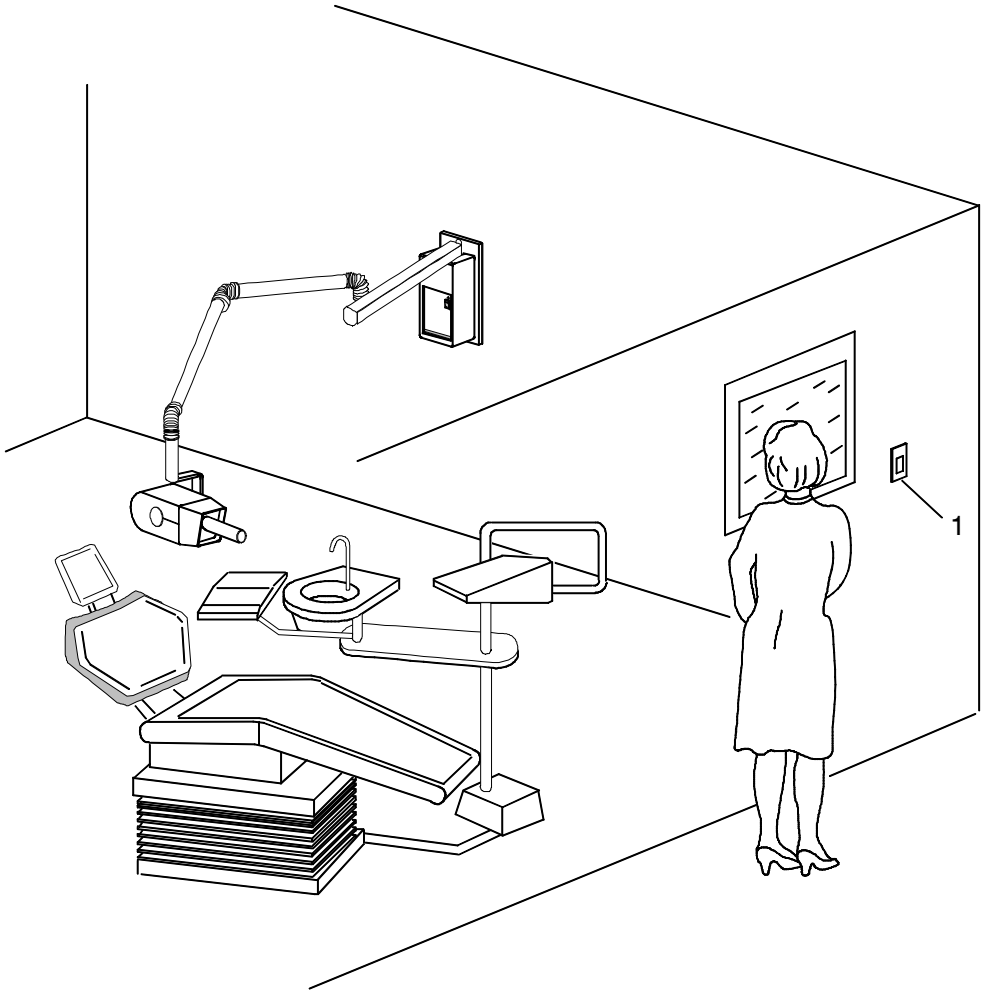
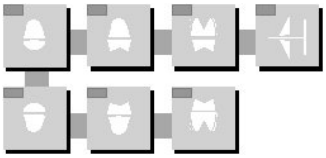


Figure 3-4

1 X-ray button

3.4 Description of the control panel

"ANATOMIC TOOTH" selection button



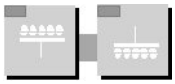
NOTE:
By depressing this button it is possible to switch to "automatic X-ray emission time selection " and the relevant functions are enabled.

Every time this button is depressed the selection of the tooth type is rotationally changed. A different exposure time corresponds to each selection.

Depressing of the button is confirmed by a sound signal combined with the glowing of the relevant LED.

The automatic mode can be closed by depressing either the "Increase" or the "Decrease" button; this operation brings the system back to MANUAL mode. By selecting the OCCLUSAL function (see the description of the following button) it is possible to shift from a targeted choice to a specific examination mode.

"OCCLUSAL" selection button



NOTE:
By depressing this button it is possible to switch to "automatic X-ray emission time selection " and the relevant functions are enabled.

Every time this button is depressed the selection of upper or lower occlusal is rotationally changed. A different exposure time corresponds to each selection.

Depressing of the button is confirmed by a sound signal combined with the glowing of the relevant LED.

The automatic mode can be closed by depressing either the "Increase" or the "Decrease" button; this operation brings the system back to MANUAL mode. By selecting the ANATOMIC TOOTH function (see the description of the previous button) it is possible to go back to «Tooth type» anatomic selection mode.

"ADULT/CHILD" selection button 

NOTE:
By depressing this button it is possible to switch to "automatic X-ray emission time selection"; the Size and Anatomic-Occlusal functions are enabled (for the latter, the last used selection will be activated)

Every time this button is depressed the selection is changed, choosing between Adult and Child. A different exposure time corresponds to each selection.

Depressing of the button is confirmed by a sound signal combined with the glowing of the relevant LED.

The automatic mode can be closed by depressing either the "Increase" or the "Decrease" button; this operation brings the system back to MANUAL mode.

"PATIENT SIZE" selection button 

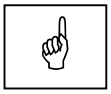
NOTE:
By depressing this button it is possible to switch to "automatic X-ray emission time selection"; the Adult/Child and Anatomic-Occlusal functions are enabled (for the latter, the last used selection will be activated).

Every time this button is depressed the selection is changed, choosing between the different sizes available (Small/Medium/Large). A different exposure time corresponds to each selection.

Depressing of the button is confirmed by a sound signal combined with the glowing of the relevant LED.

The automatic mode can be closed by depressing either the "Increase" or the "Decrease" button; this operation brings the system back to MANUAL mode.

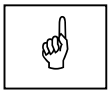
"DIGITAL" selection button



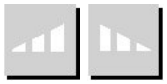
NOTE:
By depressing this button it is possible to switch to "**automatic Digital X-ray emission time selection**"; the Adult-Child, Size and Anatomic-Occlusal functions are enabled (for the latter, the last used selection will be activated).

By depressing this button the system switches to «Digital Selection» of X-ray times. Lower exposure times, typical of the DIGITAL system, are automatically selected for every tooth type, size and Adult/Child patient.

Depressing of the button is confirmed by a sound signal combined with the glowing of the relevant LED.



NOTE:
This button and the relevant functions can be disabled by Technical Service during the programming phase.

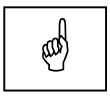


"INCREASE" and "DECREASE" buttons

These buttons are generally used to select X-ray exposure times during «Manual Selection". Their simultaneous pressure also provides access to service functions (see chapter 8). By depressing one of these buttons the system goes back to «manual selection» of the X-ray exposure timer IN ANY CASE, and to the relevant recovery of displaying conditions.

 "EXPOSURE ENABLING" button

Once the cycle to be performed has been chosen, this button enables the X-ray cycle; this means that further pressure on the X-ray button, carried out within the set time, causes X-ray emission.
The «Ready for X-ray» status is displayed by the glowing of the green LED  , which remains on until the end of the emission cycle or until expiration of the "Enabled exposure time" (usually 15 seconds).



NOTE:
Pressure on the X-ray button without enabling causes the display of the last exposure time selected.

4. TECHNICAL FEATURES

Technical features	
Equipment	Explor-X 70
Manufacturer	VILLA SISTEMI MEDICALI Buccinasco (MI) Italy
Class	Class I with type B applied parts (IEC 601-1 classification); Class II according to 21 CFR 
Line voltage	120V~ ± 10%
Line frequency	60Hz
Rated current	8.2A rms @ 132V ~
Power consumption	1.1 kVA @ 132V ~
Line Voltage Regulation	≤ 3% at 132V ~
Main fuse	10A F
Preset exposure times	from 0.04 to 3.2s in 32 steps
Anatomic selection (for AP TIME X only)	54 pre-set times
Exposure control	Microprocessor controlled exposure times, with automatic compensation of line voltage fluctuations.
TIMER ACCURACY on the CORRECTED EXPOSURE TIME (This is the actual time of exposure, pre-indicated on the timer during the enabled status and during emission and determined by the internal algorithm as a function of the line voltage) **See paragraph 4.1!!!**	± 2 pulses (± 32 ms)
TIMER ACCURACY on the PRE-SELECTED EXPOSURE TIME (This is the value of the timer setting the operator pre-selects)	The absolute maximum deviation can be +200% ; -100% when the line voltage changes within the rated voltage range: it includes intrinsic inaccuracy and correction due to line voltage changes. **See paragraph 4.1!!!** (The inaccuracy at 120V is ±32ms)
Timer dimension	12x7x4 inches (310x170x100 mm)

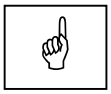
Tubehead features	
Manufacturer	VILLA SISTEMI MEDICALI Buccinasco (MI) Italy
Rated output voltage	70kV$_p$ ±15%
High voltage circuit type	Single phase, self-rectifying
Tubehead current	8mA
Tubehead power	0.8kW
Total filtration	2mm Al eq. @ 70kV$_p$
Transformer insulation	Oil bath
Cooling	Convection
Maximum deviation of output current	±4.5mA
Pre-heating time	250ms
Interval between exposure / duty cycle	60 times X-ray time / 1:60
Minimum focus to skin distance	20cm (7 7/8”)
X-ray beam diameter (@ 20 cm focus)	6cm (2 3/8”)
Radiation leakage at 1 m	<25 mR/h, duty cycle 1:60 (at 132V~)
Technical factors for radiation leakage	70kV, 8mA, 1s
X-ray tube features	
Manufacturer	Toshiba (Japan)
Type	D-082B
Focal spot	0.8 (IEC 336)
Inherent filtration	0.5mm Al equivalent
Anode thermal capacity	6kJ
Environmental conditions	
Operating temperature range	+50°F ÷ +104°F (+10°C ÷ +40°C)
Operating relative humidity range	30% ÷ 75%
Temperature range for transport and storage	-4°F ÷ +168°F(-20°C ÷ +70°C)
Max. relative humidity for transport and storage	<95 % non condensing
Min. atmospheric pressure for storage and transport	630hPa

Apparatus and detachable parts weight	
Gross weight including packing	35kg
Net apparatus weight in standard configuration	30kg
30cm (11 3/4") extension arm	2.9kg
60cm (23 5/8") extension arm	4.3kg
75cm (29 1/2")extension arm	5kg
90cm (35 7/16") extension arm	5.7kg
Scissors arm	6kg
Timer plus wall plate	8.3kg
Tubehead	8.5kg

4.1 Exposure time correction algorithm

The Explor-X 70 timers carries a special feature that allows automatic correction of the selected exposure time in case the line voltage has drifted from 120V. A change in the line voltage affects the peak voltage applied to the X-ray tube and the value of high voltage affects significantly the spectrum of the radiation, which finally affects the optical density of the image on the film. Purpose of the timer correction is to provide basically the same optical density on the film in front of any variation of the line voltage, within the standard accepted limits of rated voltage (120V +/-10%). This feature allows the user to get basically the same quality of the image without caring about possible variations of the line voltage, which are quite common in many areas, and very difficult to monitor.

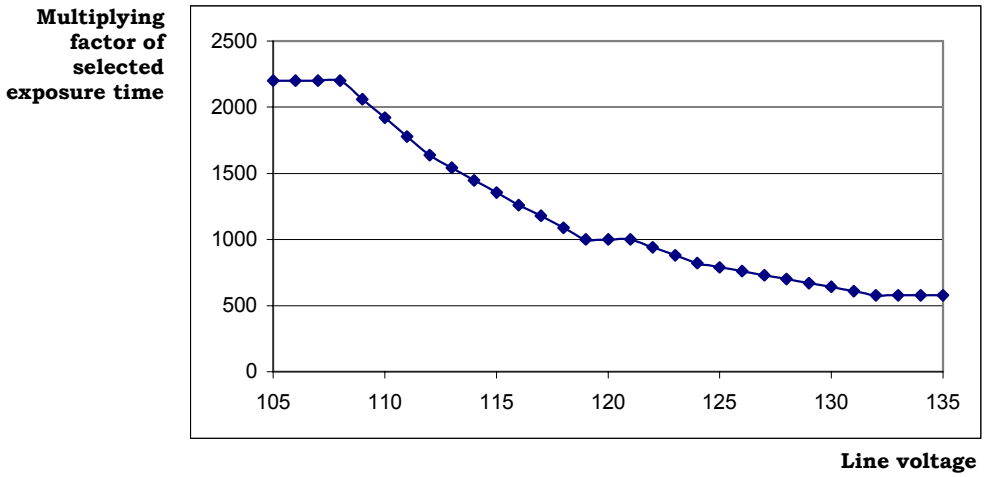
The automatic correction of the exposure time works with the following sequence: the internal voltmeter of the timer monitors continuously the line voltage while the user selects the desired exposure times. Once the user has selected the exposure time that is thought adequate to obtain the proper quality of the image for that specific test, the user presses the "READY" button to enable the system and the timer displays the corrected actual exposure time that is calculated by the timer itself, on the basis of the line voltage measured every half a second by the internal voltmeter. When the user presses the X-ray button, the exposure will start implementing the last displayed pre-indicated time and the display will maintain the indication of the actual exposure time until the X-ray button is released. The actual exposure time of the last exposure can be retrieved any time by pressing the X-ray button without having enabled the system; in this case no X-ray emission is generated and the last exposure time is displayed.



NOTA:
AP TIME X and TIME X timers works synchronously with the power line, so the calculated time is always rounded off to a multiple of pulses.

The corrected exposure is calculated applying a correction factor to the selected exposure time, based on an empirical law that correlates the dose with the high voltage peak and consequently with the line voltage.

The qualitative relationship between the multiplying factor and the line voltage is shown in the following picture:



The following table allows to establish pre-indicated times and final real exposure times as a function of reselected time and line voltage variation.

line voltage	108V		112V		116V		124V		128V		132V	
	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to intrinsic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to intrinsic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to intrinsic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to intrinsic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to intrinsic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to intrinsic inaccuracy
line voltage correction factor:	2,2		1,64		1,16		0,82		0,7		0,58	
preselected time (ms)												
40	88	120	66	98	46	78	33	65	28	60	23	55
		0		0		0		0		0		0
60	132	164	98	130	70	102	49	81	42	74	35	67
		100		66		38		17		10		3
100	220	252	164	196	116	148	82	114	70	102	58	90
		188		132		84		50		38		26
200	440	472	328	360	232	264	164	196	140	172	116	148
		408		296		200		132		108		84
400	880	912	656	688	464	496	328	360	280	312	232	264
		848		624		432		296		248		200
800	1760	1792	1312	1344	928	960	656	688	560	592	464	496
		1728		1280		896		624		528		432
1000	2200	2232	1640	1672	1160	1192	820	852	700	732	580	612
		2168		1608		1128		788		668		548
1200	2640	2672	1968	2000	1392	1424	984	1016	840	872	696	728
		2608		1936		1360		952		808		664
1500	3300	3332	2460	2492	1740	1772	1230	1262	1050	1082	870	902
		3268		2428		1708		1198		1018		838
2000	4400	no exposure	3280	3312	2320	2352	1640	1672	1400	1432	1160	1192
		no exposure		3248		2288		1608		1368		1128
2500	5500	no exposure	4100	no exposure	2900	2932	2050	2082	1750	1782	1450	1482
		no exposure		no exposure		2868		2018		1718		1418
3000	6600	no exposure	4920	no exposure	3480	3512	2460	2492	2100	2132	1740	1772
		no exposure		no exposure		3448		2428		2068		1708
(1) IT IS THE PREINDICATED VALUE OF EXPOSURE TIME DISPLAYED BY THE TIMER DURING THE ENABLE STATUS												
no exposure = the timer does not allow exposure times longer than 4 sec												

4.2 Technical factors measuring method

kV_p The kV_p is defined as the stationary high voltage value which settles under load after pre-heating time.
The kV_p is assessed with a non-invasive instrument having a ± 2% accuracy, at a nominal input line voltage.
A direct measurement of the high voltage can only be carried out by specialized technicians in a suitable testing laboratory that would require disassembling of the tubehead.

mA The output current is defined as the average value of the stationary current which settles after pre-heating time.
The output current is measured with a digital voltmeter by assessing DC voltage drop on terminals of 1k Ohm resistance (measurement accuracy ± 2%) mounted on the tubehead. To access the resistance, remove the tubehead plastic covers loosening the four recessed screws. The voltmeter has to be connected in parallel to the resistance (DC, 10V).

t The exposure time is defined as the time measured with pulse counter, measuring pulses of the input line voltage during the loading time; this loading time is defined as the time during which the voltage is applied to the tubehead. This loading time is obtained by the sum of the pre heating time (fixed and equal to 250 ms) and the corrected exposure time, displayed on the timer during "exposure enabled" time and during exposure itself. To perform the measurement, the pulse counter has to be connected to terminal X3 and X4 of the power board of the timer.
The number of pulses measured by the instruments has to be converted to exposure time, measured in seconds; to do so, subtract 15 pulses (corresponding to the fixed pre heating time of .25 s) and multiply the result by .017.
As explained before, the time is synchronous with the line frequency, so time round off is possible.

The following table gives example of conversion of exposure time to pulses and vice versa.

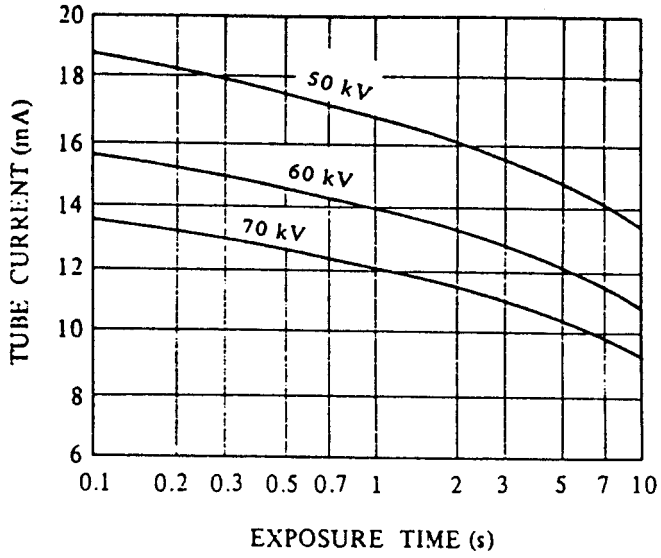
Exposure time	Line Voltage	Multiplying factor	Corrected exposure time	Measured pulses	Measured pulses - 25
0.10	120	1.00	0.100	31	6
0.10	116	1.16	0.116	32	7
0.10	128	0.70	0.070	29	4
1.00	120	1.00	1.00	85	60
1.00	112	1.64	1.64	114	89
1.50	120	1.00	1.50	115	90
2.00	120	1.00	2.00	145	120

4.3 X-ray tubehead curves

TOSHIBA D-082 B

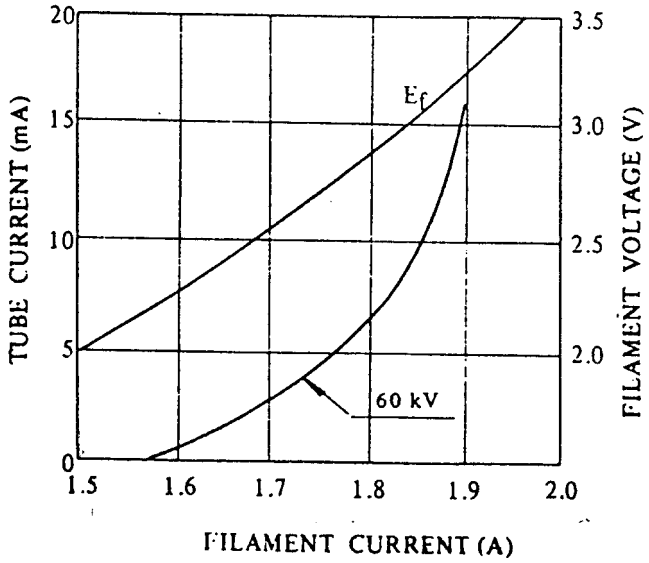
Emission and filament features

Self-Rectified
Focal Spot : 0.8 mm

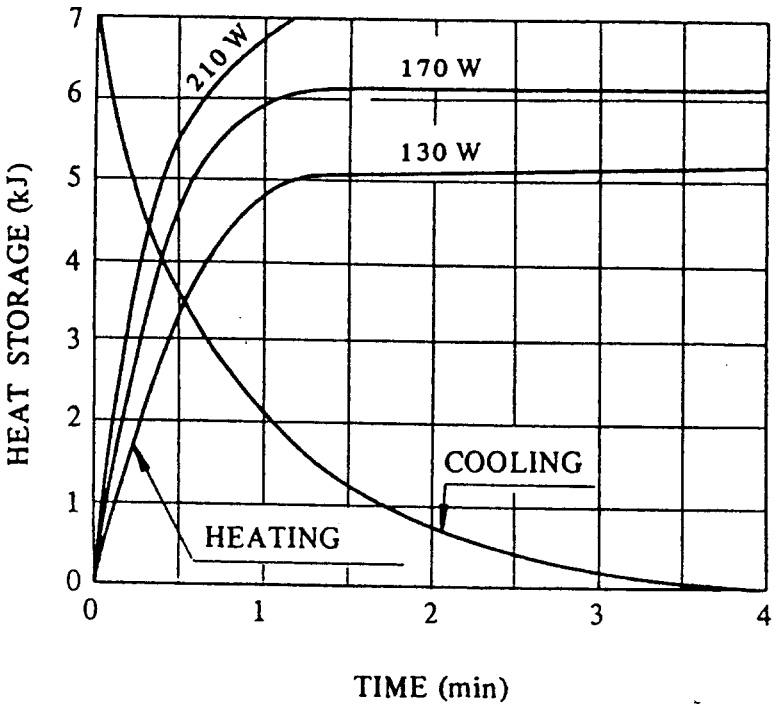


Load

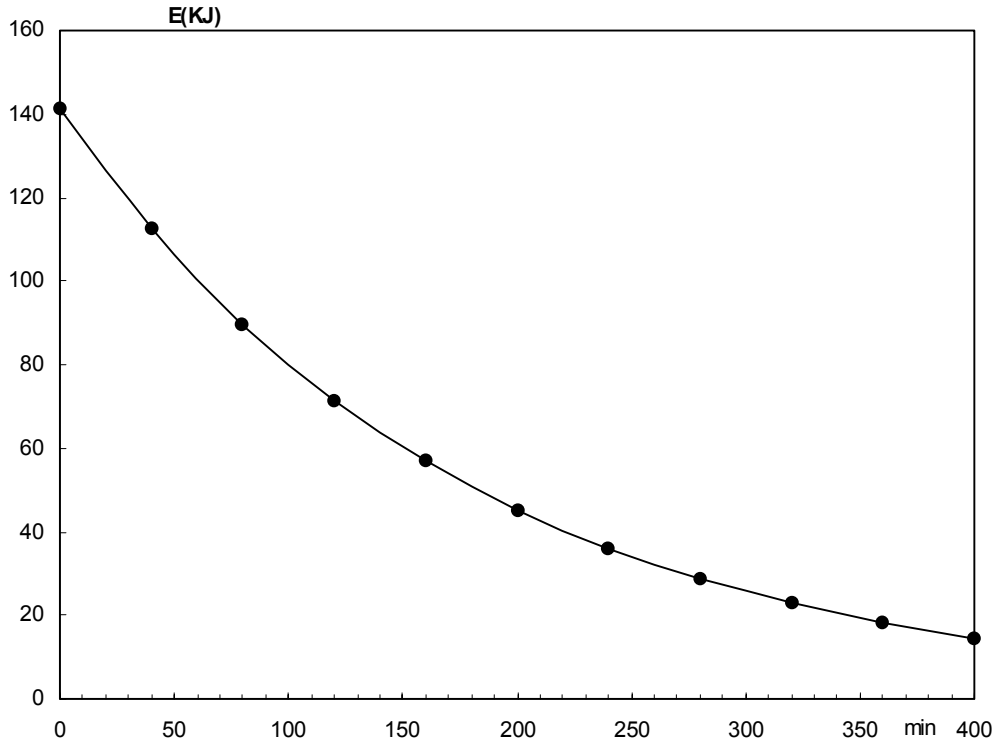
Self-Rectified



Cooling curve



COOLING CURVE OF TUBEHEAD



4.4 Standards and regulation

Explor-X 70 is designed and produced to meet the following standards:

- 21 CFR
- UL 187
- EN 60601-1
- EN 60601-1-1
- EN 60601-1-2

4.5 Dimensions

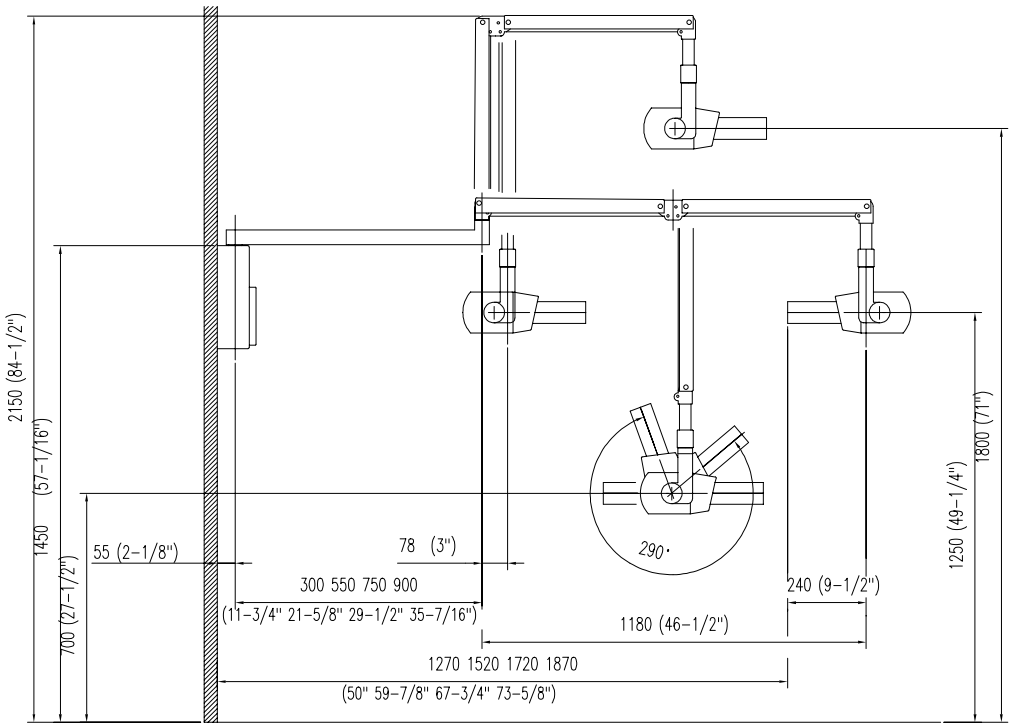


Figure 4-1 - Wall mounting configuration - Square arms

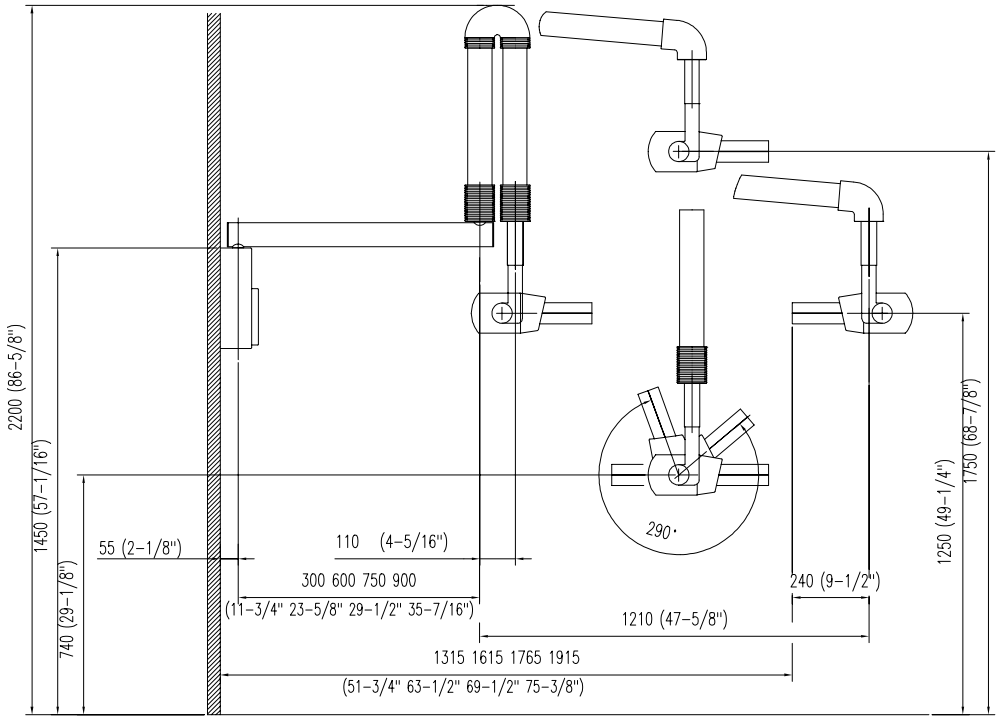


Figure 4-2 - Wall mounting configuration - Oval arms

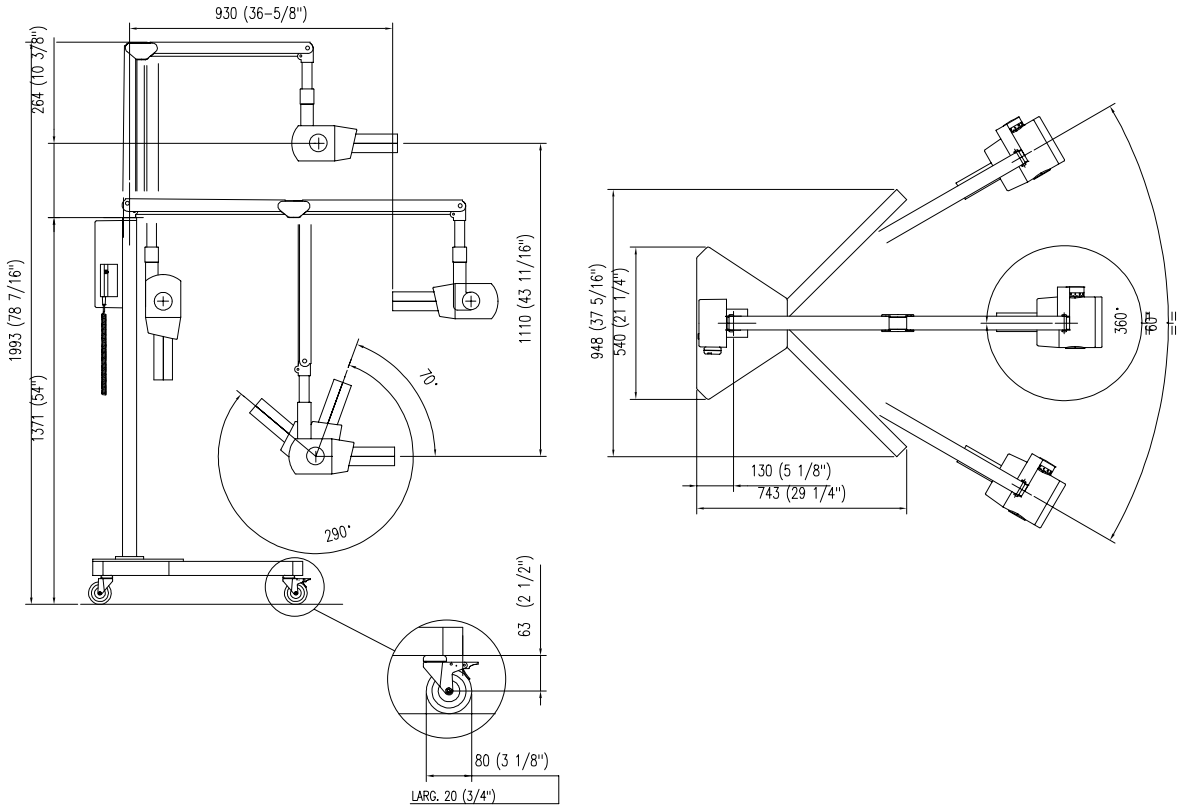


Figure 4-3 - Mobile stand configuration - Square arms

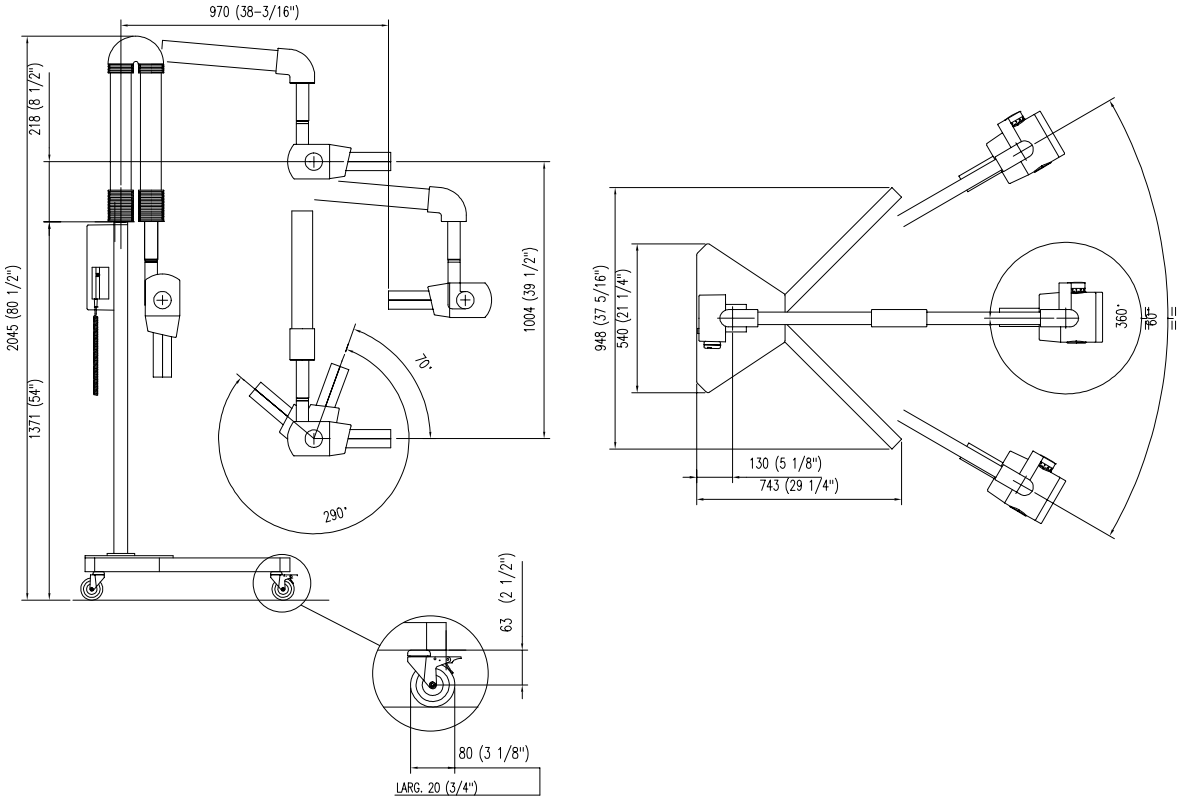


Figure 4-4 - Oval arms

5. PRE-INSTALLATION

Explor-X 70 does not require specific pre-installation procedures: compliance with the rules stated in paragraph 5.1 is the sole requirement.
Should you wish to effect sub-trace connections for the Explor-X 70, these must be carried out before the intra-oral X-ray equipment installation phase, considering dimensions and suggested distance from floor as stated in paragraph 4.5.
The manufacturer is able to ensure the necessary technical assistance and advice since the pre-installation phase; wall building and pre-installation are at the customer's charge.

5.1 Fixing methods

NOTE:
This chapter applies to Wall, Remote Timer (only for the arm support plate) versions; Mobile Stand versions do not require any assessment of wall solidity.

Assessment of wall solidity is left to the person in charge of installation.
The extraction load on each boss is 528 lb (240kg) for the wall mounting version and 484 lb (220kg) for the ceiling suspension version.
For each type of wall, use the most suitable fixing method according to the following specifications:

- wood walls: 8x70 A 4.8 self-threading screws (provided in installation kit)
- concrete or R250 cement bricks: expansion iron bosses (not provided) in M8 or WURTH chemical bosses (not provided)
- hollow bricks: in-wall support (not provided) which must support different weight and momentum as shown in the following table.

	Remote/Wall version
Weight	264 lb (120 kg)
Momentum	140 kgm (1324 Nm)

WARNING:
Villa Sistemi Medicali shall bear no responsibility for installations not complying with the above instructions and specifications.

5.2 Electrical features

The supply line must comply with the following values:

- Single-phase mains voltage + ground 120V ±10%
- Line Frequency 60Hz
- Absorbed current 8.2A at 132V
- Line regulation <3% at 132V

Connection of the equipment requires a circuit breaker having the following features:

- Nominal current 10A
- Differential sensibility 30mA

The equipment must be connected to a system provided with correct grounding, in compliance with local regulations.
Maximum distance between electrical panel and supply terminal block varies according to the section of supply wires as reported in Table 1 below.

	Distance	
Supply	0-45 feet (0-15m)	45-70 feet (15-22.5m)
120V / 60Hz	12 AWG (4mm^2)	10 AWG (6.3mm^2)

Table 1

NOTE:
For 120V supply, we recommend to use wires whose section is not lower than 12 AWG (4mm^2).
For standard configuration (Figure 4-1 and Figure 4-2) and mobile stand configuration (Figure 4-3), the supply terminal block is the same as the timer's; for the other configurations, the timer's supply terminal block is only a "link" between the electrical panel and the arms support terminal block.

6. INSTALLATION

6.1 Wall mounting installation

The Explor-X 70 intra-oral X-ray unit is shipped in pre-assembled groups.
Mechanical mounting only consists of assembling these groups.
Registration of all mechanical elements is therefore effected prior to delivery; any intervention on these components is not required and may cause misfunctioning of the equipment; any operation must therefore be carried out by personnel authorised by the manufacturer.

6.1.1 Explor-X 70 installation with single stud

Should the system require an electrical box, the installation must be done using a UL listed Junction Box.

NOTE:
The Junction box must always be placed behind the cutoff of the single stud wall-plate (anchor plate) , as stated on the Figure 6-1 below.

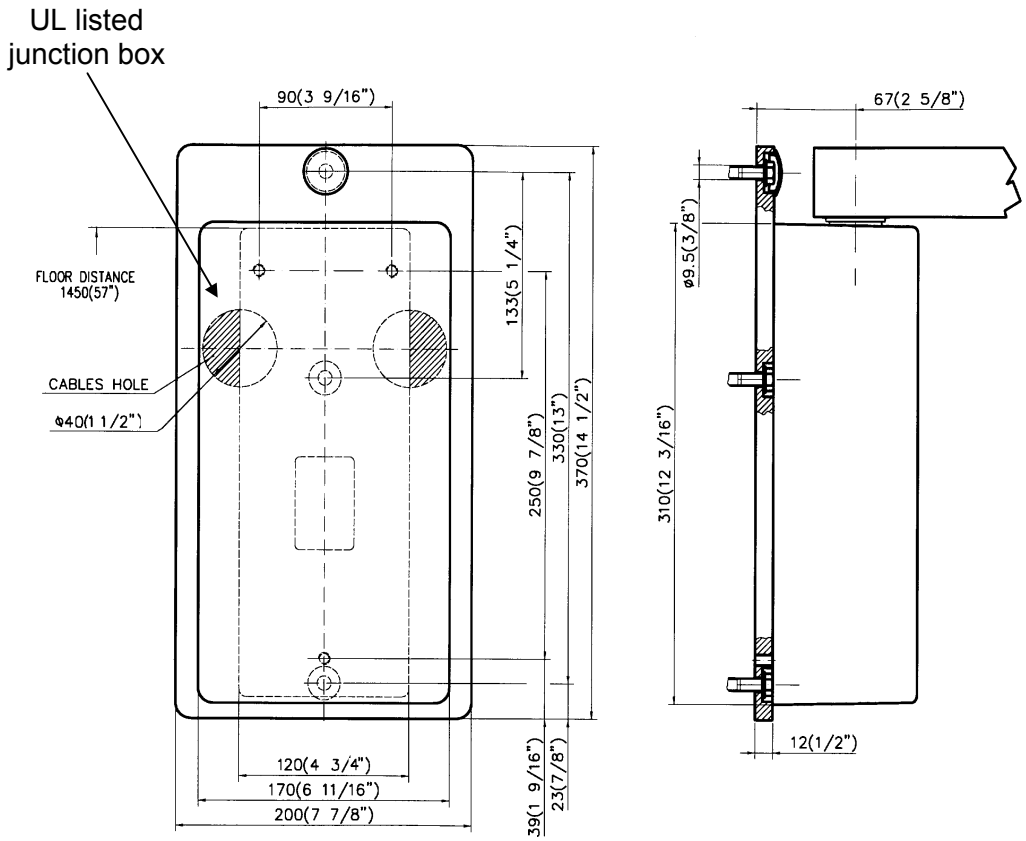


Figure 6-1 - Single stud wall plate mounting

The kind of installation needs 3 lag bolts 5/16 x 2 - ½ inches.

1. Install first the single stud plate using the template (code 39609249)
2. The cable must exit from the wall by a UL listed Junction Box
3. Then install aluminum plate using the 3 screws.
4. Follows instruction as for wall mount.

6.1.2 Explor-X 70 installed to a concrete wall

The Explor-X 70 can be installed to a concrete wall. For this application, 3 3/8" lead expansion bosses are needed.

6.1.3 Wall plate + Timer (standard configuration)

1. After having installed the wall plate as before specified, proceed with the following steps.
2. Referring to Figure 6-2 below, remove wall plate/timer external cover by loosening the two screws (**1**) located in the bottom part of the plate.
3. Loosen the internal screw (**2**) fixing the components plate and rotate the support by 90°.

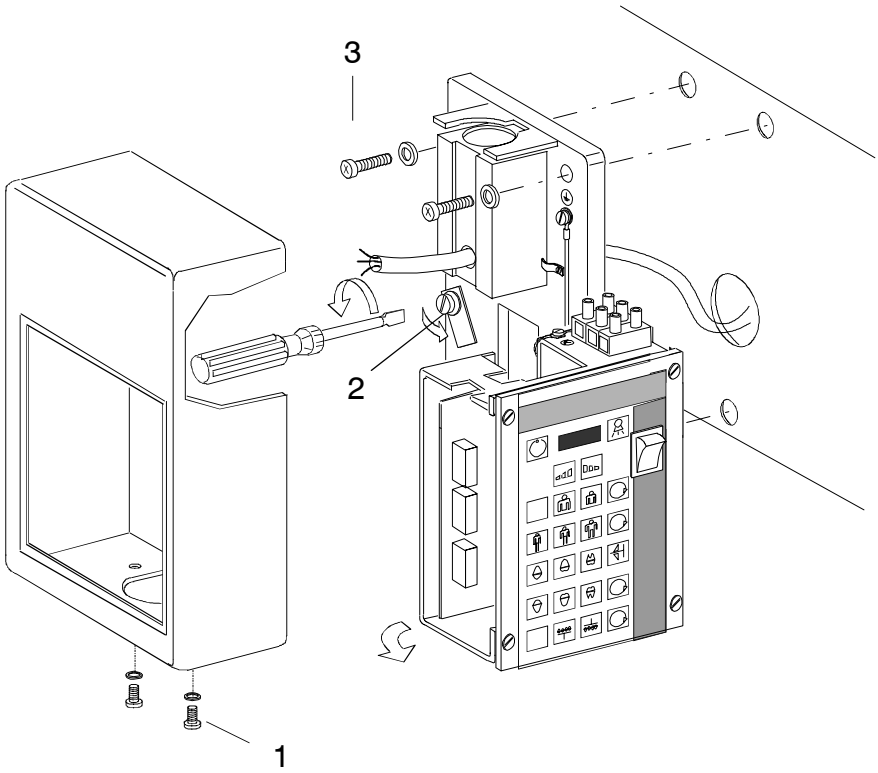
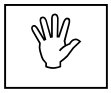


Figure 6-2

4. Secure the timer to wall plate to wall by means of the screws (**3**) and check that top plane is levelled (use a level).

6.1.4 Wall plate (configuration with Remote Timer)

Installation of the system with Remote Timer is marked by the presence of two seemingly similar elements. The first, having an arm support function, is made up of a wall plate complete with X-ray support block, (transit) terminal block and external cover. The second element, having a timer function, is made up of a support timer plate and external cover (with two boards and one control panel)



WARNING:
The plate must be placed so that the supply wires income hole coincides with their outcome from the wall.
Assessment of wall solidity is left with the person responsible for installation, taking into account the fact that load on top bosses is 528 lb (240 kg) each.
The fixing bosses to be used for the different types of wall are the following:

- wood walls: self-threading screws provided in installation kit
- concrete walls: expansion bosses (not provided)
- hollow bricks: chemical bosses (not provided)

- **Wall plate**

1. Mark the points for wall plate mounting by means of the enclosed template (code 39609124) and make the relevant holes having a diameter corresponding to that of the selected bosses.

2. Remove wall plate external cover by loosening the two screws (**1**) located in the bottom part of the plate.

3. Loosen the internal cover fixing screws (**2**).

4. Make holes in wall in the marked points and insert the expansion bosses provided in the installation kit.

5. Secure wall plate to wall by means of the screws (**3**), and check that top plane is levelled (use a level).

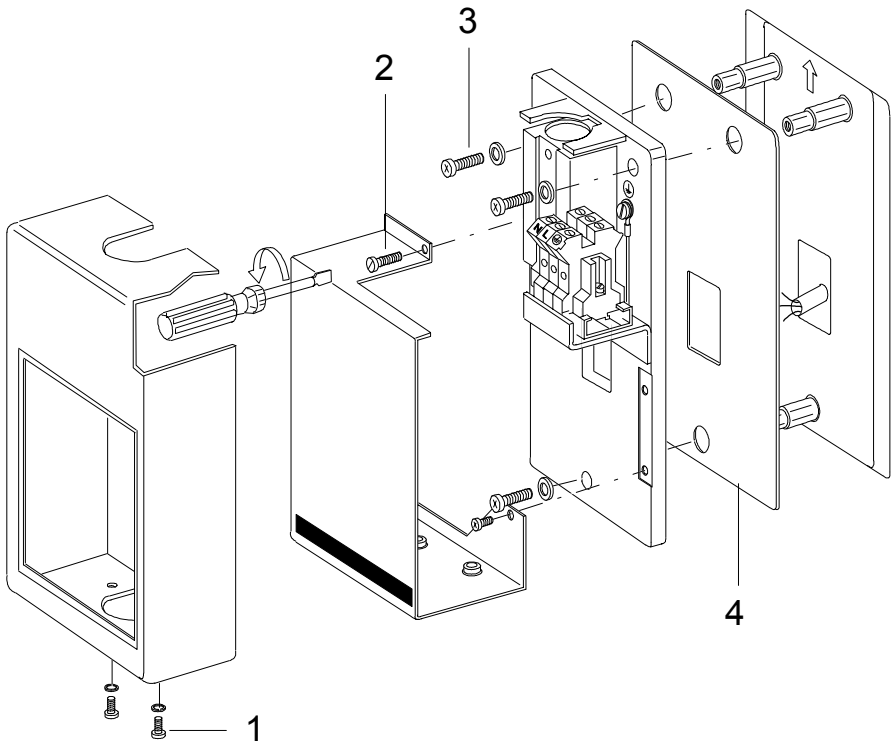


Figure 6-3

- **Timer plate**

1. Mark the points for wall plate mounting by means of the enclosed template (code 39609122) and make the relevant holes having a diameter corresponding to that of the selected bosses.

2. Remove timer external cover by loosening the two screws (**1**) located in the bottom part of the plate.

3. Loosen the internal screw (**2**) fixing the components plate and rotate the support by 90°.

4. Make holes in wall in the marked points and insert the expansion bosses provided in the installation kit.

5. Secure wall plate to wall by means of the screws (**3**), inserting the counter-plate (**4**) between the two and check that top plane is levelled (use a level).

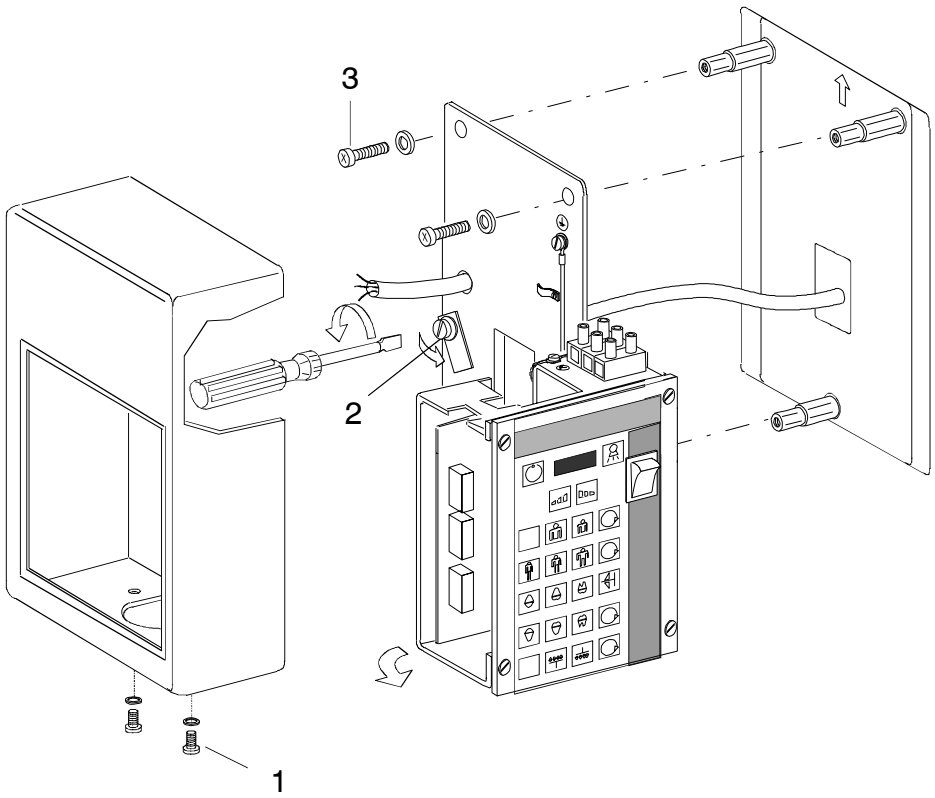


Figure 6-4

6.1.5 Mobile stand mounting and timer installation

1. Cross the two base tubes (**1**) in the relevant slot and fix them together by means of the relevant screw (**2**) and nut (**3**).

NOTE:
Before tightening the screw, make sure that the angle between the two base tubes is approximately 90°.

2. Position base plate (**4**) and secure it by means of the four relevant screws (**5**).
3. Mount column stand (**6**) on base plate (**4**) by means of the four relevant screws (**7**).
4. Remove timer's external cover by loosening the two screws located in the bottom part of the timer (**8**).
5. Loosen components plate internal fixing screw (**9**) and rotate the plate by 90°.
6. Fix timer (**10**) on the back side of column stand (**6**) by means of the two relevant screws (**11**) and check that top plane is levelled (using a level).

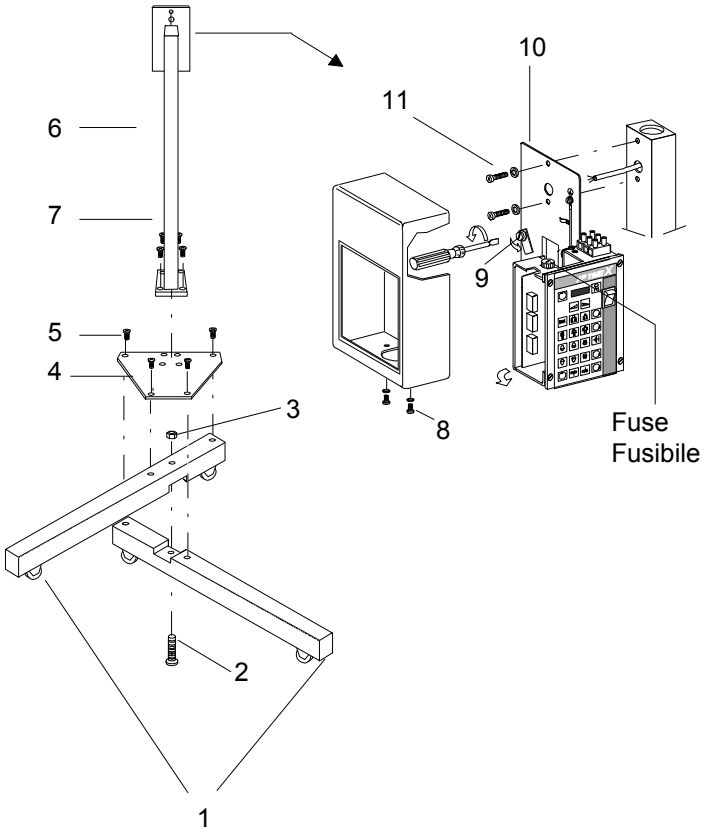


Figure 6-5

NOTE:
An additional 10A F (6.3x32) fuse is provided for the mobile stand version.

6.2 Scissors arms and extensions arms mounting

6.2.1 Preparation of square arms

WARNING:
To ease this operation (and avoid any inconvenience), we recommend not to remove the part of packing holding the two sections of the scissors arm closed and to perform the whole phase on bench. Non-compliance with this procedure may cause damage to the equipment and to people.

1. By means of tape, put the scissors arm cable and extension arm traction wire together (**1**). Pull wire until cable appears, then separate cable from traction wire (**2**).
2. Turn out the safety screw «A» (**4**) and introduce Scissors Arm pivot into Extension Arm (**2**).
3. Insert cable extremity in the relevant hole on extension arm and pull cable through rotation pivot (**3**).
4. Close hole on extension arm by means of the plastic plug provided in installation kit (**4**).

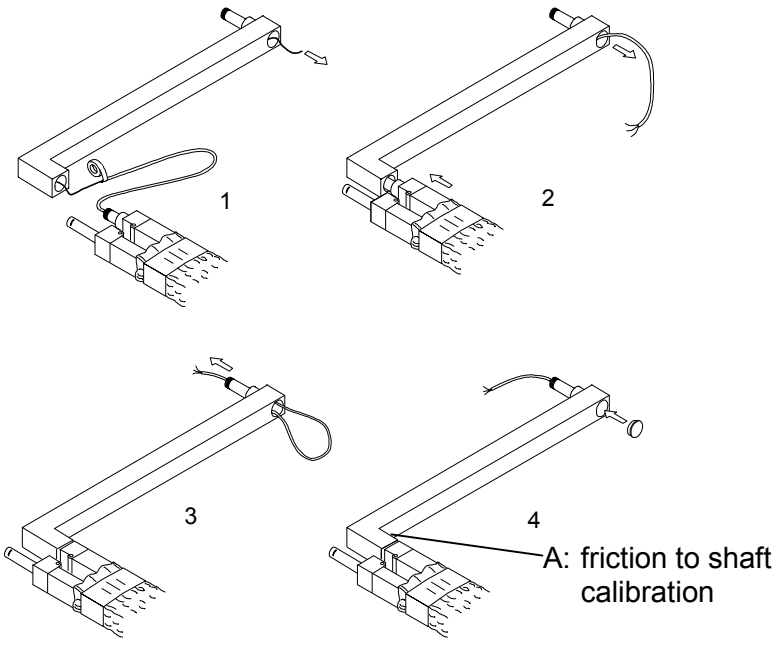


Figure 6-6

NOTE:
At the end of operation please proceed with friction adjustment as described in paragraph 7.2.1.

6.2.2 Preparation of oval arms

WARNING:
To ease this operation (and avoid any inconvenience), we recommend not to remove the part of packing holding the two sections of the scissors arm closed and to perform the whole phase on bench. Non-compliance with this procedure may cause damage to the equipment and to people.

1. To easily pull cable through extension arm, remove cover of the first arm by means of the relevant screw (**a**). Then remove the rotation pivot by loosening the two fixing screws (**b**) (**1**).
2. By means of tape, put scissors arm tubehead cable and extension arm traction wire together (**2**). Pull wire until cable appears, then separate cable from traction wire (**3**).
3. Insert scissors arm pivot in the relevant hole on extension arm (**3**).
4. Place rotation pivot and cover back on extension arm (**4**), performing the operations described at point 1 in reverse order.

WARNING:
Wrong pivot positioning can negatively affect the equipment's operational radius.

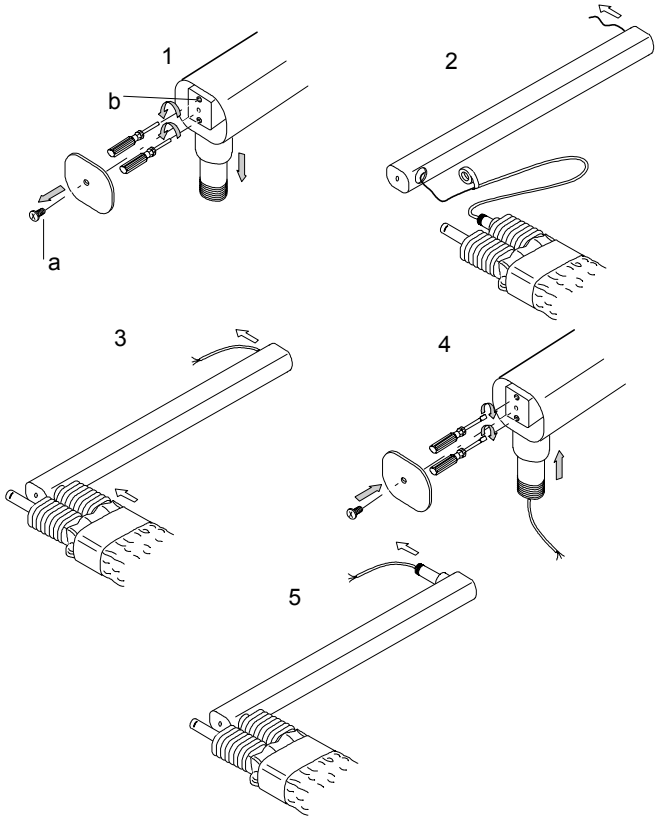


Figure 6-7

6.3 Arms mounting on support

6.3.1 Wall mounting of arms assembly

Mount complete extension arm on wall plate, by inserting rotation pivot in the relevant mounting sleeve.

NOTE:
To insert extension arm rotation pivot, keep arm in orthogonal position with respect to plate.
Do not free scissors arms from holding pack.

Check that extension arm is levelled, by means of a level; should this not be the case, adjust it by operating on regulation screws, as described below:

- extension arm with angle wider than 90°: operate on top screws (**B**)
- extension arm with angle narrower than 90°: operate on bottom screws (**A**)

NOTE:
Since, in this phase, extension arm must not support tubehead weight, we recommend to keep the angle slightly wider than 90°, thus allowing a full-load flexion of about 4 mm with a 900 mm extension arm.

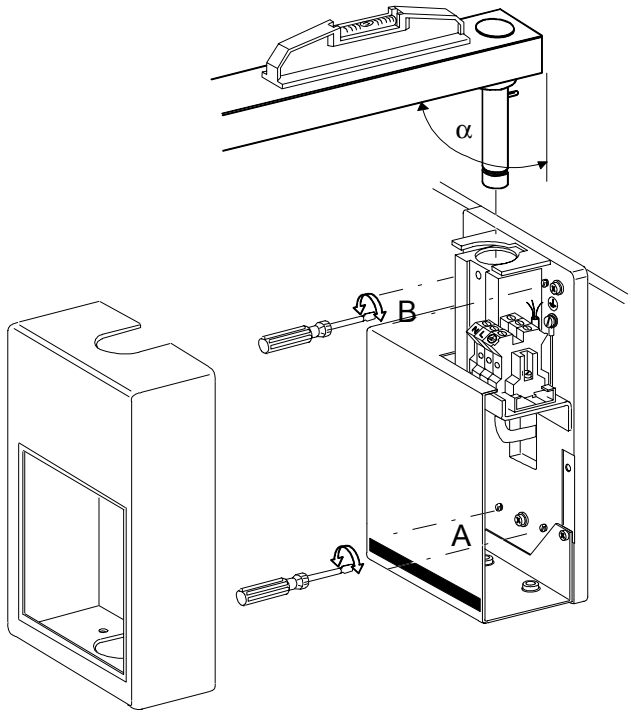


Figure 6-8

6.3.2 Stand mounting of arms assembly

Mount scissors arm (extension arm is absent in this configuration) on stand, by inserting rotation pivot in the relevant thimble.

NOTE:
To insert extension arm rotation pivot in thimble, keep arm in orthogonal position with respect to stand.
Do not free scissors arms from holding pack.

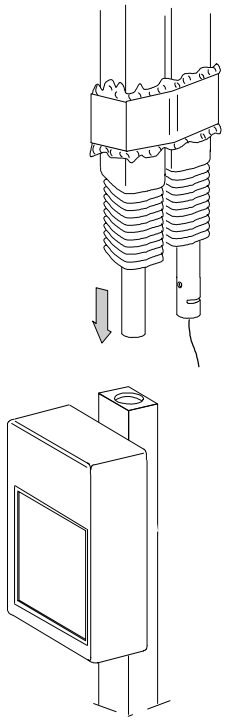


Figure 6-9

6.4 Tubehead mounting

6.4.1 On square arms

1. Remove safety screw (**1**) located on joint.
2. Keep arm articulation at maximum height and position safety cover (**2**) on joint.
3. Insert tubehead rotation pivot on joint for about half of its length and insert elastic ring (**3**) in the two relevant transversal slots.

NOTE:
The elastic ring must be inserted on the same side as the screw, in order to avoid excessive movement of safety cover.

NOTE:
If difficulties should arise when inserting tubehead rotation pivot on joint, remove screw (**4**) and then remove the grounding clip (**5**) from its location.

4. Completely insert rotation pivot, so that safety ring fits the relevant slots on the pivot. If previously removed (see previous NOTE), re-install the grounding clip and relevant fixing screw. Only after this has been carried out, the scissors arms holding pack can be removed.
5. Lower cover on elastic ring and screw back safety screw (**1**).

NOTE:
The function of the cover is to avoid that security ring leaves the relevant set. Therefore, cover (**2**) must be held in the right position by means of the relevant holding screw (**1**).
All operations for extension arm friction regulation must be performed as described in paragraph 7.2.1.

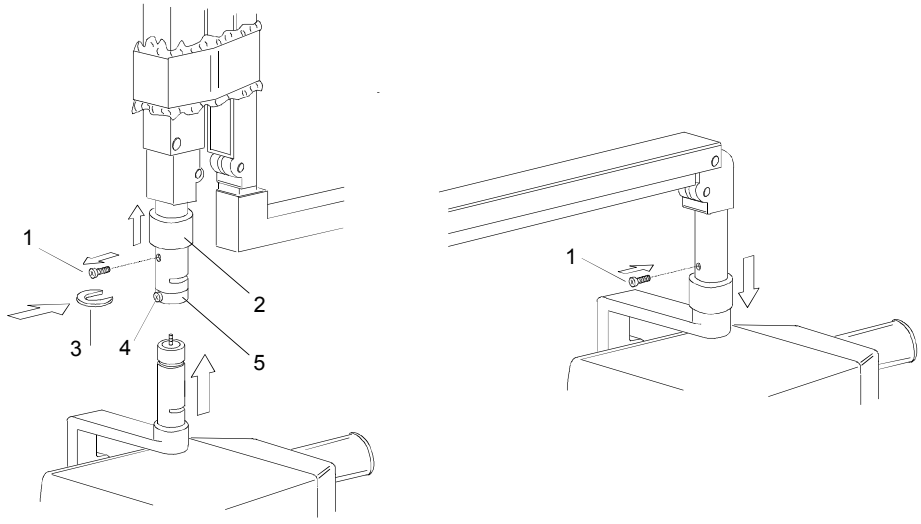


Figure 6-10

6.4.2 On oval arms

1. Remove safety screw (**1**) located on joint.
2. Lift joint protection cover (**2**) to see the safety elastic ring (**3**) insertion slot. Insert a pivot - whose diameter shall not exceed 3 mm (e.g., a screwdriver) - in the hole left empty by safety screw, in order to keep protection cover lifted and see safety ring slot.
3. Insert tubehead rotation pivot on joint for about half of its length and insert elastic ring (**3**) in the two relevant transversal slots.

NOTE:
The elastic ring must be inserted on the same side as the screw, in order to avoid excessive movement of safety cover.

NOTE:
If difficulties should arise when inserting tubehead rotation pivot on joint, remove screw (**4**) and then remove the grounding clip (**5**) from its location.

4. Completely insert rotation pivot in the joint, secure it with safety ring (**3**) and lower protection cover (**2**). If previously removed (see previous NOTE), re-install the grounding clip and relevant fixing screw. Only after this has been carried out, the scissors arms holding pack can be removed.
5. Lower cover on elastic ring and screw safety screw back (**1**).

NOTE:
The function of the cover is to avoid that security ring leaves the relevant seat. Therefore, cover (**2**) must be held in the right position by means of the relevant holding screw (**1**).
All operations for extension arm friction regulation must be performed as described in paragraph 7.2.2.

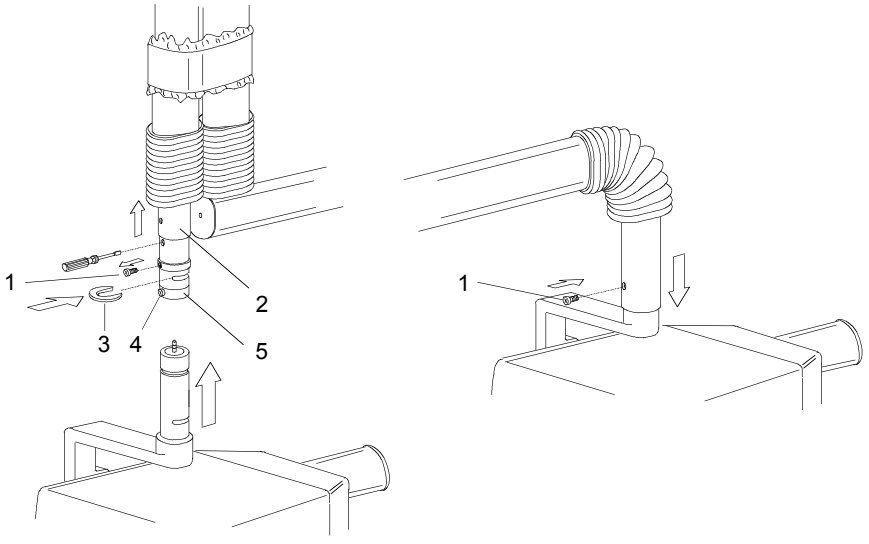


Figure 6-11

6.5 Installation of options

6.5.1 Remote X-ray button with signalling LED

WARNING
The timer, as manufactured by VILLA SISTEMI MEDICALI, is in compliance with DHHS performance standards as set forth under 21 CFR subchapter J.
The regulation requires that a visual indication of the technique factors be visible from the operator's position. The timer, by itself, may easily be extended and used as a remote switch assembly to meet this criteria. Occasionally, a need may arise to complement this switch with another single button or a combination thereof. Although a connection point is provided on the timer, the manufacturer specially and expressly, by this warning, disclaims any responsibility, either expressed or implied as to the fitness and correctness of this remote installation in reference to the federal regulations as applicable. It is the installers responsibility to observe and abide by the rules.

This optional part allow to install a remote X-ray button having a signalling LED that will light on during emission. The installation Kit (code 6260372900) is completed with the following parts:

- Remote X-ray button with signalling LED and a 4 wires coiled cord.
- 8 spade connectors
- 1 terminal block

The kit does not include the 4 wires cable from the timer to the remote point of installation.

1. Run the 4 wires cable from the timer to the point of installation of the push button; the wires must have a minimum section of $1mm^2$
2. Install the spade connectors to the both end of the cable (4 on each side)
3. Connect the wires to the timer recording numbers or colours of the wires connected to the following terminal on the timer:
   - X-ray button # 1 to terminal X12 (wire **a**)
   - X-ray button # 2 to terminal X13 (wire **b**)
   - LED negative to terminal X14 (wire **c**)
   - LED positive to terminal X15 (wire **d**)

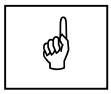
4. At the other end of the cable connect the wires to cable coming from the X-ray button with the following sequence and respecting the correspondence (see previous point 3):

- the wire "**a**" to the red wire of the push button
- the wire "**b**" to the white wire of the push button
- the wire "**c**" to the yellow wire of the push button
- the wire "**d**" to the black wire of the push button

This operation is made easiest using the special terminal block supplied with the kit.

6.6 Electrical connection

After completions of the mechanical installation of the timer (available in different versions), proceed to electrical connection referring to the electrical schematics presented in chapter 9.
The timer must be connected to a system equipped with adequate grounding, in compliance with existing local safety regulations



NOTE:
For safety reason, the equipment must be installed provided with a line breaker on a dedicated line.

6.6.1 Electrical connection for standard versions

Perform connection between main switch and timer terminal block by means of a bipolar cable + ground, whose minimum section must be of 2.5mm^2 (14 AWG); close cable on timer side with the relevant prod terminals provided in installation kit. Secure cable to terminal block, respecting indicated positions (L = line - brown cable, N = neutral - blue cable, Ground = yellow/green cable). The three wires must be bundled together near terminal block.
Connect tubehead cable to supply board, closing cables with the relevant terminals provided in installation kit, **respecting the positions indicated in the following table:**

Signal	Tubehead wire	Power board Position	Cable colour
Line	L2	X3	Brown (Black)
Neutral	N2	X4	Blue (Black)
Ground	Ground	Ground	Yellow/Green

X3 and X4 wires must be bundled together near the relevant faston; it is also necessary to prevent the wires from running between the boards, and consequently the excess wire must be fixed to the upper part of the timer by means of a bent.

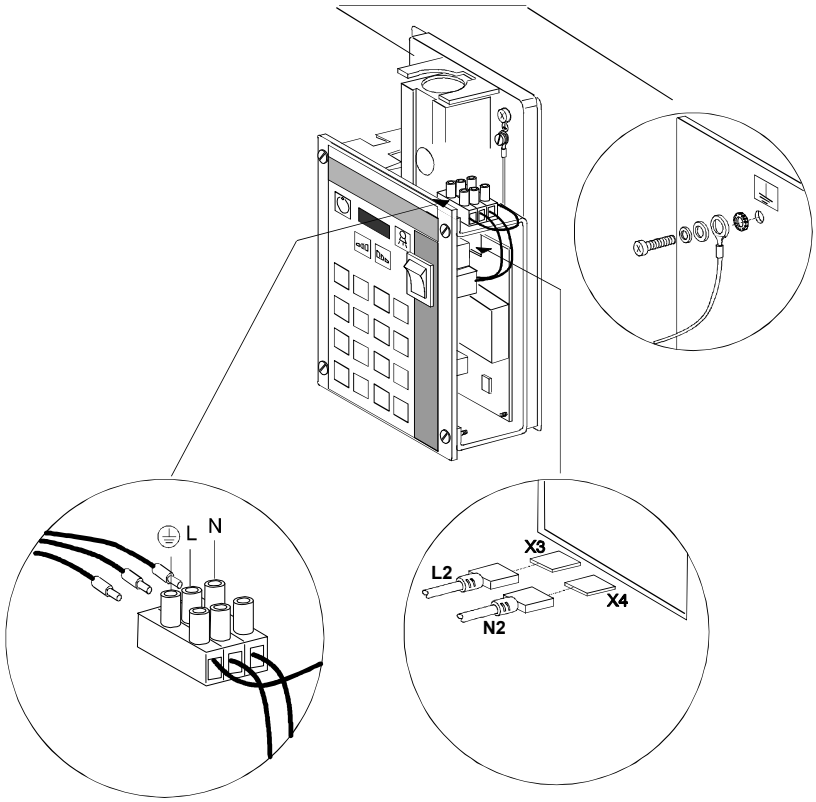


Figure 6-12

6.6.2 Electrical connection for versions equipped with remote timer

Perform connection between main switch and remote timer terminal block by means of a bipolar cable + ground, whose minimum section must be of 2.5mm^2 (14 AWG); close cable on timer side with the relevant prod terminals provided in installation kit. Secure cable to terminal block, respecting indicated positions (L = line - brown cable, N = neutral - blue cable, Ground = yellow/green cable).
Connect X3, X4 and Ground timer cables to terminal block L, N and Ground respectively on wall plate terminal block, using the terminals provided in the installation kit.
Connect tubehead cable to wall plate terminal block, attaching it with spade connector (as shown in table of 6.6.1), respecting indicated positions (N2 = blue or black cable, L2 = brown or black cable, Ground = yellow/green cable on point of frame).

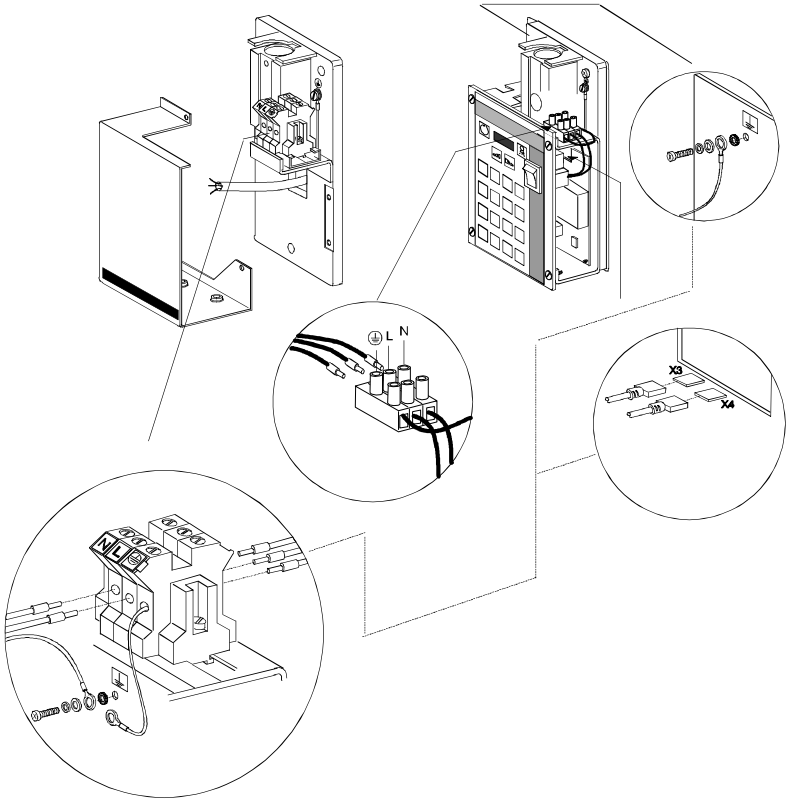


Figure 6-13

WARNING:
For all versions, tubehead connection to the supply board must be effected following the instructions provided, to ensure that the system functions at nominal values. Wrong connections may cause abnormal current absorption and consequent drop in tubehead performance and, in some cases, interruption of mains fuses.

6.7 Final functioning tests

6.7.1 AP TIME X timer

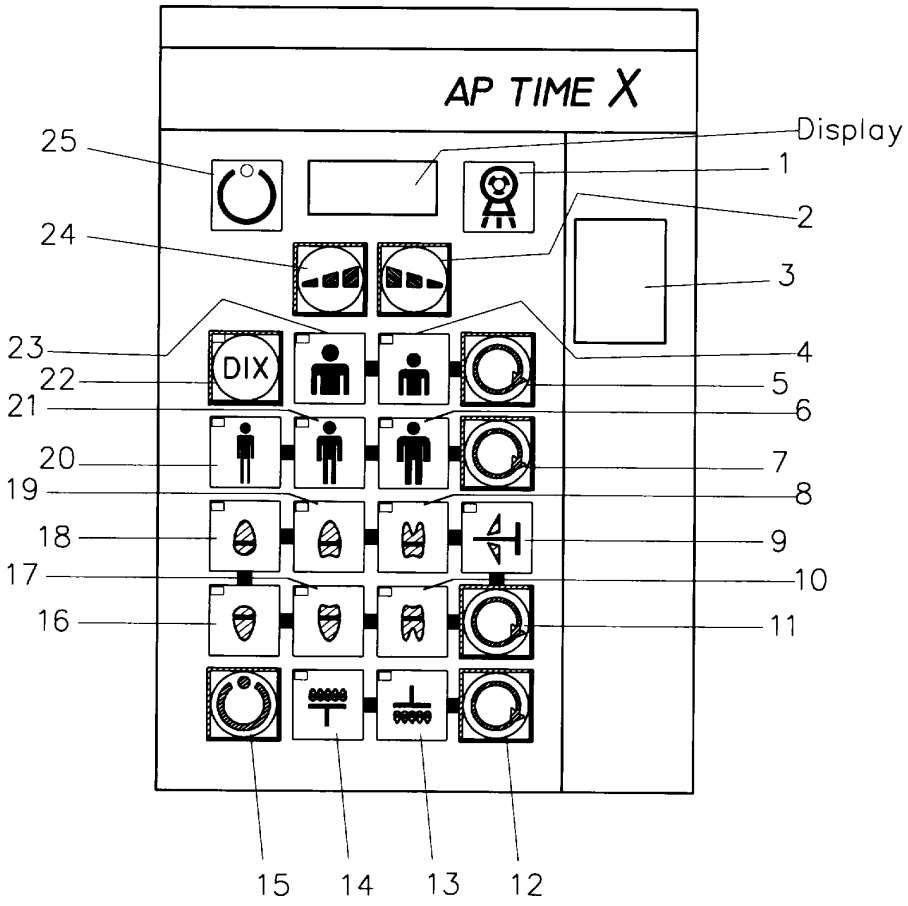


Figure 6-14

LEGEND:

1	X-ray emission LED	**10**	Lower Molar LED	**18**	Upper incisor LED
2	Decrease key	**11**	Tooth type selection key	**19**	Upper canine LED
3	Mains switch	**12**	Occlusal selection key	**20**	Small size LED
4	Child LED	**13**	Lower Occlusal LED	**21**	Medium size LED
5	Adult/Child selection key	**14**	Upper Occlusal LED	**22**	Digital radiography selection key
6	Large size LED	**15**	Exposure enabling key	**23**	Adult LED
7	Size selection key	**16**	Lower incisor LED	**24**	Increase key
8	Upper Molar LED	**17**	Lower canine LED	**25**	«Ready for X-ray» Green LED
9	Bite-wing LED				

All equipment functions are set at standard values and are tested in the factory during final tests. However, some of the functions may be regulated by Service engineers only after installation has been completed or according to specific requirements. (see chapter 8).

After equipment has been connected to network mains voltage, perform the following functional tests:

1. Put mains switch (**3**) on **ON** position and check that light on the switch turns on and that hand remote control is set on automatic function

selection mode for keys  **23** (adult),  **22** (medium size) and  **19** (upper jaw premolar) (the relevant LEDs are on).

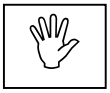
2. Check correct functioning in automatic mode by checking that the values displayed correspond to those reported in the table for all combinations of Patient, Size and Tooth type. Values reported in the table are calculated with multiplying factor «1» (see paragraph 7.5.2 of the User's Manual)

	0.25	0.32	0.50	0.12	0.16	0.23
	0.32	0.50	0.70	0.18	0.25	0.36
	0.36	0.63	0.80	0.23	0.32	0.45
	0.25	0.32	0.50	0.12	0.16	0.23
	0.36	0.50	0.70	0.18	0.25	0.36
	0.30	0.40	0.60	0.12	0.16	0.23
	0.23	0.30	0.45	0.12	0.16	0.23
	0.60	0.80	1.00	0.30	0.40	0.60
	0.45	0.60	0.90	0.23	0.30	0.45

Table 1

3. Select manual function by pressing button  **2** (increase) or  **24** (decrease) and check that display visualises the different manual exposure times by repeatedly pressing the relevant keys, as shown in the following table:

0.04 - 0.06 - 0.08 - 0.10 - 0.12 - 0.14 - 0.16 - 0.18 - 0.20 - 0.23 - 0.25 - 0.30 - 0.32 - 0.36 - 0.40 - 0.45 - 0.50- 0.54 - 0.60 - 0.63 - 0.70 - 0.80 - 0.90 - 1.00- 1.25 -1.30 - 1.40 - 1.60 - 2.00 - 2.50 - 3.00 - 3.20

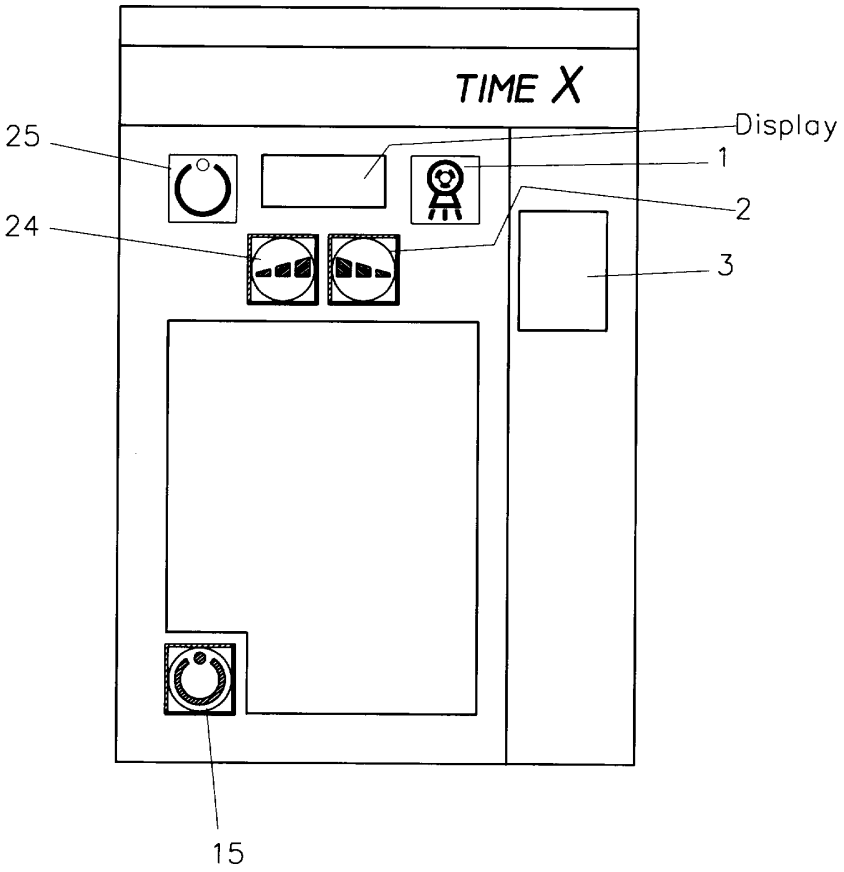


WARNING:
The following test implies X-ray emission; please follow all measures envisaged by local safety regulations.

4. Position fluorescent screen (not provided) for radiation visualisation at extreme end of collimator; press key  **15** and check simultaneous switching on of green LED  **25**, press X-ray button and check simultaneous switching on of the yellow LED  **1** and generation of acoustic signal accompanying X-ray emission.

Once these checks have been successfully completed, **EQUIPMENT IS READY FOR USE.**

6.7.2 TIME X Timer



LEGEND:

1 X-ray emission LED

2 Decrease key

3 Mains switch

15 Exposure enabling key

24 Increase key

25 "Ready for X-ray" Green LED

Figure 6-15

All equipment functions are set at standard values and are tested in the factory during final tests. However, some of the functions may be regulated by Service engineers only after installation has been completed or according to specific requirements. (see chapter 8).
After equipment has been connected to network mains voltage, perform the following functional tests:

1. Position main switch (**3**) on **ON** position and check that light on the switch turns on and hand remote control is activated.

2. By means of key **2** (increase) or **24** (decrease) check that display visualises all manual exposure times indicated in the following table:

0.04 - 0.06 - 0.08 - 0.10 - 0.12 - 0.14 - 0.16 - 0.18 - 0.20 - 0.23 - 0.25 - 0.30 - 0.32 - 0.36 - 0.40 - 0.45 - 0.50- 0.54 - 0.60 - 0.63 - 0.70 - 0.80 - 0.90 - 1.00- 1.25 -1.30 - 1.40 - 1.60 - 2.00 - 2.50 - 3.00 - 3.20

WARNING:
The following test implies X-ray emission; please follow all measures envisaged by local safety regulations.

3. Position fluorescent screen (not provided) for radiation visualisation at the extreme end of collimator; press key  **15** and check simultaneous switching on of green LED  **25**, press X-ray button and check simultaneous switching on of the yellow LED  **1** and generation of acoustic signal accompanying X-ray emission.

NOTE:
Pressing the "Ready" key, the system will be ready for the exposure and also it will starting showing on the display the exposure time corrected according to the internal line voltage fluctuation algorithm (please see paragraph 4.1).

Once these checks have been successfully completed, **EQUIPMENT IS READY FOR USE.**

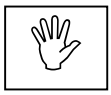
7. MAINTENANCE

7.1 General features

Like all electrical equipment, this unit requires not only correct use, but also regular maintenance and checks. Such measures will guarantee safe and effective equipment functioning and will prevent any risk for both patient and operator.
Preventive maintenance consists of checks performed directly by operator and of periodical maintenance interventions to be performed by Service engineers only.

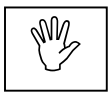
Checks directly effected by the operator may be:

- check that labels are intact and properly secured
- check that tubehead is free from oil residues
- check that the hand control cable is not broken or worn out
- check for external damage on the apparatus, which may prejudice protection against radiation
- check centering of X-ray beam
- check scissors arm balancing
- on the square arm check that, when the 2 sections of the arm are fully open (e.g. first arm in vertical position, second arm in orizontal position) they are perpendicular each other.
  If instead the angle between the 2 sections of the arm is lower than 85°, check the position of the pivot holding the tubehead as follows:
  - if it is perpendicular to the floor (angle between the pivot and the second section of the arm >90°), perpendicularity between the 2 sections of the arm can be obtained by performing the Square arm balancing procedure (see paragraph 7.2.1)
  - if the pivot holding the tubehead is not perpendicular to the floor (angle between the pivot ad the second section of the arm =90°), then the arm needs refurbishing as, probably, the junction mechanism and the covers are worn out. This condition can be confirmed by the fact that the second arm has an evident mechanical play bringing it from rest position to horizontal position.



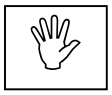
WARNING:
Checks must be performed before any operating session.
In case of irregularities or failures, the operator shall contact Technical Service.

In order to preserve the equipment's original features, preventive maintenance must be effected once a year by a authorised engineer.



WARNING:
Preventive and/or corrective interventions may be performed by authorised personnel by Villa Sistemi Medicali or its representative.

During this maintenance phase the equipment's functional performance is checked and repaired if required, following the instructions provided in paragraphs 7.2 and chapter 8.



WARNING:
In case of components replacement, use only original spare parts.

7.2 Arms regulation

NOTE:
Arms regulation does not require removal of tubehead. In case this operation is considered useful or necessary, before removing tubehead bring scissors arm in closed position and secure it with safety fixing device. This operation is necessary to avoid damage to people and to the arm.

7.2.1 Square arms

After a certain time, arms balancing springs may sag.
Should this happen, tubehead will no longer be balanced in all positions and spring calibration will be required.

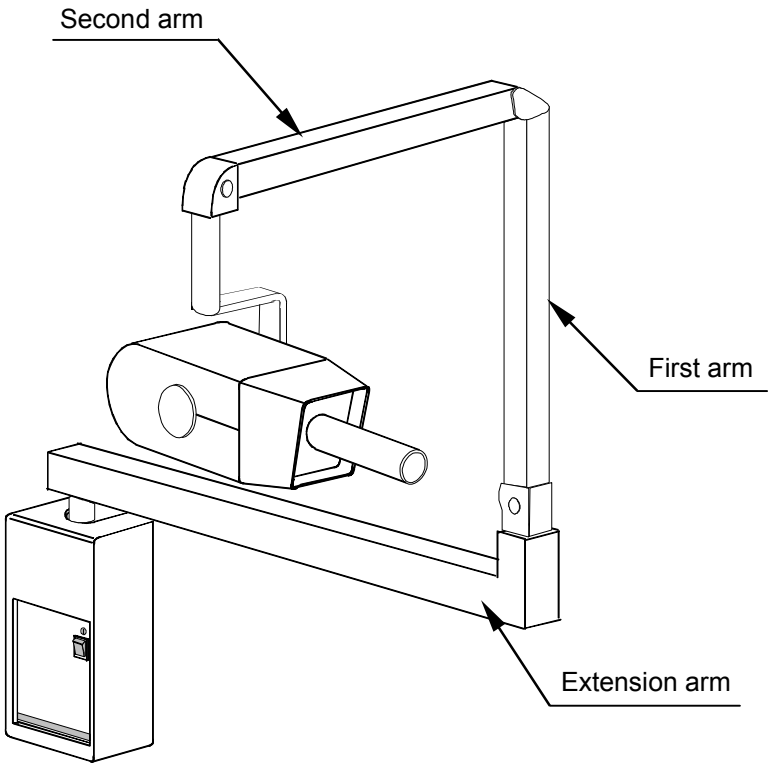


Figure 7-1

- ## Balancing of second arm

1. Keep first arm in vertical position.
2. Remove screw and pivot, then lift carter to allow regulation operations.
3. Insert an hexagonal pivot - whose diameter must not be over 4mm - in the holes on spring regulation thimble. Rotate pivot clockwise in case tubehead tends to lower, or counter-clockwise if tubehead tends to rise.
4. Once correct balancing has been found, place pivot back in the original position and secure it with the relevant screw.

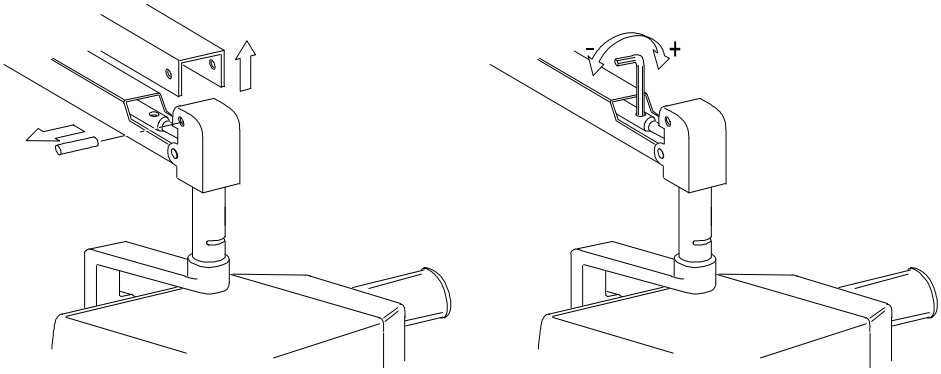


Figure 7-2

- **Balancing of first arm**

Should balancing of first arm be necessary:

1. Place arm in horizontal position.
2. Lift arms assembly so as to reduce load on pivot, then remove screw and pivot.

NOTE:
At this stage the arm is no longer balanced; therefore, be very careful when proceeding with the operation.

3. Lift carter to allow regulation operations.
4. Insert an hexagonal pivot - whose diameter must not be over 4mm - in the holes on spring regulation thimble. Rotate pivot clockwise in case tubehead tends to lower, or counter-clockwise if tubehead tends to rise.
5. Once correct balancing has been found, place pivot back in original position and secure it with the relevant screw.

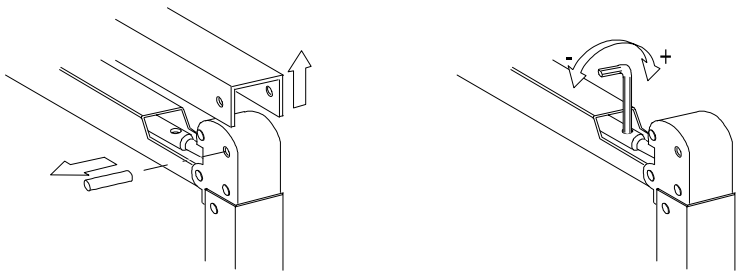


Figure 7-3

- **Extension arm friction adjustment**

  Adjust friction by means of a 4mm hexagonal wrench and check arm rotation.

NOTE:
The purpose of friction is also to avoid disconnection of scissors arm; hence it must not be totally loosened except in the case of arms replacement.

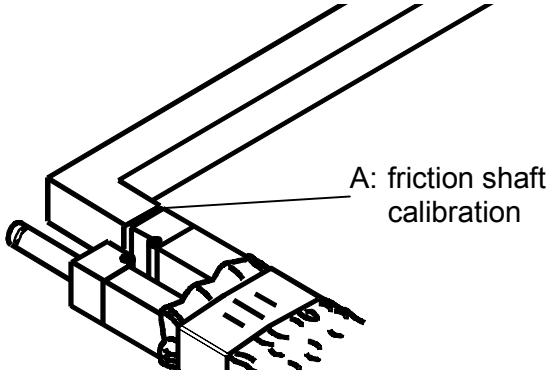


Figure 7-4

7.2.2 Oval arms

Arms regulation may be necessary in the following cases:

- the simultaneous movement of scissors and extension arms is not ergonomic; in this case, operate on extension arm friction regulation
- scissors arm is not perfectly balanced; in this case, operate on spring regulation.

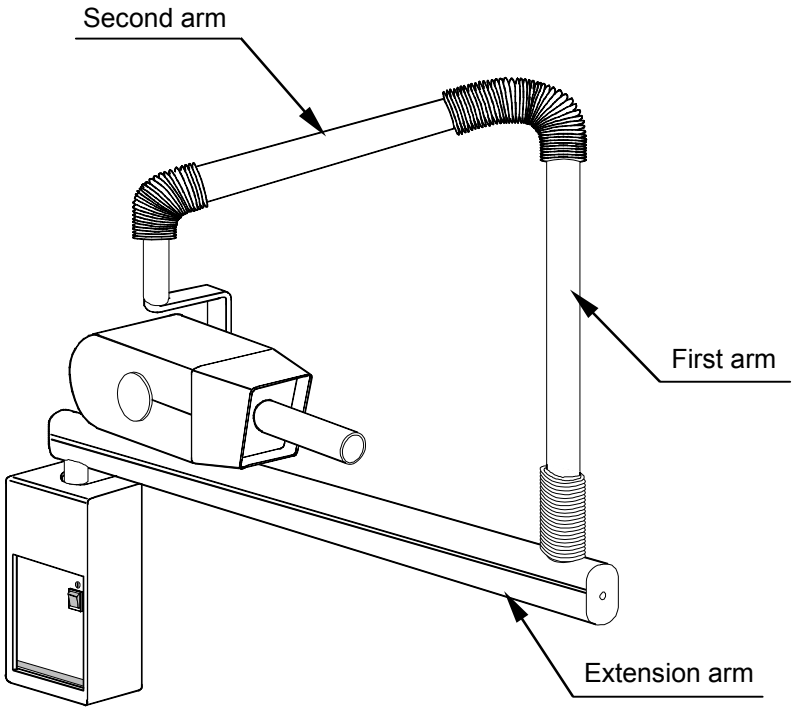


Figure 7-5

- ## Extension arm friction regulation

1. Remove logo label located on extension arm cover.
2. Remove extension arm front cover by loosening the relevant screw.
3. Regulate friction by means of a 4mm hexagonal wrench and checking arm rotation.

NOTE:
The purpose of friction is also to avoid disconnection of scissors arm; hence it must not be loose.

4. Place cover and logo label back in the original position.

Figure 7-6

- ## Scissors arm regulation: second arm

To proceed to scissors arm regulation, proceed as follows:

Friction regulation (A)

1. Move bellows aside to uncover friction.
2. Operate with one 10mm wrench and one 13mm wrench, regulate friction by rotating the 13 mm wrench ¼ of a turn at a time
3. Once regulation has been completed, place bellows back in the original position.

Spring regulation (B)

In case friction regulation is not sufficient, operate on spring regulation system:

1. Move bellows aside and bring arm in horizontal position
2. By means of an 8mm hexagonal wrench rotate clockwise in case arm tends to lower with respect to release position, or counter-clockwise if arm tends to rise
3. Once regulation has been completed, place bellows back in the original position.

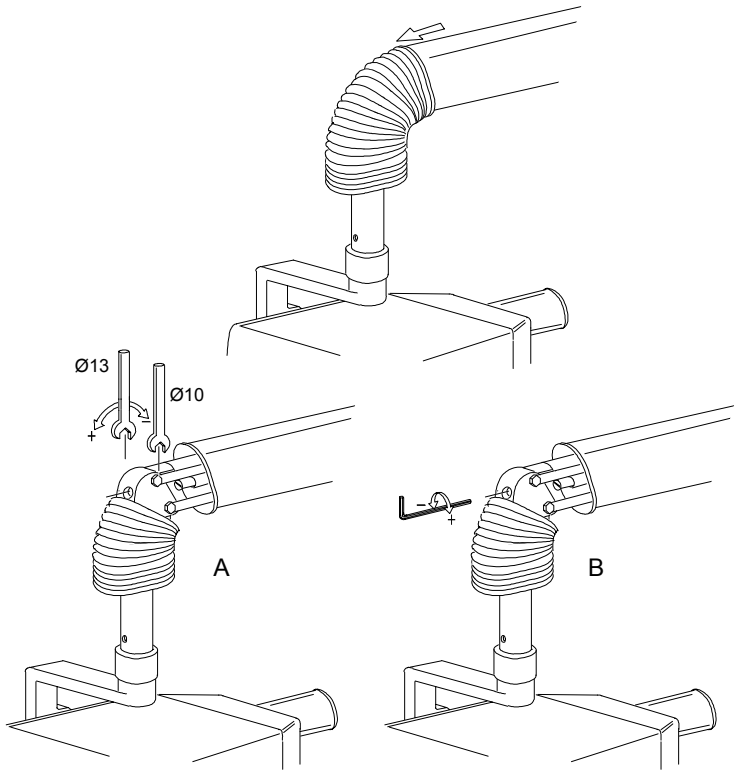


Figure 7-7

- ## Scissors arm regulation: first arm

In case first arm regulation is required:

Friction regulation

1. Move bellows aside and bring second arm in vertical position;
2. Operate with one 10mm wrench and one 13mm wrench, regulate friction by rotating the 13mm wrench ¼ of a turn at a time;
3. Once regulation has been completed, place bellows back in the original position.

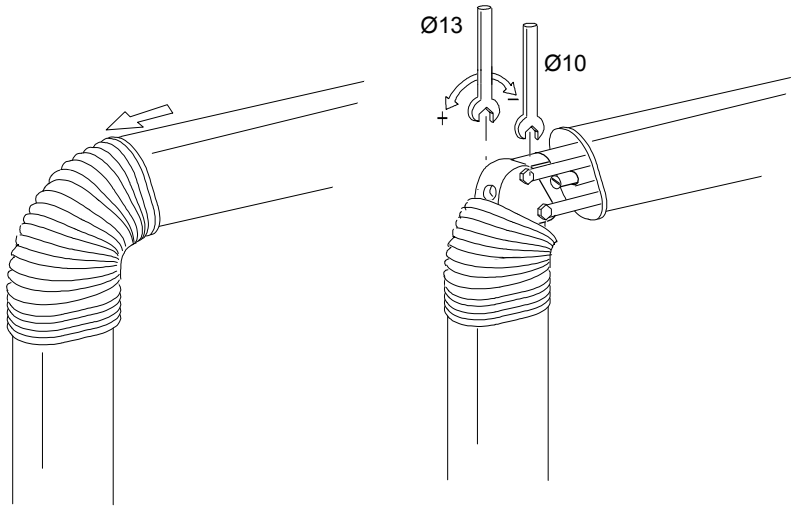


Figure 7-8

8. SET-UP AND ERROR MESSAGES

8.1 Set-up

In case of replacement of the electronic boards of the timer or of the whole tubehead, the system will require the re-adjustment of some parameters by means of the «PARAMETER SET-UP» procedure.

NOTE:
During the Set-up procedure the LED's of the keyboard will not be activated.

Starting from the condition of system switched off (system not connected to the mains), switch on the unit by acting on the green mains switch (I/O) located on the front panel of the timer. Wait for the end of the initial self check procedure and that Software revision appears on the display (e.g. 1.05). While the display shows the software revision, keep pressed contemporaneously the increment  and decrement  keys for five seconds.
The activation of the Set-up program is confirmed by the system through the message **"Pr0"** shown on the display for 2 seconds.

When the 2 seconds time is elapsed, the message **"Pr0"** disappears and the system shows the message **"P01"**, corresponding to the first parameter of the set-up procedure.

WARNING:
During any step of the Set-up procedure, the storing of the selections is achieved by pressing the "system enabled" key  .

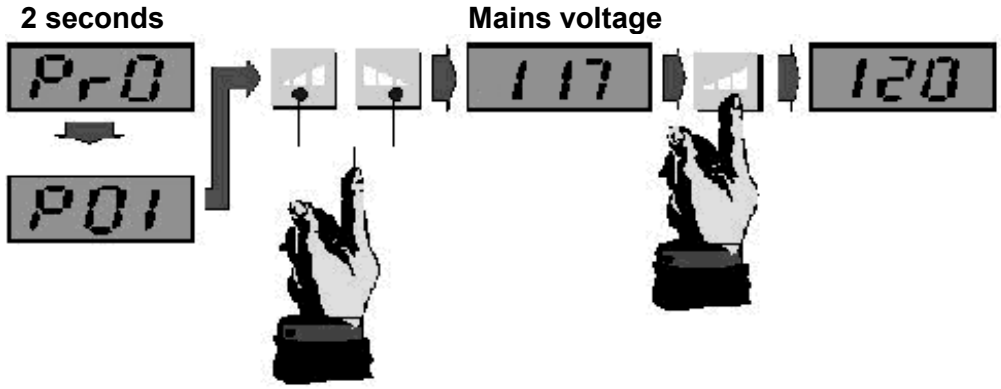
After pressing this key, the system stores the actual selection and moves to the next parameter to be set.

NOTE:
The modification of the parameter actually selected has to be carried out within 5 seconds from the selection of the parameters itself. If the 5 seconds time elapses before the confirmation key has been pressed, the system will show again on the display the number of the parameters «PXX» to be checked/modified.

Within the set-up program, the procedure to access and modify any of the parameter is the following:

1. when the display shows the message **"Pxx"** press contemporaneously the keys «increment» and «decrement» to activate the parameter to be modified.
2. to modify the parameter selected press the «increment» or «decrement» keys until the display shows the needed value.

Example: selection of the line voltage

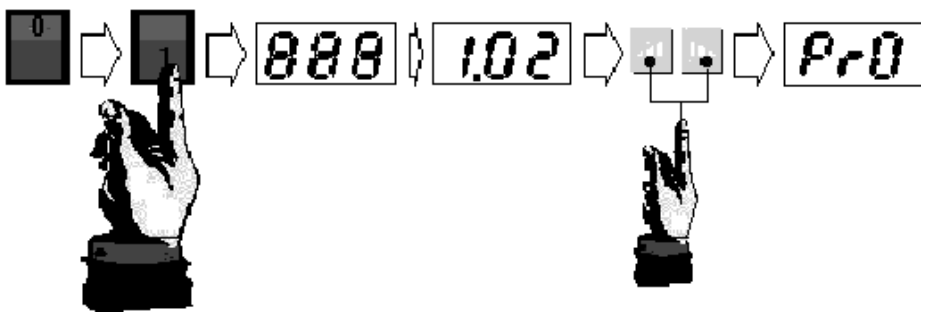


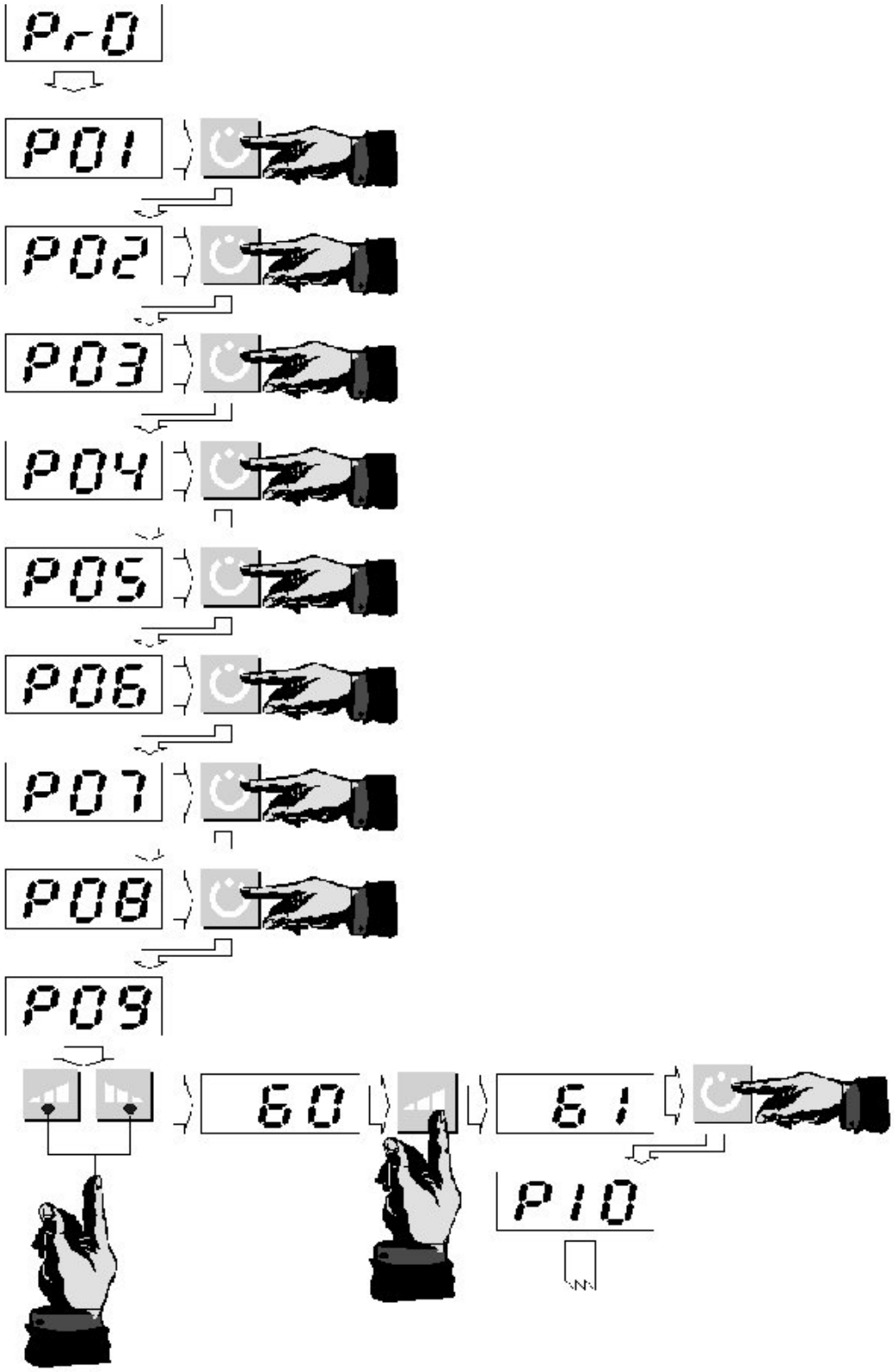
In addition, if only one or few of the parameters need to be modified, press several times the key until the parameter to be modify is reached, without entering into the adjustment of all the other parameters.

Example: ***1) Activation of Pause (P09)***

2) Selection of the manual exposure time (P13).

The following two pages show the sequence of actions to perform in order to carry out the programming of the two parameters P09 e P13, without entering all the other parameters (QUICK PROGRAMMING SEQUENCE).





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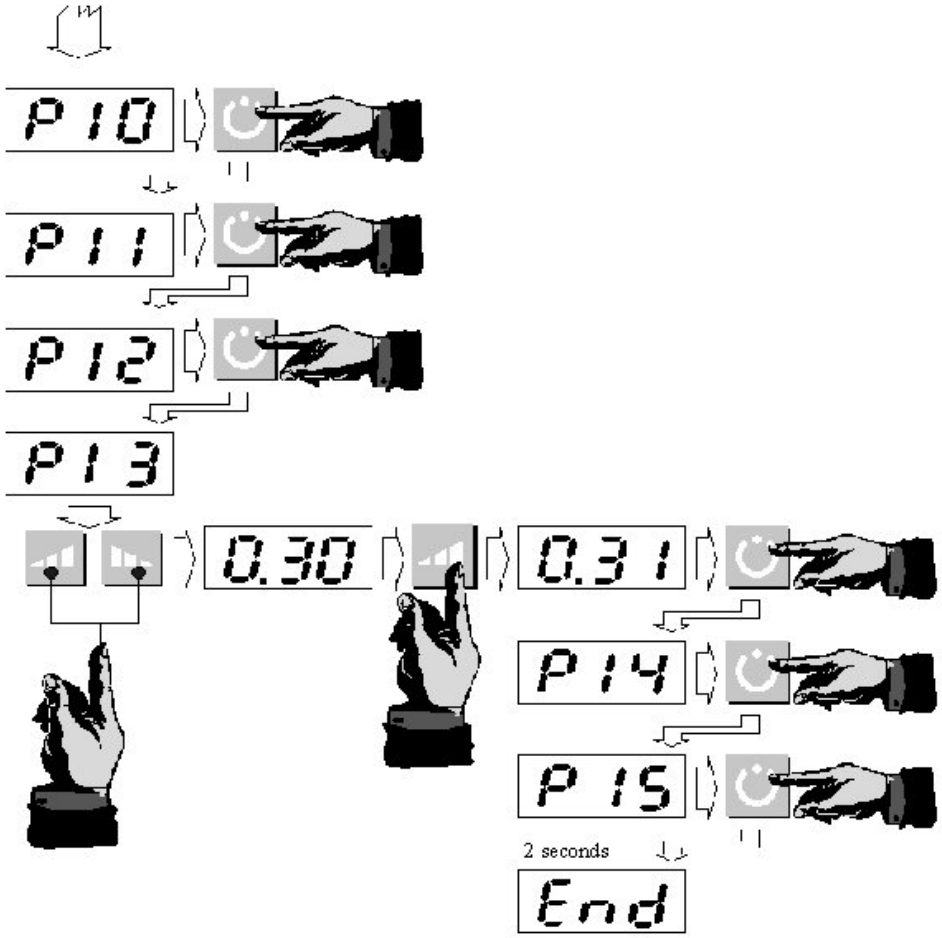

P10
P11
P12
P13
0.30
0.31
P14
P15
2 seconds
End

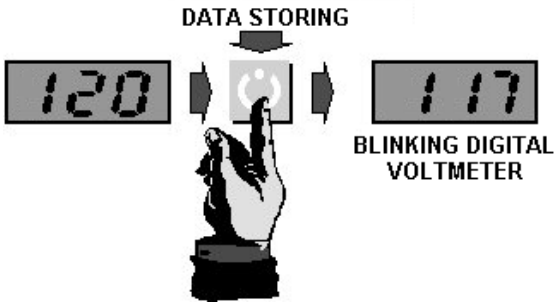
8.1.1 Accessing and setting parameters

P01 Selection of the line voltage:

the value chosen in this selection is used as internal reference to correct the exposures time depending on the actual mains voltage. Possible selections are 120Vac, 220Vac, 230Vac and 240Vac; make sure that the selected voltage corresponds to the mains voltage (120Vac).

NOTE:
Whenever the value selected differs from 120V, the system will not comply with 21 CFR.

After making proper selection, press the ; in this case (**P01**), after pressing the key, the display will show (blinking mode) the actual mains voltage read by the internal voltmeter of the unit (± 1,5%); in this way, the system allows the operator to check for possible line voltage fluctuations.



Next steps allow to adjust the reading of the internal voltmeter of timer by using an external DVM:

7. Connect to the mains input terminal block of the timer a digital voltmeter (DVM) able to read the true RMS value, set to read alternate voltage (AC).

8. Press contemporaneously the keys and for at least two seconds. This action resets possible correction previously introduced.

9. Acting on keys and/or , match the reading of the internal voltmeter of the timer with the reading of the external DVM.

10. Once proper adjustment has been carried out, press the key to confirm. The display will then move to the second step of the set – up procedure showing the message **"P02"**.

P02 Selection of the driving mode of the tubehead:

parameter not to be modified

The value set must be **[P=1]**.

NOTE:
Selection of values different from the one shown above will affect the proper functioning of the unit and will affect the exposure parameters set by the operator. Therefore, modification of the setting of "**P02**" is forbidden.

Press the key to proceed with the next settings.

P03 Pre-heating time:

parameter not to be modified.

The value set must be **[0.25]** (seconds).

NOTE:
To guarantee proper functioning of the system, modification of the parameter "**P03**" is forbidden, as different settings will affect the reliability of the tubehead.

Press the key to proceed with the next settings.

P04 Booster time:

parameter not to be modified

The value set must be **[0.04]**.

NOTE:
To guarantee proper functioning of the system, modification of the parameter "**P04**" is forbidden, as different settings will affect the reliability of the tubehead.

Press the key to proceed with the next settings.

P05 Minimum exposure time:

this selection allows the setting of the minimum exposure time (in seconds). The minimum value can be chosen among the following times:

0.04 / 0.06 / 0.08 / 0.10 / 0.12 / 0.14 / 0.16 / 0.18 / 0.20

NOTE:
If the minimum exposure time selected is 0.02, the system will not comply with the 21 CFR.

Proper minimum value to set is **[0.04]** (seconds).

Press the key to proceed with the next settings.

P06 Maximum exposure time:

this selection allows the limiting of the exposure times available to the user to the maximum value of 2 seconds.

- setting **[E=0]** all the exposure times shown in the next table will be available to the operator
- setting **[E=1]** the maximum exposure time is 2 seconds.

0.04 - 0.06 - 0.08 - 0.10 - 0.12 - 0.14 - 0.16 - 0.18 - 0.20 - 0.23 - 0.25 - 0.30 - 0.32 - 0.36 - 0.40 - 0.45 - 0.50- 0.54 - 0.60 - 0.63 -0.70 - 0.80 - 0.90 - 1.00- 1.25 -1.30 - 1.40 - 1.60 - 2.00 **- 2.50 - 3.00 - 3.20**

Press the key to proceed with the next settings.

P07 Selection of the compensation factors of the exposure times:

parameter not to be modified.

The set value must be **[2]**.

NOTE:
Whenever a value different from 2 is selected, the system will not comply with the 21 CFR.

Press the key to proceed with the next settings.

P08 Selection of the compensation factor of the pre-heating time:

The set value must be **[1]**.

NOTE:
Whenever a value different from 1 is selected, the system will not comply with the 21 CFR.

Press the key to proceed with the next settings.

P09 Activation of the pause:

this parameter is a factor K (admitted values from 0 to 80) which, multiplied by the actual exposures time, gives the minimum pause between exposures.

PAUSE BETWEEN EXPOSURE = Exposure time * K

The default value is **[60]** (sixty times the exposure time).

NOTE:
To allow proper cooling of the tubehead between exposures, the minimum value to be set is 60.

Press the key to proceed with the next settings.

P10 Time between enabling of exposure and exposure:

is the maximum time (in seconds) available to the operator between the enabling of an exposure (obtained by pressing the key) and the execution of the exposure itself. This parameter ranges from 10 to 30 seconds (1 second step).

The default value is **[15]** seconds.

Press the key to proceed with the next settings.

P11 Selection of the tubehead version (65/70KV):

this parameter allows proper setting of the unit according to the tubehead to be connected (65 o 70kV).

The default value is **[70]** (Explor-X 70).

NOTE:
Whenever a value different from 70 is selected, the system will not comply with the 21 CFR.

Press the key to proceed with the next settings.

P12 Enabling of digital radiography:

this selection allows the activation of the digital functioning mode, which is in turn linked to the use of the Digital selection key.

Setting **[d=0]** the digital functioning mode is disabled; therefore, pressing the Digital selection key DIX will not cause the activation of the relevant LED.

Setting **[d=1]** instead, activates the digital functioning mode. After this setting is done, the system allows the operator to automatically adapt the exposure times (shortening) to digital acquisition devices, upon pressure of the relevant activation key DIX.

Press the key to proceed with the next settings.

P13 Setting of the default exposure time:

this selection sets the default exposure time which will be proposed to the operator once he enters the manual functioning mode. The time ranges from 140 to 500 msec, with the following steps:

0.14 / 0.16 / 0.18 / 0.20 / 0.23 / 0.25 / 0.30 / 0.32 / 0.36 / 0.40 / 0.45 / 0.50

The default value is **[0.30]** (seconds).

Press the  key to proceed with the next settings.

P14 Resetting of the exposure counter:

this selection allows the resetting of the internal exposure counter.
First the system shows the digits relative to the «thousand», then it shows the digits relative to the values from 0 to 999.

To reset the counter act as follows:

1. press the X-ray push button and check that the number shown on the display starts blinking
2. within 5 seconds, press again the X-ray push button and check that the display stops blinking and shows **"000"**: this indicates that the «thousand» digit has been reset
3. press the «decrement» key and act as above to reset the «hundred» digits.

Press the  key to proceed with the next settings.

P15 Enabling or disabling ready button:

this programs the use/non use of the READY button.

***A=1** = use of READY button as programmed in P10.

***A=0** = disables READY button.

Press «increase» button then adjust increase decrease to desired program.

Press the  key to confirm and move to the next setting.

This will also display END as programming is now complete.

Next table shows the ranges of the programmable parameters

Display	Parameter	Default	Note
P01	Selection of the line voltage	120	*
P02	Selection of the driving mode of the tubehead	P=1	*
P03	Pre-heating time	0.25	*
P04	Booster time	0.04	
P05	Minimum exposure time	0.04	*
P06	Maximum exposure time	E=0	*
P07	Selection of the compensation factors of the exposure times	002	*
P08	Selection of the compensation factors of the pre-heating time	001	*
P09	Activation of the pause	60	*
P10	Time between enabling of exposure and exposure	15	
P11	Selection of the tubehead version (65/70 kV)	70	*
P12	Enabling of digital radiography	d=0	
P13	Setting of the default exposure time	0.30	
P14	Resetting of the exposure counter	///////	
P15	Enabling of the «System enabled» key	A=1	*

WARNING:
The parameter signaled by "*****" on the previous table must be left unchanged to preserve system's functionality and comply with 21 CFR

8.2 Error messages

AP TIME X and TIME X timers are equipped with a self-diagnosis function which continuously monitors the machine and the relevant safety circuits.
In case a problem is encountered, the machine shows an error message, to alert the operator. There are three different categories of error messages:

- errors occurred during the activation phase, which requires the intervention of the service
- resettable errors occurred during the activation phase (do not require service)
- errors occurred during the X-ray emission phase.

The first of the three typologies of errors occurs at switch on; in this case the system is stopped in order to prevent any further action. This status can only be reset by switching off and then back on the machine or by following the instructions provided in the next pages. The corresponding error codes are from "**E01**" to "**E09**".

The error conditions that can be reset usually inhibit some of the functions of the machine, leaving the others operative. The corresponding error messages are from "**E11**" to "**E13**".

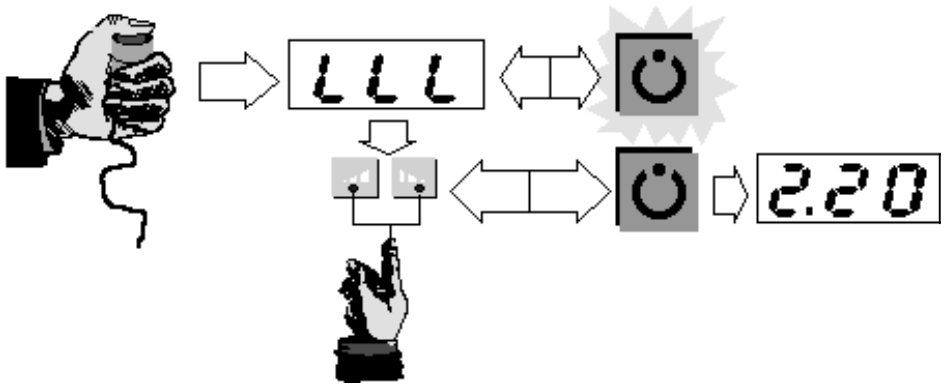
Errors found during the X-ray emission phase can bring the machine in a status where further exposures are not allowed. This typology of anomalies has error codes from "**E20**" to "**E25**".

Refer to paragraph 8.4 for further details on any of the three categories of error messages mentioned above.

NOTE:
Erratic intervention of error messages (i.e. display signal error number different from one time to another) can be due to a bad connection between power and logic board. Check the correctness of the flat cable connecting X1 on the power board with X4 on the logic board; verify the complete insertion and eventually change the flat cable.

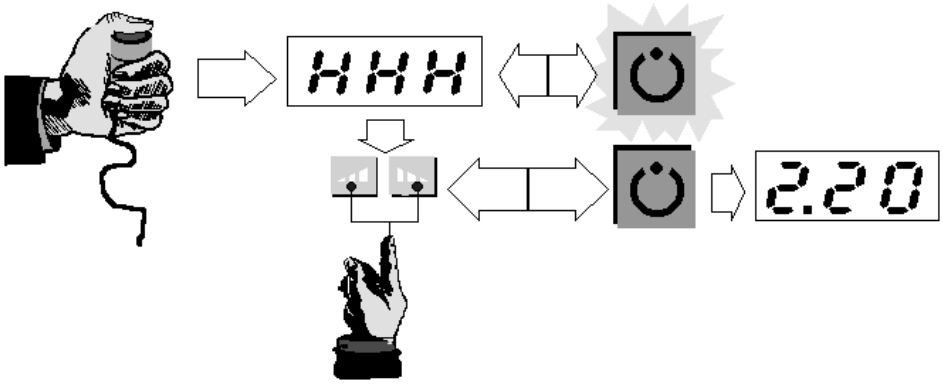
- **Input line voltage below rated voltage by 12.1%**

  Before performing the exposure a check of the input line voltage is performed. If voltage is below rated voltage by 12.1% , the display shall show the code "LLL" combined to glowing of the green operation LED. To reset this alarm, press the "INCREASE" or "DECREASE" button.



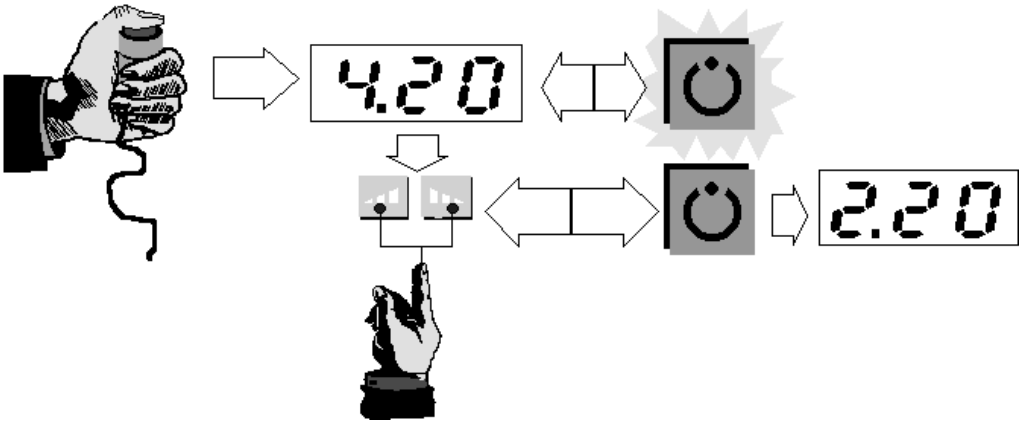
- **Input line voltage above rated voltage by 12.1%**

  Before performing the exposure a check of the input line voltage is performed. If voltage is above rated voltage by 12.1% , the display shall show the code "HHH" combined to glowing of the green operation LED. To reset this alarm, press the "INCREASE" or "DECREASE" button.



- **Calculated exposure time above 4 seconds**

  In the cycle-Start phase (X-ray button depressed), the actual exposure time is calculated according to variations in the line voltage. If the time detected is above 4 seconds, the display will show the value of calculated time (e.g. 4.20 seconds) and the green operation LED will simultaneously glow. To reset this alarm, press the "INCREASE" or "DECREASE" button.



NOTE:
In case of a Software problem, a safety timer is envisaged at the hardware level, which stops X-ray emission after a maximum of 5.5 seconds.

8.3 Replacing the tubehead

WARNING:
Before proceeding to tubehead replacement operations, close and tie the two scissors arm sections together.
Non-compliance with these instructions leads to serious assembly difficulties as well as to possible damages to the installation engineer and the arm itself.

1. Remove safety screw on the joint
2. Lift joint protection cover until the hole for insertion of the safety elastic ring is visible. Insert a pivot - whose diameter must not exceed 3mm - into the safety screw hole, inserting it in the hole on the joint. The protection cover is consequently kept lifted, thus showing the safety ring.
3. Holding the tubehead with one hand, remove the safety ring.
4. Gently remove the tubehead, rotating it if necessary.
5. Install the new tubehead proceeding to the operations already described for tubehead mounting (see paragraph 6.4).

NOTE:
Following tubehead replacement, it may be necessary to reset the exposures counting device (see chapter 8, "**P14**" parameter).

8.4 Troubleshooting

8.4.1 Timer does not function.

WARNING:
CPU BOARD AND POWER BOARD ARE FACTORY MATCHED. NEVER ATTEMPT TO REPLACE AT SINGLE BOARD LEVEL, AS THIS ACTION WILL IMPAIR THE SYSTEM PERFORMANCE.

- **The main switch does not glow up**

  The line voltage is not present; check input line voltage.

- **The main switch glows but the display does not light up**

  Look at the LED H1, located on the lower right side of the power board:

  1. If the LED is lighted, check the fuse F4 (630 mA). If the fuse blew out, replace it. If not, check the flat cable connecting the power board with the logic board. Check the correct insertion of the cable or broken wires; eventually replace the cable.
  2. If the LED H1 is not lighted the main fuse F2 has blown out.

  If the fuse F4 continue to blow, change the timer.

- **The main fuse F2 continues to blow**

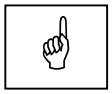
  This means that there is abnormal current absorption which possible cause can be a possible inversion of tubehead wires or a short circuit.

- **Check of correctness of wires connection**

  Look at X3 and X4 terminals and verify that labels on the wires correspond to the relevant terminal (see paragraph 6.6).

- **Check for short circuit on power board**

  1. Disconnect the tubehead cable from the power board, removing the wires marked L2/X3 and N2/X4 from the X3 and X4 connector on the power board.
  2. If available, connect a test resistor (e.g. 680Ω 100W) on the X3 and X4 connector.(*also see next note)
  3. Select an exposure time of about 2 s on the timer and perform simulated exposures (3 or 4); in fact, there is no X-ray emission due to the fact that the tubehead is disconnected.
  4. If the fuse blows, the short circuit is on the power board, so change the timer.
  5. If the fuse does not blow, check for possible error of wires labeling; to perform this operation, **be sure to secure the arm in order to avoid possible injuries to people and/or damage to the arm.**



NOTE (*):
If the test resistor is not available, the test can be conducted on the same way, but at the end of the exposure time the error message "**E23**" will be displayed. Reset the error powering off the timer.

- **Correctness of wires labeling**

  1. Close and tie the two scissors arm sections together.
  2. Remove safety screw on the tubehead joint.
  3. Lift joint protection cover until the hole for insertion of the safety elastic ring is visible. Insert a pivot - whose diameter must not exceed 3 mm - into the safety screw hole, inserting it in the hole on the joint. The protection cover is consequently kept lifted, thus showing the safety ring.
  4. Holding the tubehead with one hand, remove the safety ring.
  5. Gently remove the tubehead, rotating it if necessary.
  6. Using a multimeter set to measure ohm and a full scale value of about 1 kΩ (or low resistance), verify that the wire labeled L2/X3 is connected to the central pin of the sliding male connector at the arm end; this is assured when the meter reads a low value (near zero Ω); if the meter measures a high value, generally indicated as ɜ, this means a label inversion, so connect wire L2/X3 to X4 and vice versa, or exchange wire labels and connect as usual.

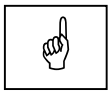
- **Check for damage on tubehead cable**

  This can be tested measuring the resistance between the two wires, using the same procedure as above; a low value means a short on the cable, so exchange the scissors arm.
  This can be tested also on the following mode:

  1. Reconnect tubehead wires to the appropriate connector, respecting the standard procedure; connect L2/X3 wire to connector X3 and wire N2/X4 to X4.
  2. Select an exposure time of about 2 s on the timer and perform simulated exposures (3 or 4); in fact, there is no X-ray emission due to the fact that the tubehead is disconnected.
  3. If the fuse blow, the short circuit is on the cable, so change the scissors arm.

- **Tubehead defective**

  If the previous checks give positive results (i.e. correct labelling and no short circuit on the arm), a possible cause is a short circuit on the tubehead. Change the tubehead, using the procedure described in the manual (see paragraph 8.3).



NOTE:
Following tubehead replacement, it may be necessary to reset the exposures counting device (see chapter 8, "**P14**" parameter).

8.4.2 Errors occurred at switch on

WARNING:
CPU BOARD AND POWER BOARD ARE FACTORY MATCHED.
NEVER ATTEMPT TO REPLACE AT SINGLE BOARD LEVEL, AS THIS ACTION WILL IMPAIR THE SYSTEM PERFORMANCE.

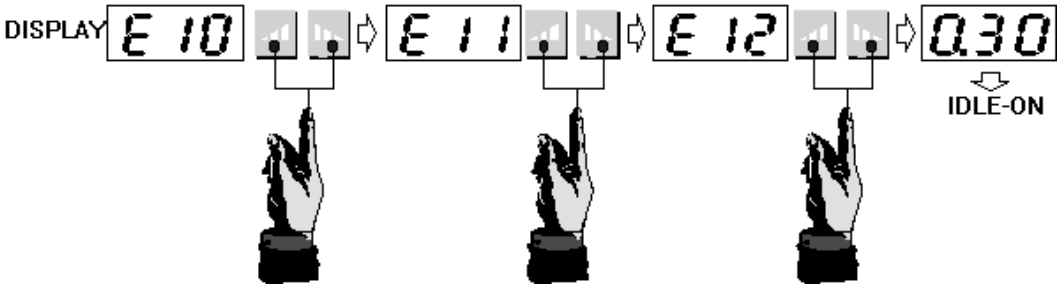
DISPLAY Signal	Meaning	Checks and actions to carry out
CHS	Checksum error of the memories (EEPROM + EPROM) and RAM test (1)	This means that a severe error occurred on the system memory, so data could be corrupted. • Switch off the timer and on again, pressing at the same time the Ready pushbutton and X-ray command. This will reset the system to default values • If the error still remain, replace the Power and Logic boards kit. **NOTE: After reset, a complete set up sequence has to be performed.**
E01	X-ray relay found activated (closed) at switch on	Severe error on the safety device. Check for possible flat cable between power and logic boards not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E02	Tubehead powered at switch on	**Switch off immediately the timer because emission can occur.** Check for possible flat cable not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E03	X-ray "primary" push button found closed at switch on	Check if the “primary” X-ray push button is pressed or shorted; in this case replace it. Otherwise replace the Power and Logic boards kit.
E04	X-ray "remote" push button found closed at switch on	Check if the “remote” X-ray push button is pressed or shorted; in this case replace it. Otherwise replace the Power and Logic boards kit.
E05	Both X-ray push buttons found closed at switch on	Check if the both X-ray push buttons are pressed or shorted; in this case replace them. Otherwise replace the Power and Logic boards kit.
E06	"System enabling" key found pressed at switch on	• Verify that keyboard connectors are well and correctly inserted on the X1 connectors on logic board. The flat cable having the longer connector has to be put on the connector nearest the logic board, while the shortest one to the other one, with the lower end terminating at pin 31. • Replace the keyboard assy. • Replace the Power and Logic boards kit if necessary.
E07	"Digital mode" key found pressed at switch on (3)	Same as Error E06 above.
E08	"Increase” key found pressed at switch on	Same as Error E06 above.
E09	"Decrease” key found pressed at switch on	Same as Error E06 above.

8.4.3 Resettable errors at switch on

If during the self-test automatically performed by the machine after switch on, a resettable error condition is met, the relevant error message remains on the display until the “Increase” or “Decrease” keys are pressed. This action brings the system to the IDLE-ON status and the display shows the default exposure time.

NOTE:
If more than one error condition is met at the same time, the different error messages can be scrolled on the display by pressing contemporaneously the keys “Increase” and “Decrease”. The system will enter the IDLE-ON status only after that the last error message has been shown on the display.

EXAMPLE:
ADULT/CHILD, SIZE and ANATOMIC TOOTH selection buttons already depressed upon Power-on (TEST) will lead to:



DISPLAY Signal	Meaning	Checks and actions to carry out
E10	ADULT/CHILD selection key found pressed at switch on	• Verify that keyboard connectors are well and correctly inserted on the X1 connectors on logic board. The flat cable having the longer connector has to be put on the connector nearest the logic board, while the shortest one to the other one, with the lower end terminating at pin 31. • Replace the keyboard assy. • Replace the Power and Logic boards kit if necessary.
E11	PATIENT SIZE selection key found pressed at switch on	Same as error E10
E12	ANATOMIC selection key found pressed at switch on	Same as error E10
E13	OCCLUSAL selection key found pressed at switch on	Same as error E10

8.4.4 Errors during exposure

DISPLAY Signal	Meaning	Checks and actions to carry out
E20	X-ray relay does not close within the given time	Check for possible flat cable between power and logic boards not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E21	The X-ray relays does not open within the given 50 msec time	**Severe error on the safety device**. **Switch off immediately the timer because emission can occur.** Check for possible flat cable between power and logic boards not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E22	The triac controlling the X-ray emission does not close within the given time (50 msec)	Check for possible flat cable between power and logic boards not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E23	The triac controlling the X-ray emission does not open within the given time (50 msec)	No load connected to the board; check the correct and complete insertion of tubehead wires. Check for possible flat cable between power and logic boards not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E24	The X-ray relay found closed when enabling the exposure cycle	The main relay K3 is found closed, so can be stuck. Check for possible flat cable between power and logic boards not well inserted. If the cable is broken, replace it; otherwise replace the Power and Logic boards kit.
E25	Triggering of the hardware timer	**The emission was terminated by the safety backup timer.** **The emission can take place immediately at power on, so any action has to be carried out with the tubehead wires disconnected**. Check for possible flat cable between power and logic boards not well inserted and eventually replace it. Reset the system; if the cause of error is still present, E02 will be signalled; in this case, replace the Power and Logic boards kit.

9. SCHEMATICS AND DRAWINGS

1. Explor-X 70 AP TIME X general connection

2. Explor-X 70 AP TIME X general connection for mobile

3. Explor-X 70 TIME X general connection

4. Explor-X 70 TIME X general connection for mobile

5. Power board layout

6. Power board schematic

7. Logic board layout

8. Logic board schematic

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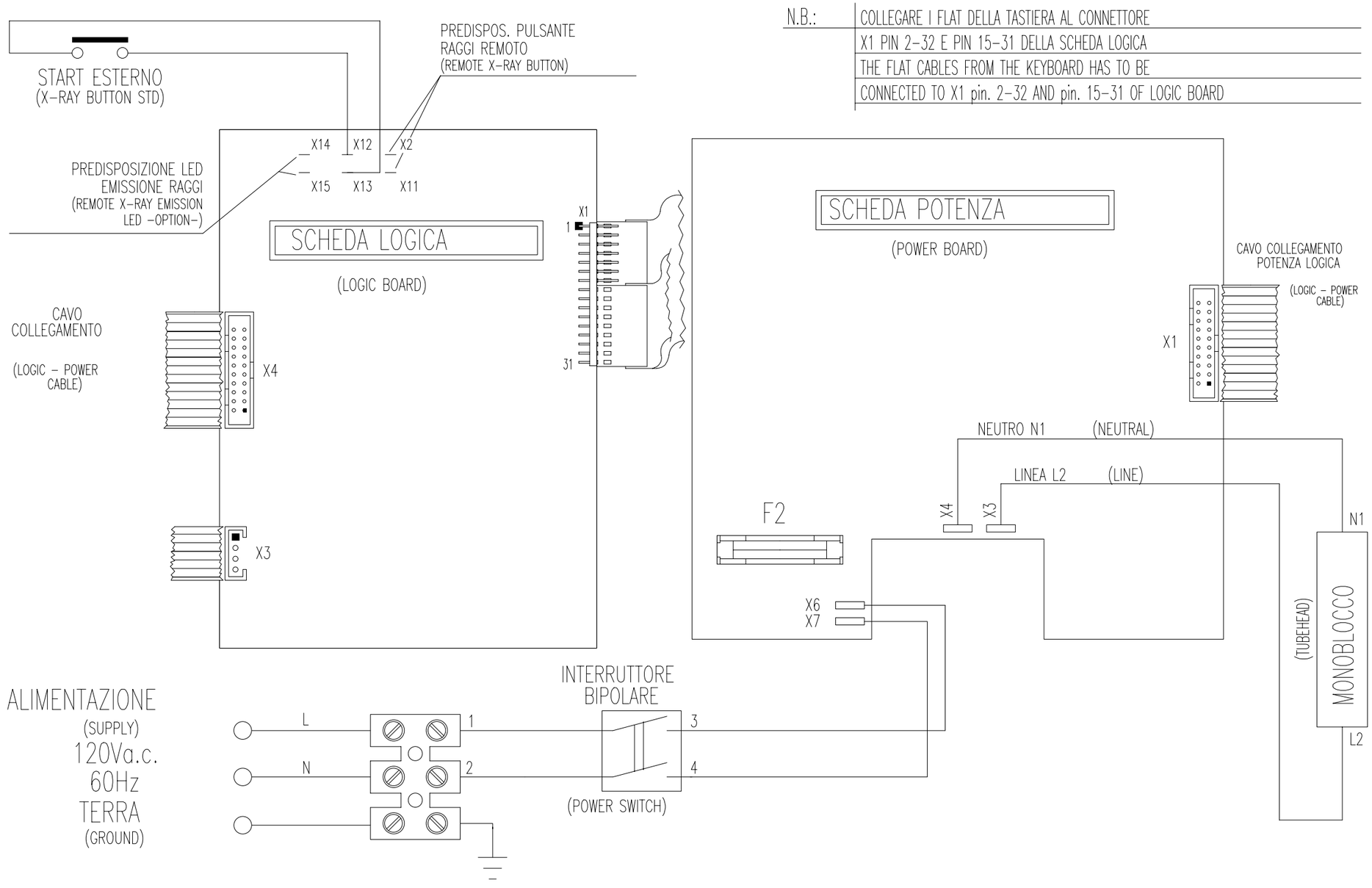

N.B.:	COLLEGARE I FLAT DELLA TASTIERA AL CONNETTORE X1 PIN 2-32 E PIN 15-31 DELLA SCHEDA LOGICA THE FLAT CABLES FROM THE KEYBOARD HAS TO BE CONNECTED TO X1 pin. 2-32 AND pin. 15-31 OF LOGIC BOARD

Explor-X 70 AP TIME X **General connection**	**1**
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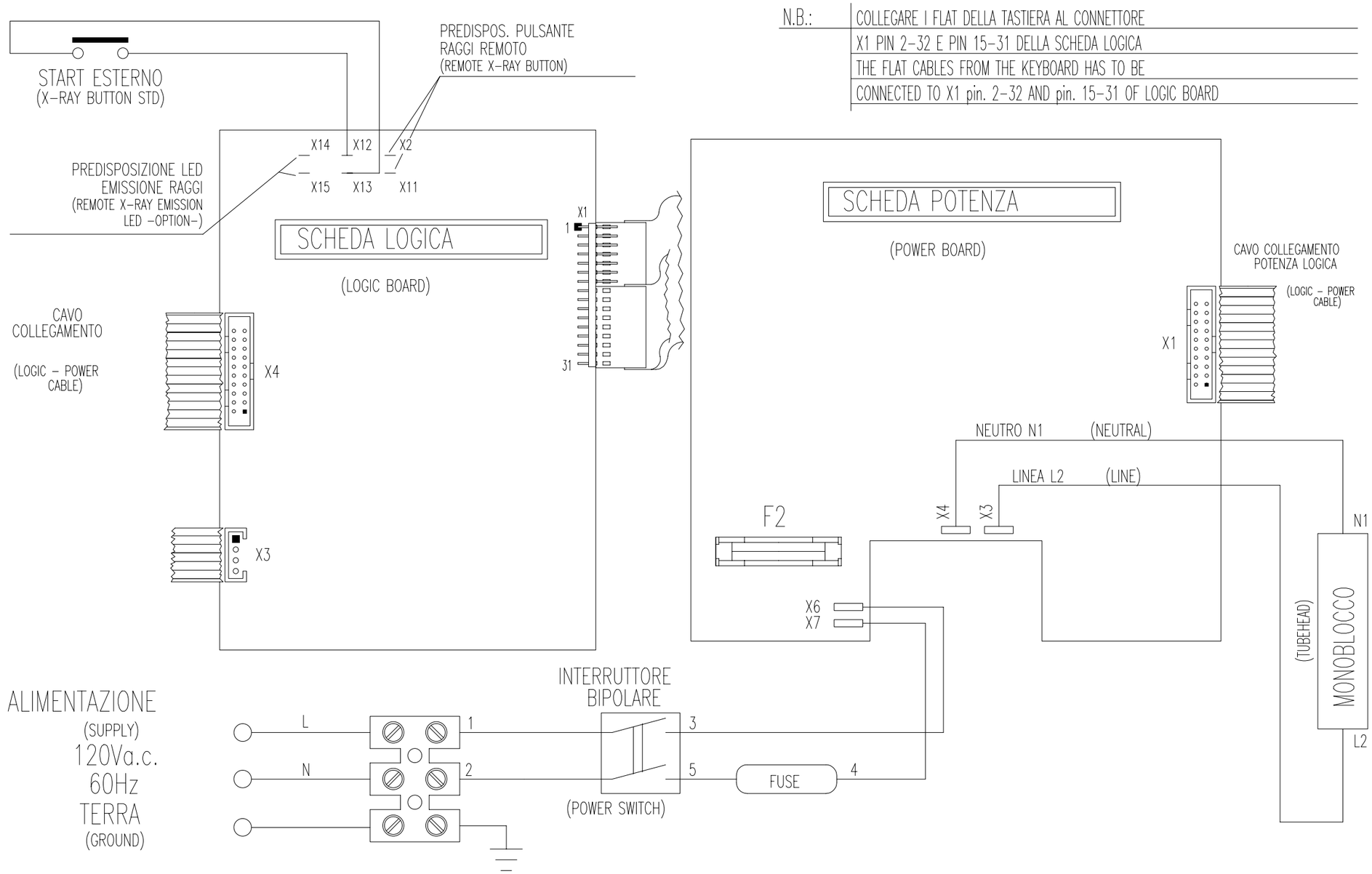
N.B.:	COLLEGARE I FLAT DELLA TASTIERA AL CONNETTORE
	X1 PIN 2-32 E PIN 15-31 DELLA SCHEDA LOGICA
	THE FLAT CABLES FROM THE KEYBOARD HAS TO BE
	CONNECTED TO X1 pin. 2-32 AND pin. 15-31 OF LOGIC BOARD



Explor-X 70 AP TIME X General connection for mobile	**2**
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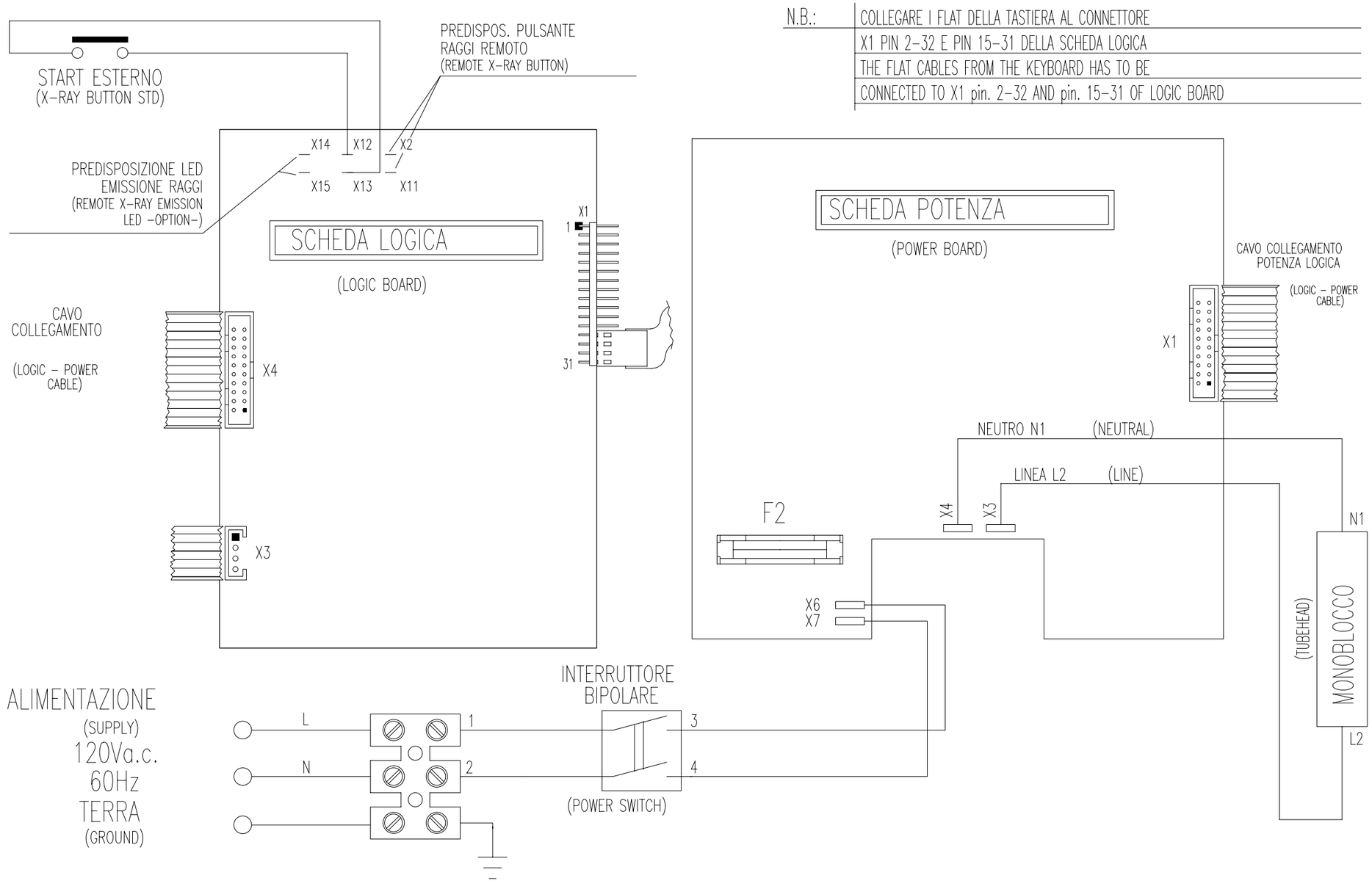
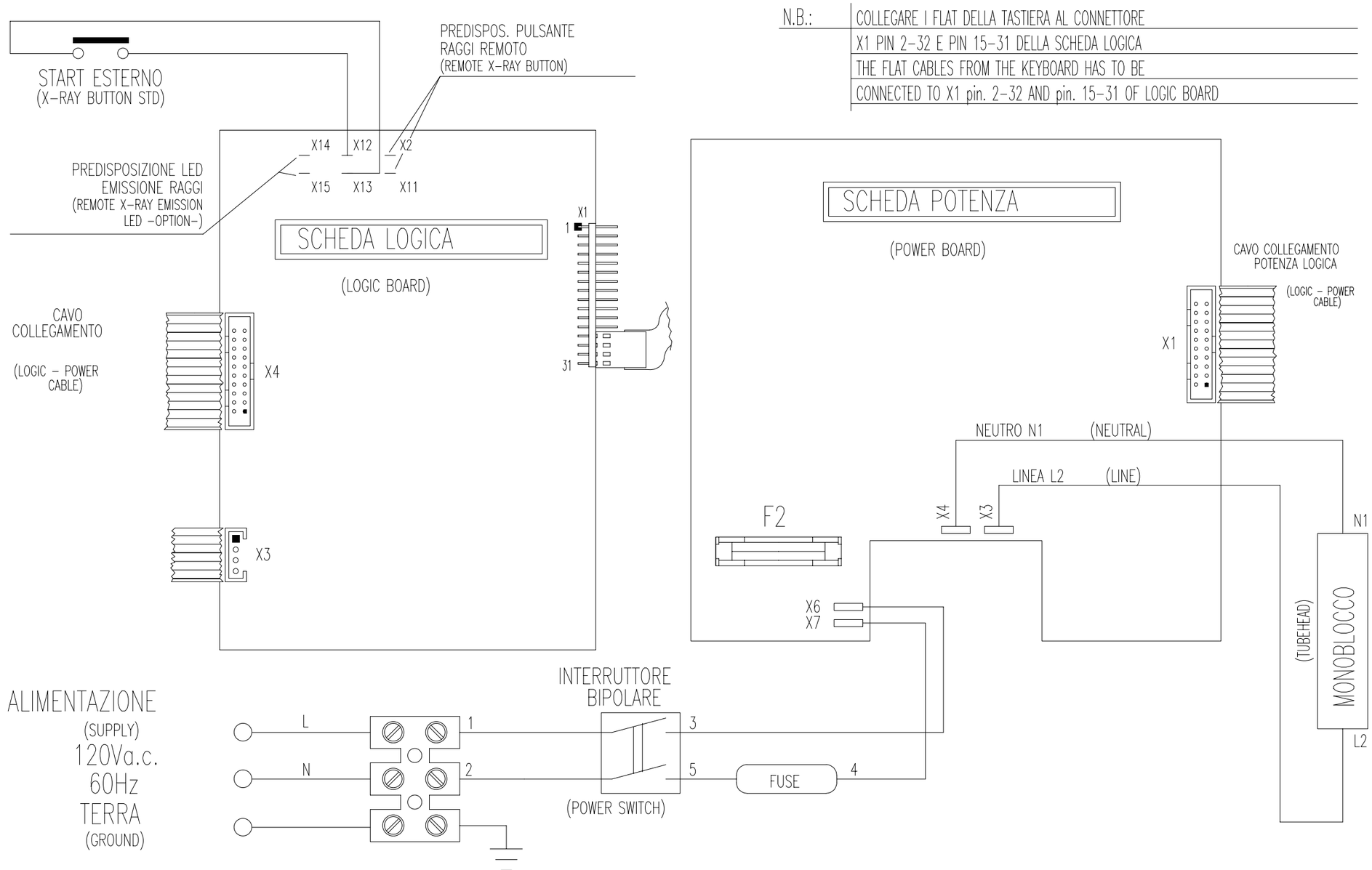


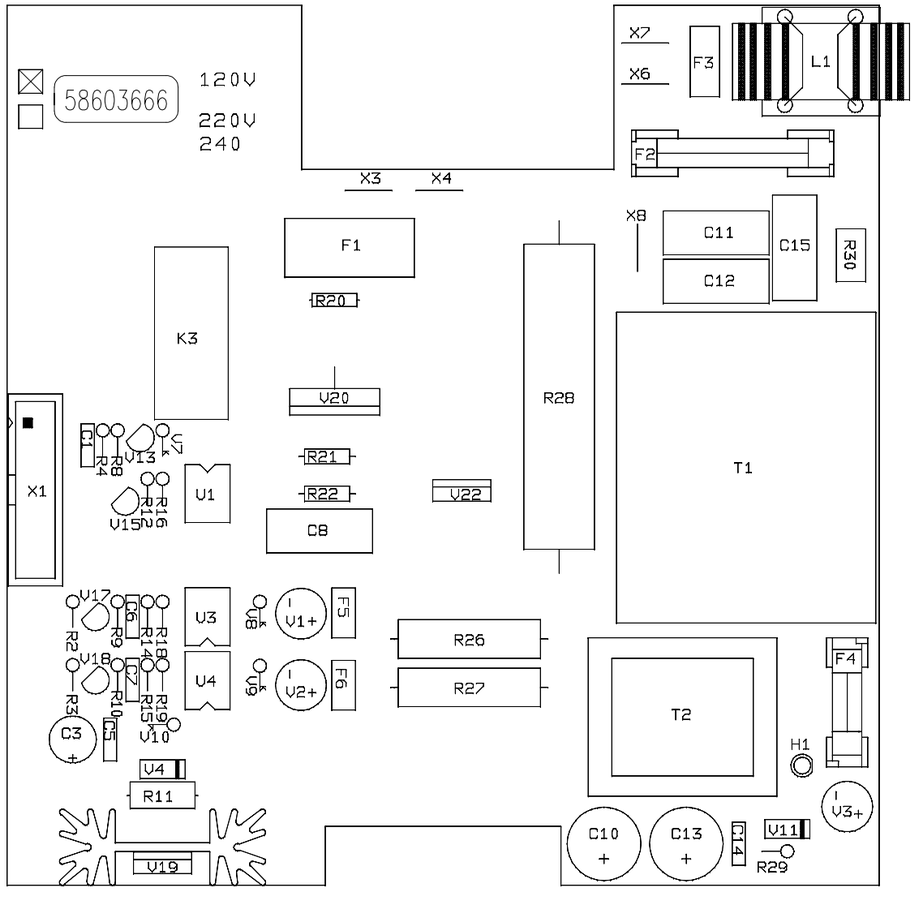
Explor-X 70 TIME X **General connection**	**3**
Code 39609059 - Rev.05	**Page 1 of 1**

N.B.:	COLLEGARE I FLAT DELLA TASTIERA AL CONNETTORE
	X1 PIN 2-32 E PIN 15-31 DELLA SCHEDA LOGICA
	THE FLAT CABLES FROM THE KEYBOARD HAS TO BE
	CONNECTED TO X1 pin. 2-32 AND pin. 15-31 OF LOGIC BOARD

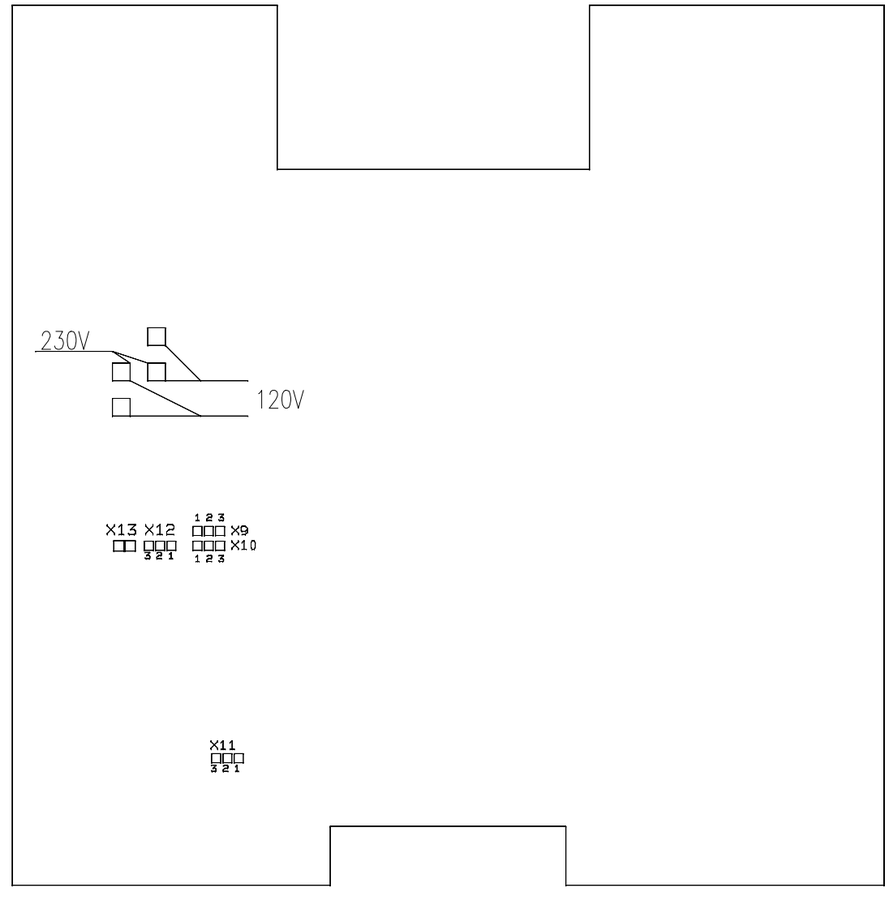


Explor-X 70 TIME X **General connection** **for mobile**	**4**
Code 39609061 - Rev.05	**Page 1 of 1**

LATO COMPONENTI
(COMPONENTS SIDE)



LATO SALDATURE
(SOLDER SIDE)



Explor-X 70 AP TIME X – TIME X Power board layout	5
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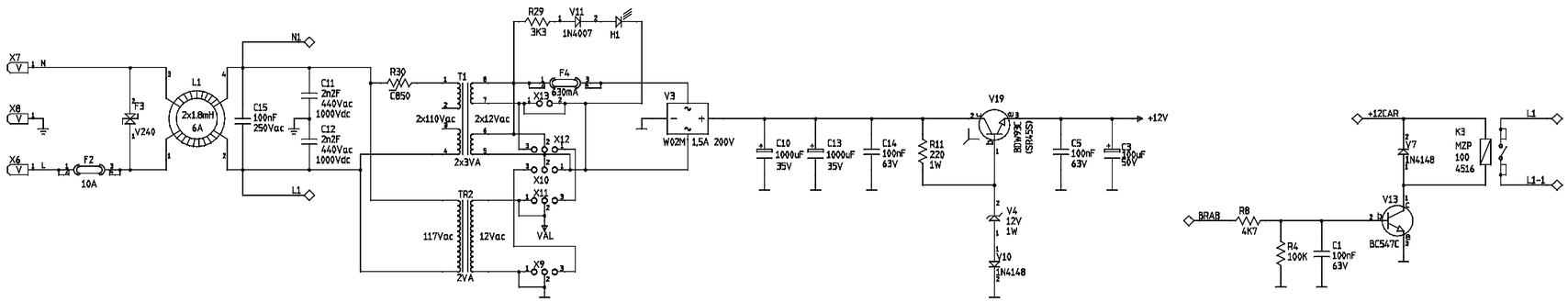
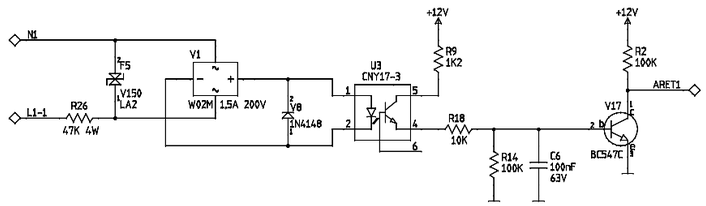
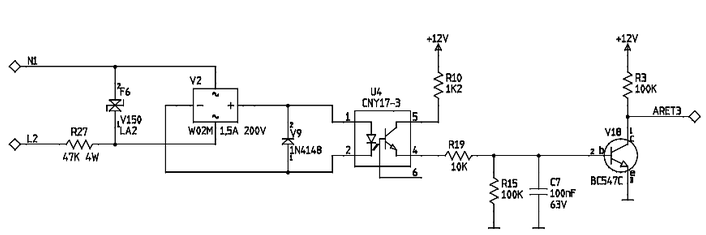
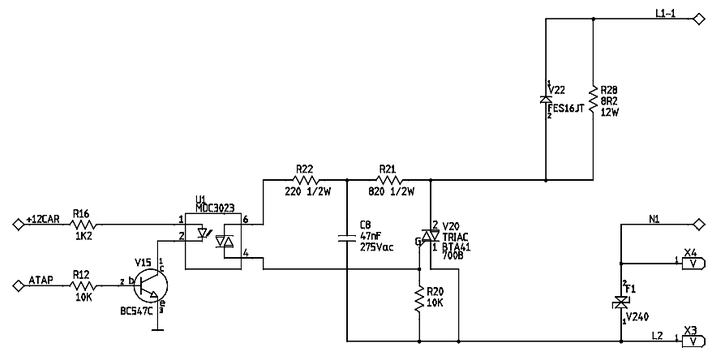
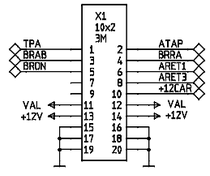






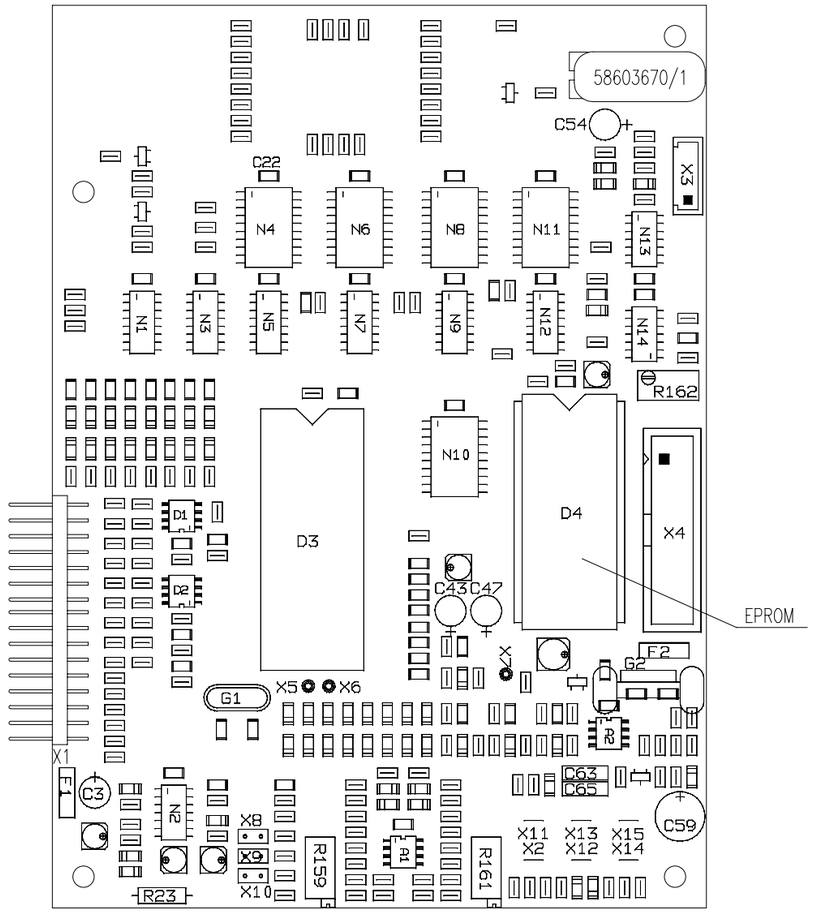


TRAFO	
NUM.GICAR	NUM.HANN
1	1
2	3
3	6
4	8
5	10
6	12
7	13
8	15

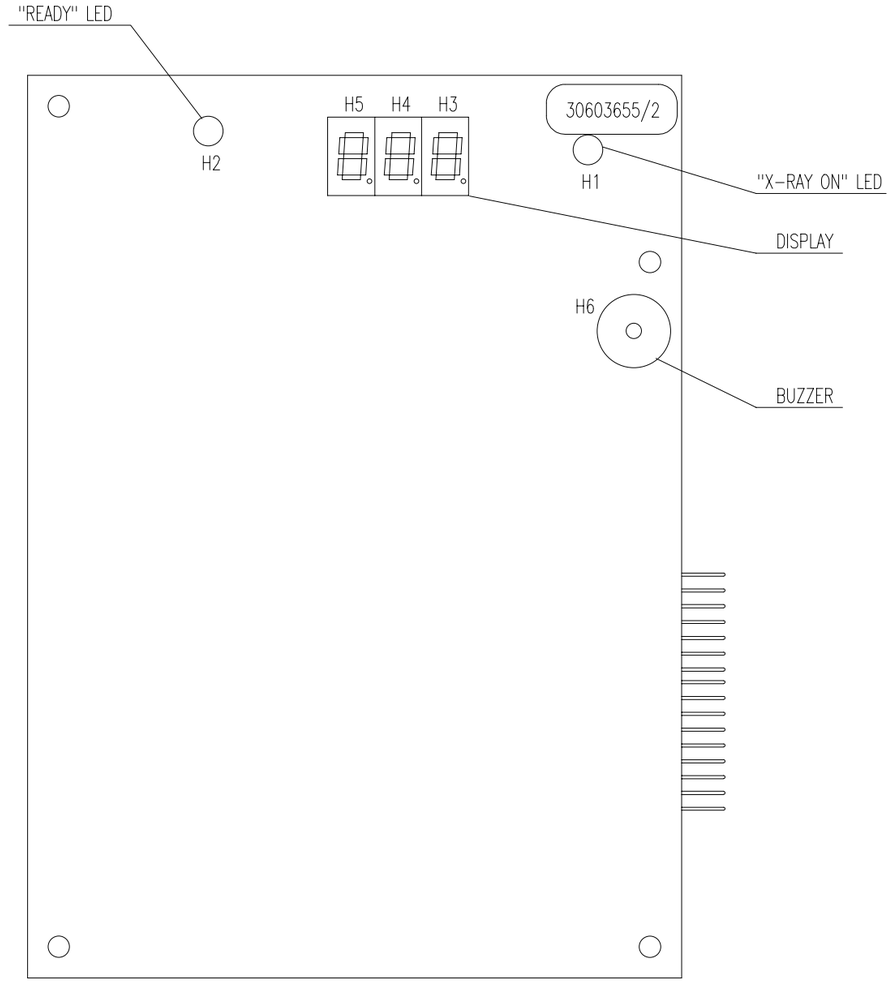


Explor-X 70 **AP TIME X – TIME X** **Power board schematic**	**6**
Code 39609082 - Rev.00	**Page 1 of 1**

LATO COMPONENTI
(COMPONENTS SIDE)

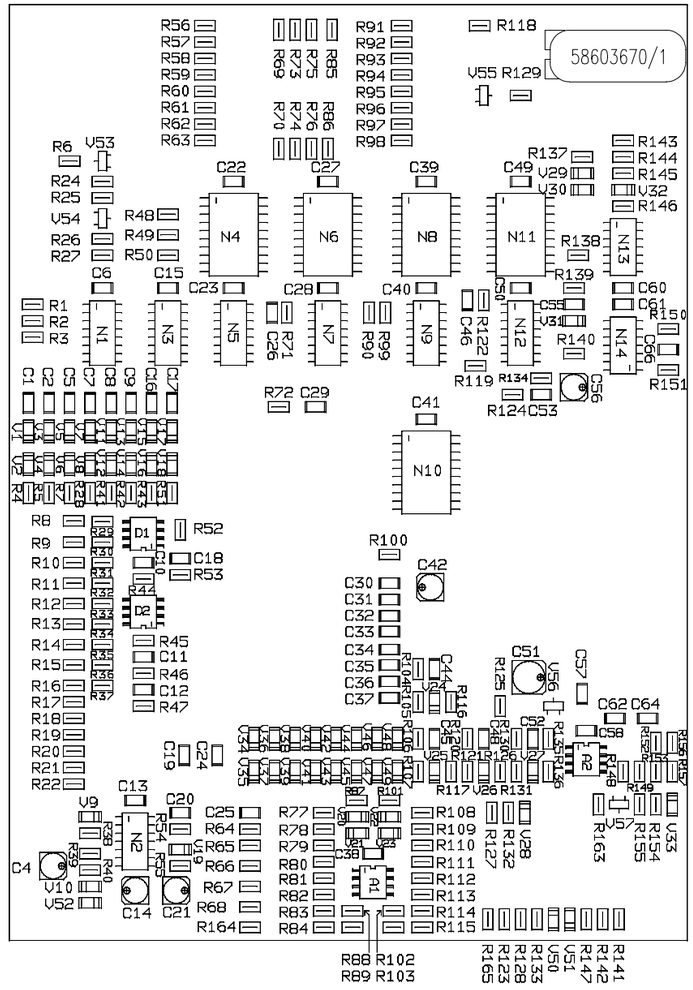


LATO SALDATURE
(SOLDER SIDE)



Explor-X 70 AP TIME X – TIME X Logic board layout	7
Code 39609077 - Rev.01	Page 1 of 2

LATO COMPONENTI
(COMPONENTS SIDE)



Explor-X 70 **AP TIME X – TIME X** **Logic board layout**	**7**
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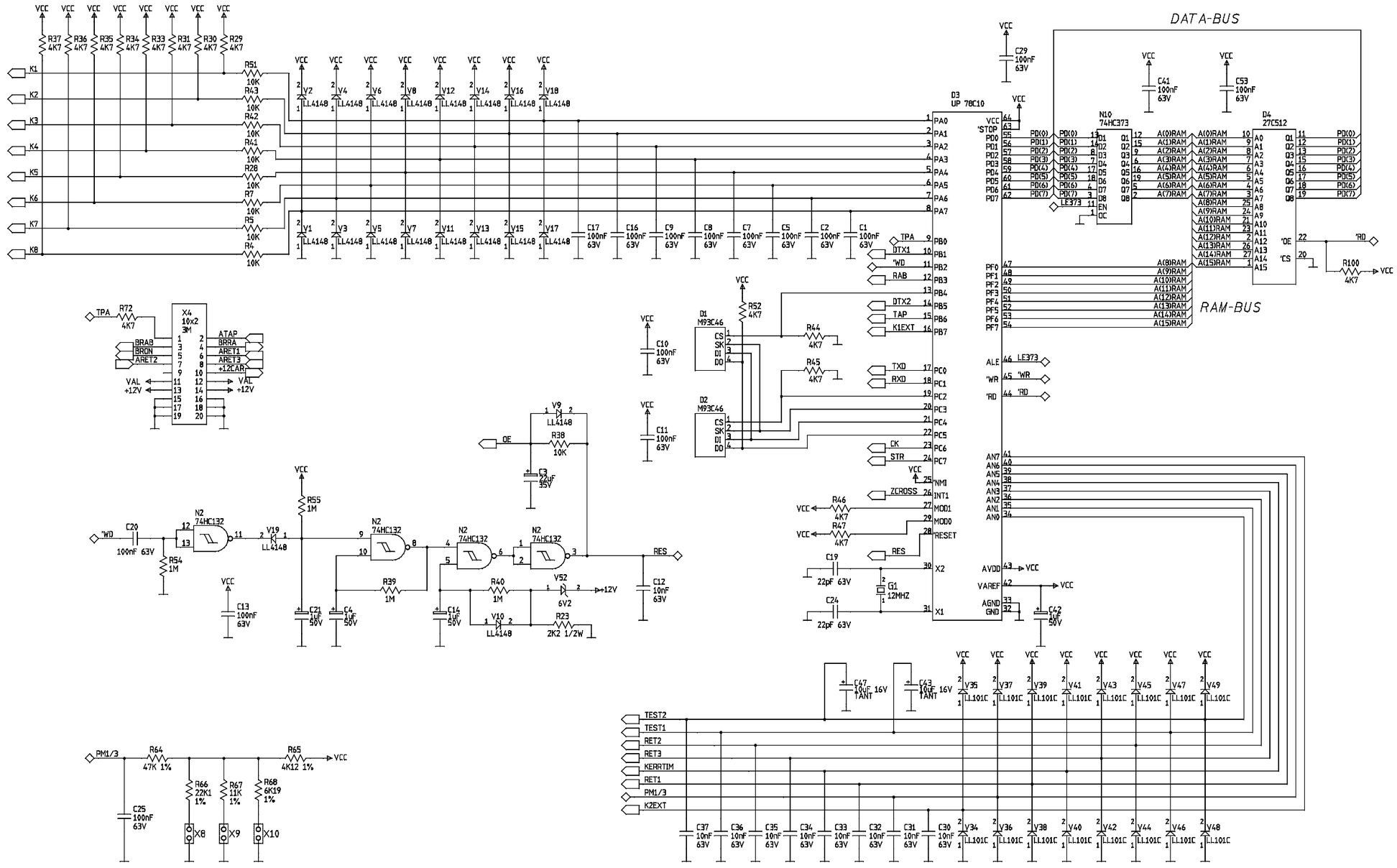
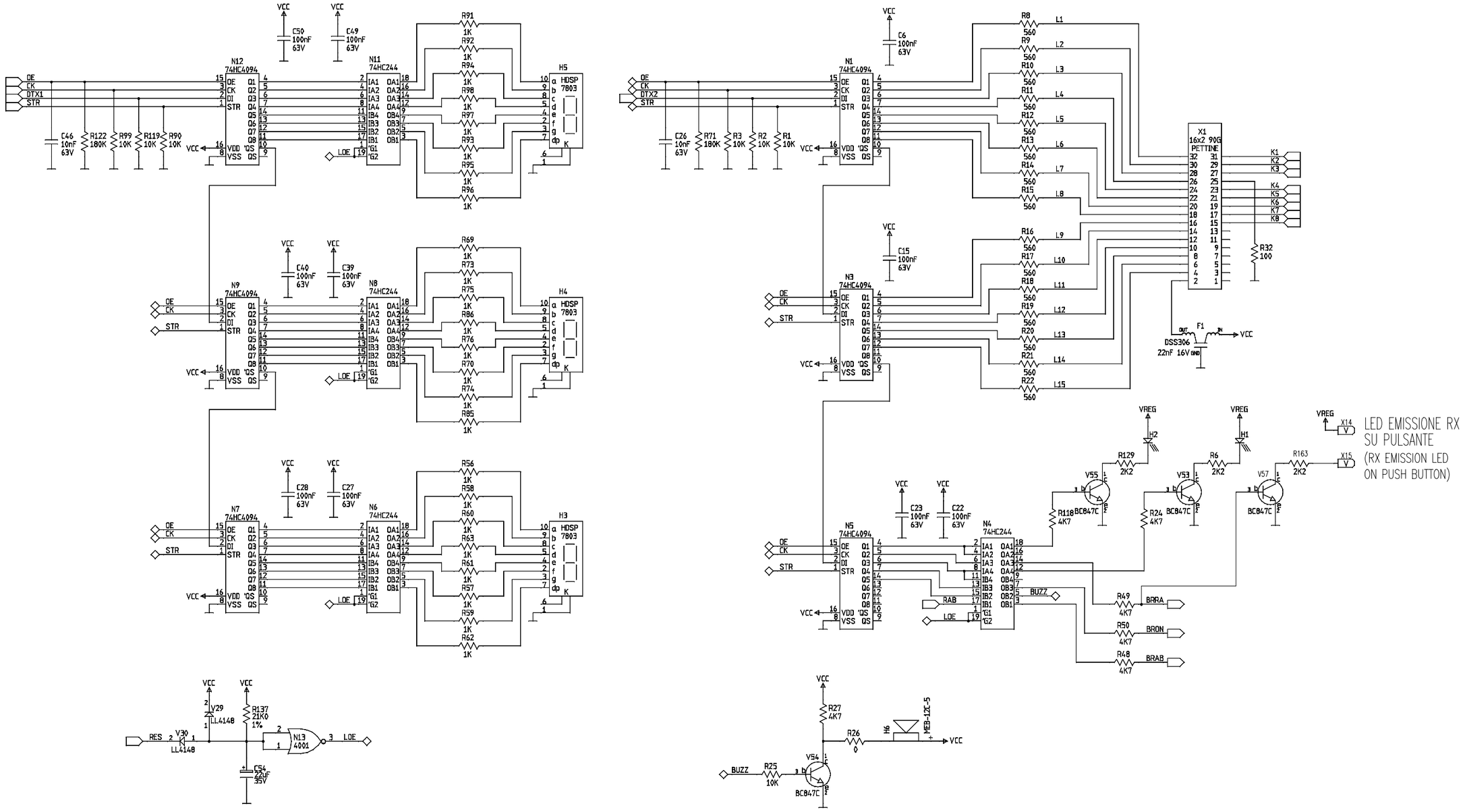
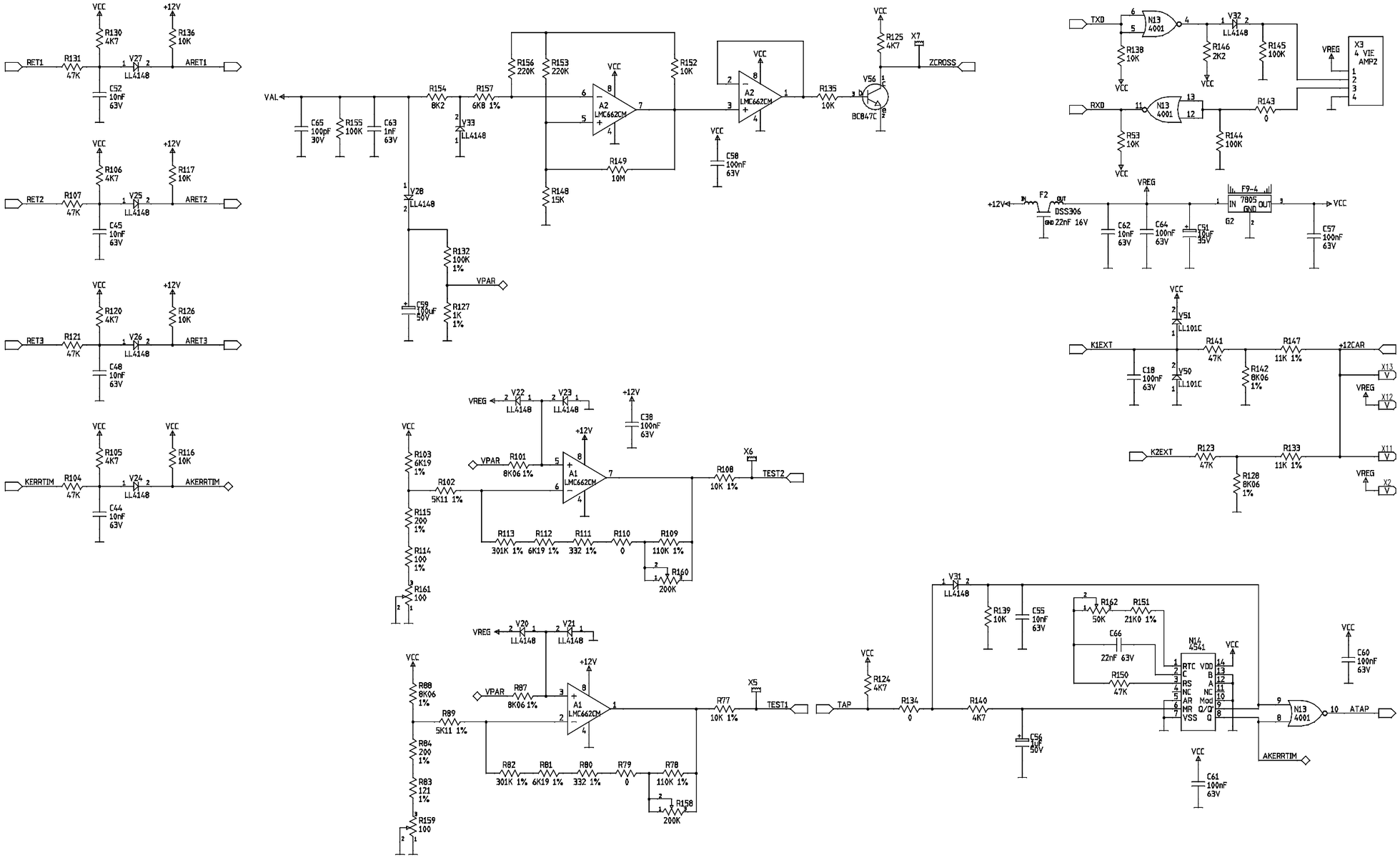


Explor-X 70 **AP TIME X – TIME X** **Logic board schematic**	**8**
Code 39609075 - Rev.01	**Page 1 of 3**



Explor-X 70 **AP TIME X – TIME X** **Logic board schematic**	**8**
Code 39609075 - Rev.01	**Page 2 of 3**



Explor-X 70 **AP TIME X – TIME X** **Logic board schematic**	**8**
Code 39609075 - Rev.01	**Page 3 of 3**

10. SPARE PARTS

1 - TIMER: AP Time X - Time X

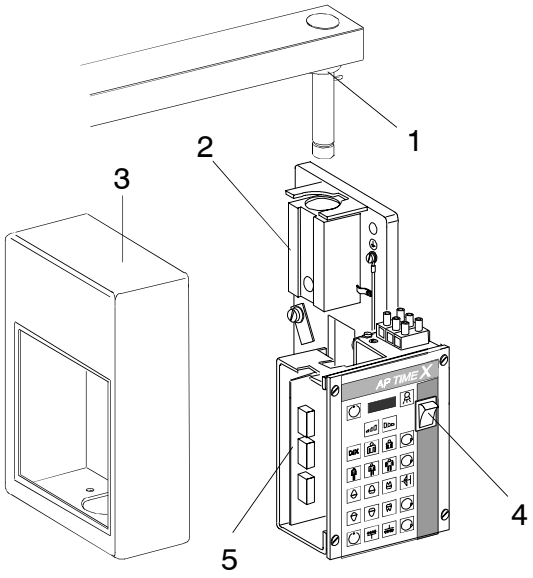
2 - EXTENSION ARM

3 - SCISSORS ARM

4 - TUBEHEAD

1 - TIMER: AP Time X - Time X

Ref.	Order code	Specification	Note
1	5160227400	Rotating pivot spacer	For extension arm
2	6160111500	Support arm	
3	5460130400	Timer cover	
4	4291415900	ON / OFF switch	
5	6660379400	Kit PCB AP TIME X – TIME X	
6	4560311800 4560311900	Fuse holder Cap for fuse holder	For mobile version
7	8160114000	Single stud assy	
8	6260372500	X-ray push button	
9	6660374300	Keyboard assy for AP TIME X	
10	6660374200	Keyboard assy for TIME X	
F2	2300974400	Fuse 6.3x32 10A F	Mounted on Power PCB
F4	2300938000	Fuse 5x20 630mA T	Mounted on Power PCB
FUSE	2300974400	Fuse 6.3x32 10A F	For mobile version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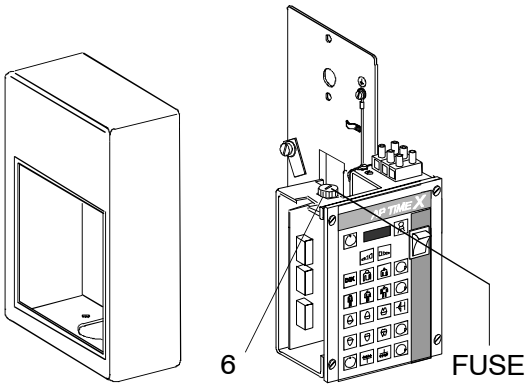
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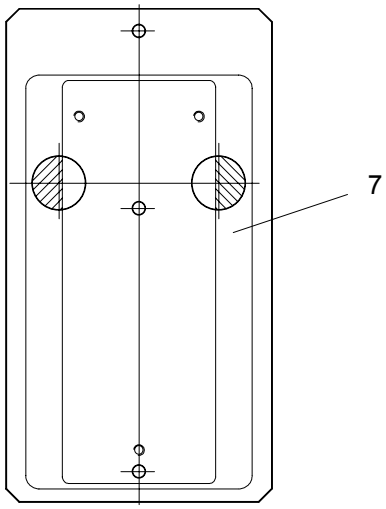
FUSE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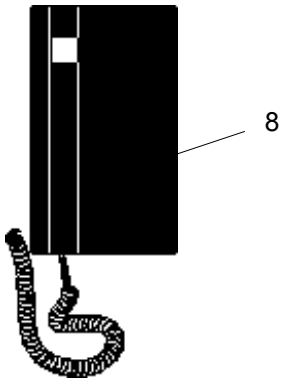
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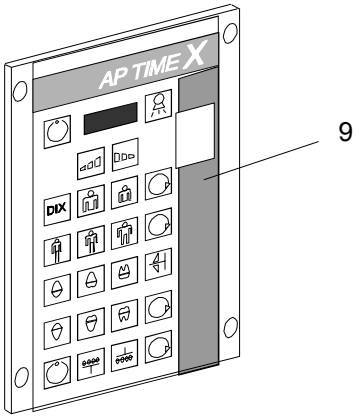
AP TIME X
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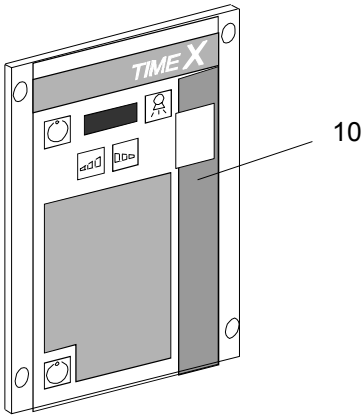
TIME X
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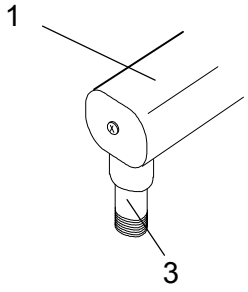
2 - EXTENSION ARM

Oval

Ref.	Order code	Specification	Note
1	5160244200	Cover 75 cm	
	5160244700	Cover 90 cm	
	5160249300	Cover 60 cm	
	5160256100	Cover 30 cm	
2	5160249800	Rotating pivot locking	
3	5260249400	Pivot	
4	6160256000	Busher ∅ 25 assy	
5	8160100100	Dental unit support	
7	8260250300	Extension arm 60 cm cpl	
	8260250400	Extension arm 75 cm cpl	
	8260250500	Extension arm 90 cm cpl	
	8260256500	Extension arm 30 cm cpl	

Square

Ref.	Order code	Specification	Note
3	5260201000	Pivot (arm 75, 55, 30 cm)	
	5260205900	Pivot (arm 90 cm)	
5	8160100100	Dental unit support	
6	8160213900	Extension arm 55 cm cpl	
	8160213500	Extension arm 75 cm cpl	
	8160213600	Extension arm 90 cm cpl	
	8160214500	Extension arm 30 cm cpl	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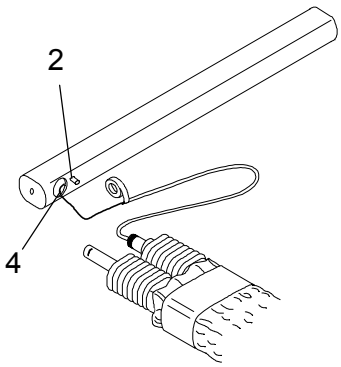
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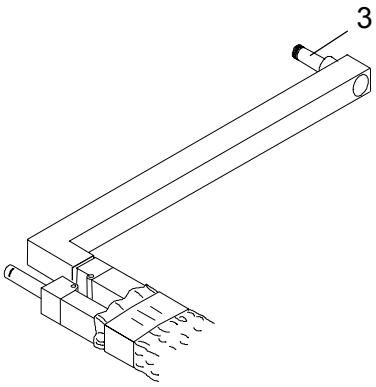
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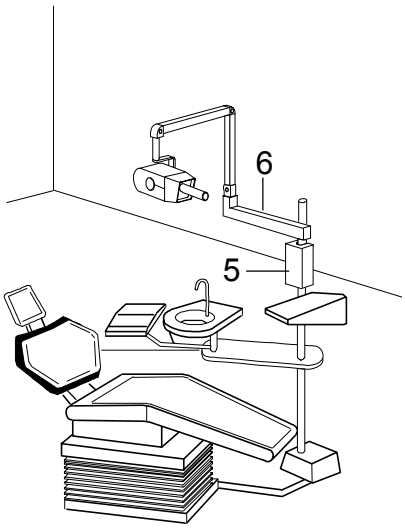
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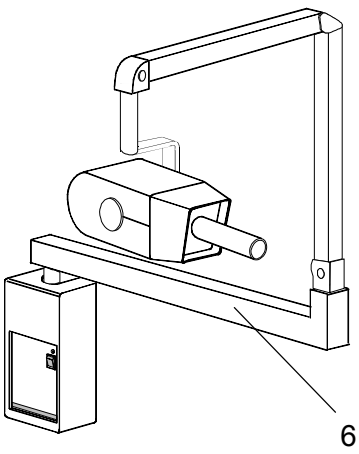
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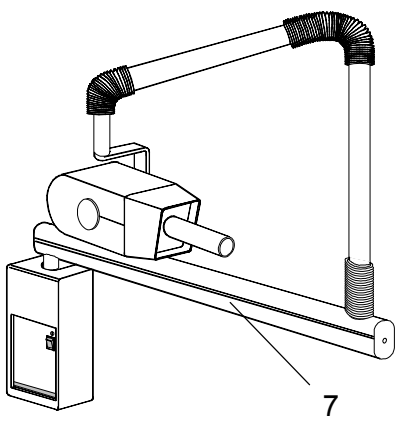
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3 - SCISSORS ARM

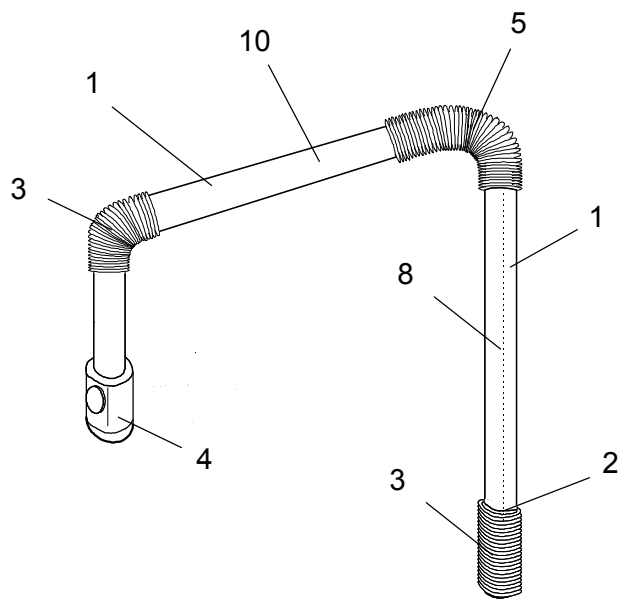
Oval

Ref.	Order code	Specification	Note
1	5160248100	Scissors arm cover	
2	5460258100	Plastic cap for bellow	
3	5460248300	Bellow (short)	
4	5660248700	Tubehead support cover (metal part)	
5	6160248800	Bellow (central part)	
8	7260209400	Scissor arm cable complete with sliding connector (female)	
10	8160250200	Scissors arm complete	(1)

Square

Ref.	Order code	Specification	Note
6	6660210200	1° scissor arm cover	
7	6660210300	2° scissor arm cover	
8	7260209400	Scissor arm cable complete with sliding connector (female)	
9	5460218800	Central joint plastic cover	
10	8160214000	Scissors arm complete (goffered)	(1)

Note (1):
Please specify where the arm is installed (Mobile, Wall mounted or Dental chair) when ordering.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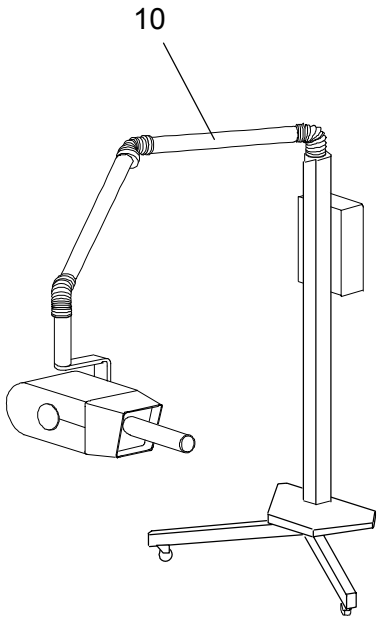
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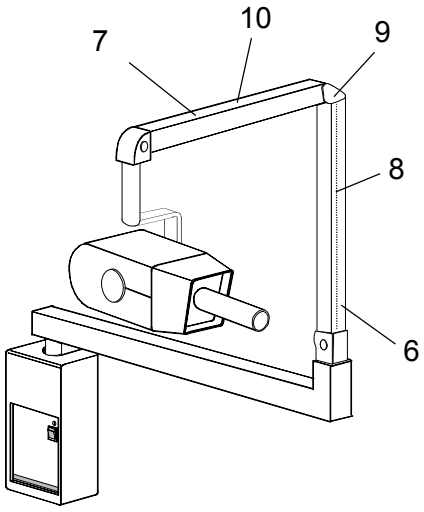
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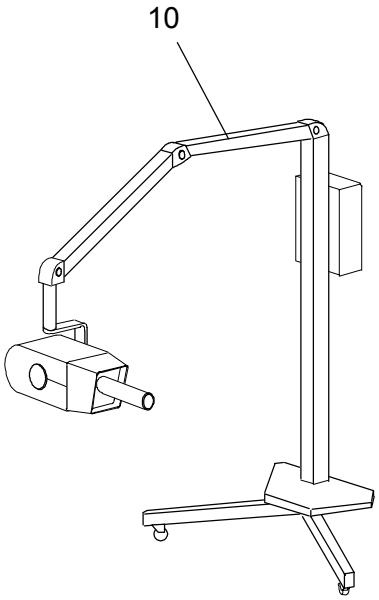
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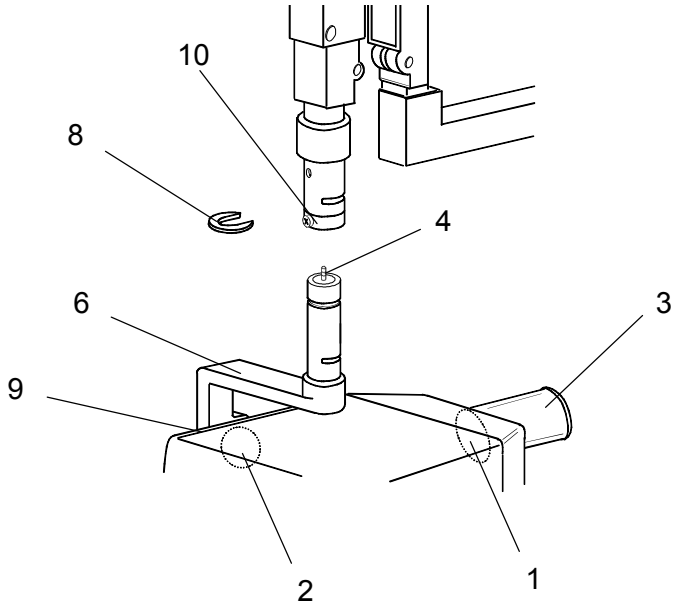
4 - TUBEHEAD

Ref.	Order code	Specification	Note
1	5160401800	Aluminium filter	
2	5160423800	Angle indicator	
3	6160405900	Tubehead collimator	
4	6260439600	Sliding connector (male)	
5	6660422300	Explor-X tubehead cover (without label)	
6	7260439500	Tubehead support	
7	8460457000	Tubehead complete assembly	
8	5160402800	Seeger	
9	5460420800	Lateral cover	
10	6160204400	Grounding clip	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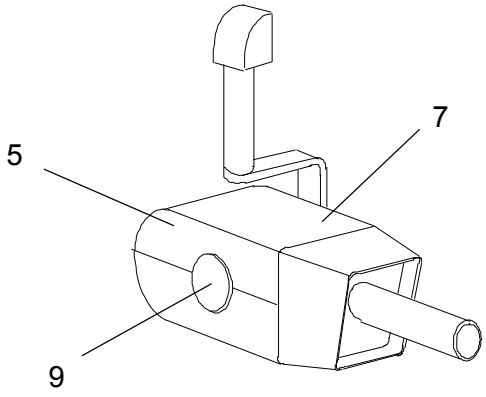
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11. FIXING TEMPLATES

The system is equipped with a set of templates, composed of the following elements:

Code	**Description**
39609122	Template for standard timer version
39609124	Template for remote timer version
39609249	Single stud template

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Cod. 6960925100_Rev.1

VILLA SISTEMI MEDICALI S.p.a.
Via Delle Azalee, 3
20090 Buccinasco (MI) - ITALY
Tel. (+39) 02 48859.1
Fax (+39) 02 4881844