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User Manual

Control panel

series C 306.20-C 306.25

n. 0071 Ver E - Rev J5

CE 0051

to the USER

The safety of both patient and operator was a major consideration in the design and manufacturing of this equipment.
The equipment will function reliably when operated, manteined, and repaired according to the instructions in this manual. Misuse, however, could result in hazards to patient, operator and/or equipment.

CONFORMITY CERTIFICATION

Manufacturer certifies that X-ray generator series PROGRAM is in accordance to the IEC 601 - 2 - 7 regulation, and it mets all the requirement asked by tubes or subassemblies that complies with this regulation, only if controls and requirement are strictly observed and tubes calibrated in the working range specified by tube manufacturer.

X-RAY DIAGNOSTIC SYSTEMS
MECHANICAL and ELETTRICAL SAFETY

All moveable assemblies and parts of the unit shuold be carefully operated and routinely inspected according to the Operator and Maintenance Manuals.

Only properly trained and qualified personnel should have access to any internal components; before opening any access door be sure that line disconnesct witch is open.

DO NOT REMOVE the high tension cables from the X-ray tube housing or high tension generator until main and auxiliary powre supplies have been disconnected.

Failure to comply with the above may result in hazard to operator, patient, and/or equipment.

Electrical Grounding Instruction

Equipment when installed must comply IEC 601-2-7 grounding requirements, it must have a protection ground using a specific separate ground cable.

The neutral side of the line is not to be considered the heart ground.

X-RAY DIAGNOSTIC SYSTEMS
RADIATION PRECAUTION

X-Rays e Gamma Rays are hazardous to both the operator and others unless radiation procedures are estabilished and strictly observed.

the useful and scattered beams can produce serious or fatal bodily injuries to any persons in the surrounding area if used by unskilled operator.

Never unnecessarily place any part of your body in the usefull X-ray beam.

This equipment must be handled only by qualified people and in accordance with the operating instruction.

Those qualified people both operating or supervisioning to the operations must know all the procedures and regulations about radiation hazards.

Failure to observe these warnings may cause serious or fatal bodily injuries to the operator or those in area

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1 DESCRIPTIONS

1.1 INTRODUCTION

The range of micro controlled generators has been developed to answer the necessity in conventional radio-diagnostic equipment for the use of remote control or classic examination tables, as with precision work as required in Multidirectional Tomography and digital imaging.

Thanks to the programming technique hand operations are reduced to a minimum.

In the study of the unit, particular consideration has been given to the development of a technology for the utilisation by the operator of a simple and intuitive anatomical programme.

The radiography parameters, liberally adjustable, can be stored by the operator as an anatomical programme for a rapid work or they may be treated as in a traditional classic generator.

The PROGRAM US generator increases the cost effectiveness of the installation being a generator for universal use.

1.2 TECHNICAL CHARACTERISTICS

The range PROGRAM US comprises four HF power generators.

These generators have the following characteristics:

- Microprocessor control

- Anatomical programming

- Power 50 - 65 - 80 - 100 kW (continuous from high frequency)

- Automatic main regulation

- Mode of working:
  - Anatomical with of without automatic exposure control
  - Manual with or without automatic exposure control

- Easy parameter adjustment

- Push button unit with soft touch tactile buttons with quick response.

- Free selection of radiography parameters, technique at 1 - 2 - 3 points.

- Pre-indication of radiography time for 2 and 3 point technique.

- Indication of actual exposure time when using the Automatic Exposure Control (AEC)

- Indication of the total thermal residual load of the tube.

- Indication of the thermal load of the exposure that is about to be executed.

- Transmission of data from console to the power cabinet with one cable

- Indication of all data on digital instruments or on alphanumerical fluorescent screen indicator.

- Anatomical programme at seven body levels with five organs and five projections possible at each level.

1.3 CONFIGURATION

The architecture of the PROGRAM US comprises a control console, a power cabinet for the electronics and an high tension transformer.

1.4 CONTROL CONSOLE

The Control Console with an extremely tidy display is easy to read and understand.

All information and selections are indicated either in anatomical or free technique or with automatic exposure control work for an immediate reading by the operator via a digital module with luminescent screen, or via digital instruments.

The positioning of the controls permits easy access to the technique of the work and agile manipulation.

The acceptance of the command is seen by the operator, by the size changing of the varied parameters on a display and by LED's on the touch buttons.

The Console permits all the techniques of working at 1-2-3 points as the technique with automatic exposure control and pre-fixed anatomical programmes.

The Console is connected to the microprocessor located in the power cabinet via one cable carrying the information from the Console.

All the functions are controlled by the microprocessor and during all phases of work, the operator is informed of the “ status of machine ” in progress on the luminescent screen.

1.5 PROGRAMMABLE CHOICE WITH ANATOMICAL TECHNIQUE

Each parameter liberally selectable can be easily stored in the anatomical programme by the user, permitting a personalised programme.

For the organ picked through the anatomical selection buttons, the programmed parameters (kV, mA, time, working stations, predisposition for AEC, X-Ray tube, eventual fluoroscopy, etc.) are automatically adjusted.

These values can be adapted to each patient according to its structure (normal,lean,strong) by the proper control.

At any time, the programmed parameters can be corrected on the console according to the operator decisions.

The programmes available are as follows:

- 7 anatomical levels
- 5 organs for each anatomical level (7 x 5 = 35 combinations)
- 5 projections for each organ (35 x 5 = 175 combinations)
- 3 kV values for normal,lean and strong person (175 x 3 = 525 combinations)

1.6 MANUAL CHOICE (FREE TECHNIQUE)

A light pressure on the sensitive buttons increases or decreases the kV - mA - Sec. values.

1.7 AEC AUTOMATIC EXPOSURE CONTROL DEVICE

Selection of the chamber is automatic in accordance with the working station and preselection of the three fields occurs.

It is possible to store two distinct darkness level depending on the screens used. There is also the possibility to finely adjust the darkness depending on the function of the anatomical programme on which work is taking place.

1.8 SELECTION OF WORKING STATIONS

The selection of the examination accessory is automatically made according to the anatomical programme.

The working station can be changed, in free selection status, using keys (Pos 1, Fig. 1).

1.9 mAs PREINDICATION

The time or the mA modification, in free selection status or during the anatomical programming, changes the mAs value. This can be seen on the right of the first line of the alphanumerical indicator.

In this way it's always possible to see the actual mAs value during time or mA change.

1.10 FLUOROSCOPY

The intensity and maximum tension in fluoroscopy are values that are programmed during installation and depending on the type of tube installed.

You can have 100 - 110 or 120 kV maximum value.

1.11 TECHNICAL CHARACTERISTICS

CIRCUIT AND WAVEFORM OF HV	continuous from high frequency PROGRAM HF 50-60-80-100
kW	
MAXIMUM OUTPUT	600 mA - 83 kV 50 kW 500 mA - 100 kV 50 kW 800 mA - 81 kV 65 kW 700 mA - 108 kV 65 kW 1000 mA - 80 kV 80 kW 800 mA - 100 kV 80 kW 1250 mA - 80 kV 100 kW 1000 mA - 100 kV 100 kW
FLUOROSCOPY	fixed linkage between kV mA from 50 to 100/110/120kV (to be decided during the installation) from 0,5 to 5 mA
RADIOGRAPHY	from 40 to 150 kV continuous regulation
AUTOMATISM	A.E.C. (Automatic Exposure Control) having max. five chambers
EXPOSURE TIME	from 0,002 to 20 s. in 39 values
RATE OF CONSECUTIVE EXPOSURES	50 per second
X-RAY TUBES	2 fixed or rotating anode bifocal tubes (all the range available for radiodiagnostic)
CONNECTABLE AUX. DEVICES	up to five

1.12 IDENTIFICATION CARD

IN CONFORMITY WITH THE STANDARD I.E.C. N. 601 - 2 - 7

MANUFACTURER NAME : Odel Spa Via Sartirana, 12 Monza Italia

MANUFACTURER PRODUCT TRADE NAME: PROGRAM 50 H.F. US

PRODUCT TRADE NAME OF THE DEALER: _____

IDENTIFICATION CONSOLE NUMBER: C 306.___ No._____

IDENTIFICATION POWER RACK NUMBER: R 306.40 No._____

IDENTIFICATION HV TRANSFORMER NUMBER: H 900.___ No._____

DATE OF MANUFACTURING: _____

NOMINAL FEEDING TENSION: 108 A/ 380 V~ (threephase)

NOMINAL FEEDING FREQUENCY: 50 Hz +/- 1 Hz

MAX POWER ABSORBED: apparent power 75 kVA
active power 63 kW

MAX. APPARENT RESISTANCE OF MAIN SUPPLY: 0,20 Ohm

MAIN FUSES ON THE FEEDING LINE: 60 A delayed

GROUND: compulsory

ADMITTED VARIATION OF THE FEEDING TENSION: +/- 10 %

FEEDING TENSION RANGE AUTOMATICALLY COMPENSATED: +/- 10 %

MAIN POWER OUTPUT: 50 kW

EQUIPMENT CLASS AND TYPE: Class I Type B

PROTECTION INDEX: IP20

MODE OF OPERATION:

cont.	
120 kV	5 mA
int.	
83 kV	600 mA
100 kV	500 mA
120 kV	400 mA
150 kV	300 mA

COOLING CONDITION:
Console approx. 95 kcal/h
Control Cabinet approx. 930 kcal/h

NOMINAL TUBE VOLTAGE int. mode: 150 kV (300 mA)

NOMINAL TUBE VOLTAGE cont. mode: 120 kV (5 mA)

HIGHEST TUBE CURRENT int.mode: 600 mA 83 kV

HIGHEST TUBE CURRENT cont.mode: 5 mA 120 kV

HIGHEST ELECTRICAL POWER: 50 kW, 100 kV 500 mA

PREINDICATED CURRENT-TIME PRODUCT:

60 mAs 60 kV 600 mA 0,1 s
50 mAs 80 kV 500 mA 0,1 s
40 mAs 100 kV 400 mA 0,1 s
30 mAs 133 kV 300 mA 0,1 s
20 mAs 150 kV 200 mA 0,1 s

HIGHEST CURRENT-TIME PRODUCT: 600 mAs hardware interdiction

MINIMUM PREINDICATED CURRENT-TIME PRODUCT:

0,6 mAs 70 kV 600 mA 0,001 s
0,5 mAs 100 kV 500 mA 0,001 s
0,4 mAs 120 kV 400 mA 0,001 s

all combination of current/time are permitted
till 0,4 mAs, lower values are not allowed (software locked)

RADIOGRAPHY MINIMUM TIME WITH AEC: 0,002 s

1.13 IDENTIFICATION CARD

IN CONFORMITY WITH THE STANDARD I.E.C. N. 601 - 2 - 7

MANUFACTURER NAME : Odel Spa Via Sartirana, 12 Monza Italia

MANUFACTURER PRODUCT TRADE NAME: PROGRAM 65 H.F. US

PRODUCT TRADE NAME OF THE DEALER: _____

IDENTIFICATION CONSOLE NUMBER: C 306.___ No._____

IDENTIFICATION POWER RACK NUMBER: R 306.41 No._____

IDENTIFICATION HV TRANSFORMER NUMBER: H 900.___ No._____

DATE OF MANUFACTURING: _____

NOMINAL FEEDING TENSION:	141 A/ 380 V~ (threephase)
NOMINAL FEEDING FREQUENCY:	50 Hz +/- 1 Hz
MAX POWER ABSORBED:	apparent power 98 kVA active power 82 kW
MAX. APPARENT RESISTANCE OF MAIN SUPPLY:	0,20 Ohm
MAIN FUSES ON THE FEEDING LINE:	60 A delayed
GROUND:	compulsory
ADMITTED VARIATION OF THE FEEDING TENSION:	+/- 10%
FEEDING TENSION RANGE AUTOMATICALLY COMPENSATED:	+/- 10 %
MAIN POWER OUTPUT:	65 kW
EQUIPMENT CLASS AND TYPE:	Class I Type B
PROTECTION INDEX:	IP20
MODE OF OPERATION:	cont. 120 kV 5 mA int. 81 kV 800 mA 92 kV 700 mA 108 kV 600 mA 130 kV 500 mA 150 kV 400 mA

COOLING CONDITION:
Console approx. 95 kcal/h
Control Cabinet approx. 930 kcal/h

NOMINAL TUBE VOLTAGE int. mode: 150 kV (400 mA)

NOMINAL TUBE VOLTAGE cont. mode: 120 kV (5 mA)

NOMINAL TUBE CURRENT int.mode: 800 mA 75 kV

NOMINAL TUBE CURRENT int.mode: 5 mA 120 kV

HIGHEST ELECTRICAL POWER: 65 kW, 81 kV 800 mA

PREINDICATED CURRENT-TIME PRODUCT:

60 mAs 60 kV 600 mA 0,1 s
50 mAs 80 kV 500 mA 0,1 s
40 mAs 100 kV 400 mA 0,1 s
30 mAs 133 kV 300 mA 0,1 s
20 mAs 150 kV 200 mA 0,1 s

HIGHEST CURRENT-TIME PRODUCT: 600 mAs hardware interdiction

MINIMUM PREINDICATED CURRENT-TIME PRODUCT:

1,6 mAs 70 kV 800 mA 0,002 s
1,4 mAs 70 kV 700 mA 0,002 s
1,2 mAs 100 kV 600 mA 0,002 s
1 mAs 120 kV 500 mA 0,002 s
0,6 mAs 150 kV 300 mA 0,002 s
0'4 mAs 150 kV 200 mA 0,002 s

all combination of current/time are permitted
till 0,4 mAs, lower values are not allowed (software locked)

RADIOGRAPHY MINIMUM TIME WITH AEC: 0,002 s

1.14 IDENTIFICATION CARD

IN CONFORMITY WITH THE STANDARD I.E.C. N. 601 - 2 - 7

MANUFACTURER NAME : Odel Spa Via Sartirana, 12 Monza Italia

MANUFACTURER PRODUCT TRADE NAME: PROGRAM 80 H.F. US

PRODUCT TRADE NAME OF THE DEALER: _____

IDENTIFICATION CONSOLE NUMBER: C 306.___ No._____

IDENTIFICATION POWER RACK NUMBER: R 306.42 No._____

IDENTIFICATION HV TRANSFORMER NUMBER: H 900.___ No._____

DATE OF MANUFACTURING: _____

NOMINAL FEEDING TENSION: 173 A/ 380 V~ (threephase)

NOMINAL FEEDING FREQUENCY: 50 Hz +/- 1 Hz

MAX POWER ABSORBED: apparent power 120 kVA
active power 100 kW

MAX. APPARENT RESISTANCE OF MAIN SUPPLY: 0,20 Ohm

MAIN FUSES ON THE FEEDING LINE: 60 A delayed

GROUND: compulsory

ADMITTED VARIATION OF THE FEEDING TENSION: +/- 10%

FEEDING TENSION RANGE
AUTOMATICALLY COMPENSATED: +/- 10 %

MAIN POWER OUTPUT: 80 kW

EQUIPMENT CLASS AND TYPE: Class I Type B

PROTECTION INDEX: IP20

MODE OF OPERATION:

	cont.
120 kV	5 mA
	int.
80 kV	1000 mA
100 kV	800 mA
114 kV	700 mA
133 kV	600 mA
150 kV	500 mA

COOLING CONDITION:
Console approx. 95 kcal/h
Control Cabinet approx. 930 kcal/h

NOMINAL HT VOLTAGE int. mode: 150 kV (500 mA)

NOMINAL HT VOLTAGE cont. mode: 120 kV (5 mA)

NOMINAL TUBE CURRENT int. mode: 1000 mA 80 kV

NOMINAL TUBE CURRENT cont.mode: 5 mA 120 kV

HIGHEST ELECTRICAL POWER: 80 kW, 100 kV 800 mA

PREINDICATED CURRENT-TIME PRODUCT:

60 mAs 60 kV 600 mA 0,1 s
50 mAs 80 kV 500 mA 0,1 s
40 mAs 100 kV 400 mA 0,1 s
30 mAs 133 kV 300 mA 0,1 s
20 mAs 150 kV 200 mA 0,1 s

HIGHEST CURRENT-TIME PRODUCT: 600 mAs hardware interdiction

MINIMUM PREINDICATED CURRENT-TIME PRODUCT:

2,0 mAs 80 kV 1000 mA 0,002 s
1,6 mAs 100 kV 800 mA 0,002 s
1,4 mAs 100 kV 700 mA 0,002 s
1 mAs 100 kV 700 mA 0,002 s
0,6 mAs 150 kV 200 mA 0,002 s
0,4 mAs 150 kV 200 mA 0,002 s

all combination of current/time are permitted
till 0,4 mAs, lower values are not allowed (software locked)

RADIOGRAPHY MINIMUM TIME WITH AEC: 0,002 s

1.15 IDENTIFICATION CARD

IN CONFORMITY WITH THE STANDARD I.E.C. N. 601 - 2 - 7

MANUFACTURER NAME : Odel Spa Via Sartirana, 12 Monza Italia

MANUFACTURER PRODUCT TRADE NAME: PROGRAM 100 HF US

PRODUCT TRADE NAME OF THE DEALER: _____

IDENTIFICATION CONSOLE NUMBER: C 306.___ No._____

IDENTIFICATION POWER RACK NUMBER: R 306.43 No._____

IDENTIFICATION HV TRANSFORMER NUMBER: H 900.___ No._____

DATE OF MANUFACTURING: _____

NOMINAL FEEDING TENSION: 207 A/ 380 V~ (threephase)

NOMINAL FEEDING FREQUENCY: 50 Hz +/- 1 Hz

MAX POWER ABSORBED: apparent power 150 kVA
active power 125 kW

MAX. APPARENT RESISTANCE OF MAIN SUPPLY: 0,10 Ohm

MAIN FUSES ON THE FEEDING LINE: 80 A delayed

GROUND: compulsory

ADMITTED VARIATION OF THE FEEDING TENSION: +/- 10%

FEEDING TENSION RANGE AUTOMATICALLY COMPENSATED: +/- 10 %

MAIN POWER OUTPUT: 100 kW

EQUIPMENT CLASS AND TYPE: Class I Type B

PROTECTION INDEX: IP20

MODE OF OPERATION:

	cont.
120 kV	5 mA
	int.
80 kV	1250 mA
100 kV	1000 mA
125 kV	800 mA
140 kV	700 mA
150 kV	600 mA

COOLING CONDITION:
Console approx. 95 kcal/h
Control Cabinet approx. 930 kcal/h

NOMINAL HT VOLTAGE int. mode: 150 kV (600 mA)

NOMINAL HT VOLTAGE cont. mode: 120 kV (5 mA)

NOMINAL TUBE CURRENT int.mode: 1000 mA 100 kV

NOMINAL TUBE CURRENT cont. mode: 5 mA 120 kV

HIGHEST ELECTRICAL POWER: 100 kW, 100 kV 1000 mA

PREINDICATED CURRENT-TIME PRODUCT:

60 mAs 60 kV 600 mA 0,1 s
50 mAs 80 kV 500 mA 0,1 s
40 mAs 100 kV 400 mA 0,1 s
30 mAs 133 kV 300 mA 0,1 s
20 mAs 150 kV 200 mA 0,1 s

HIGHEST CURRENT-TIME PRODUCT: 600 mAs hardware interdiction

MINIMUM PREINDICATED CURRENT-TIME PRODUCT:

2,5 mAs 80 kV 1250 mA 0,002 s
2,0 mAs 100 kV 1000 mA 0,002 s
1,6 mAs 120 kV 800 mA 0,002 s
1 mAs 150 kV 500 mA 0,002 s
0,6 mAs 150 kV 300 mA 0,002 s
0,4 mAs 150 kV 200 mA 0,002 s

all combination of current/time are permitted
till 0,4 mAs, lower values are not allowed (software locked)

RADIOGRAPHY MINIMUM TIME WITH AEC: 0,002 s

Index Chapter 2

2 CONTROLS and SIGNALS

2.1 Description Figure 1

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2 ON Key

3 OFF Key

4 Projection Selection Keys

5 Luminous Indicator X-Ray Radiography

6 Working Place Selection Keys

7 Digital Indicator kV-Radiography

8 Digital Indicator mA-Radiography

9 Digital Indicator sec-Radiography

10 kV-Radiography Adjustment Keys

11 mA-Radiography Adjustment Keys

12 sec-Radiography Adjustment Keys

13 kV-Radiography Selection Keys for Lean-Normal-Strong Person

14 Focus Selection Keys

15 X-Ray Preparation Radiography Key

16 X-Ray Radiography Exposure Key

17 Keys for the Selection of AEC Chamber Fields

18 Keys for the Selection of AEC Darkness

19 Multi purpose key

20 Key for Selection of AEC Screens

21 Body-Level Seven Luminous Keys

22 Key for Reset of Fluoroscopy-Time

23 Key for Selection of Fluoroscopy High Dose

24 Key for Manual Fluoroscopy Selection

25 Key for Automatic Fluoroscopy Selection

26 Keys for Adjustment Fluoroscopy kV-mA

27 Digital Time-Fluoroscopy Indicator

28 Digital mA-Fluoroscopy Indicator

29 Digital kV-Fluoroscopy Indicator

30 Reset Alarm Messages Key

31 Luminous X-Ray-Fluoroscopy Indicator

32 Luminous Alpha-Numeric Indicator

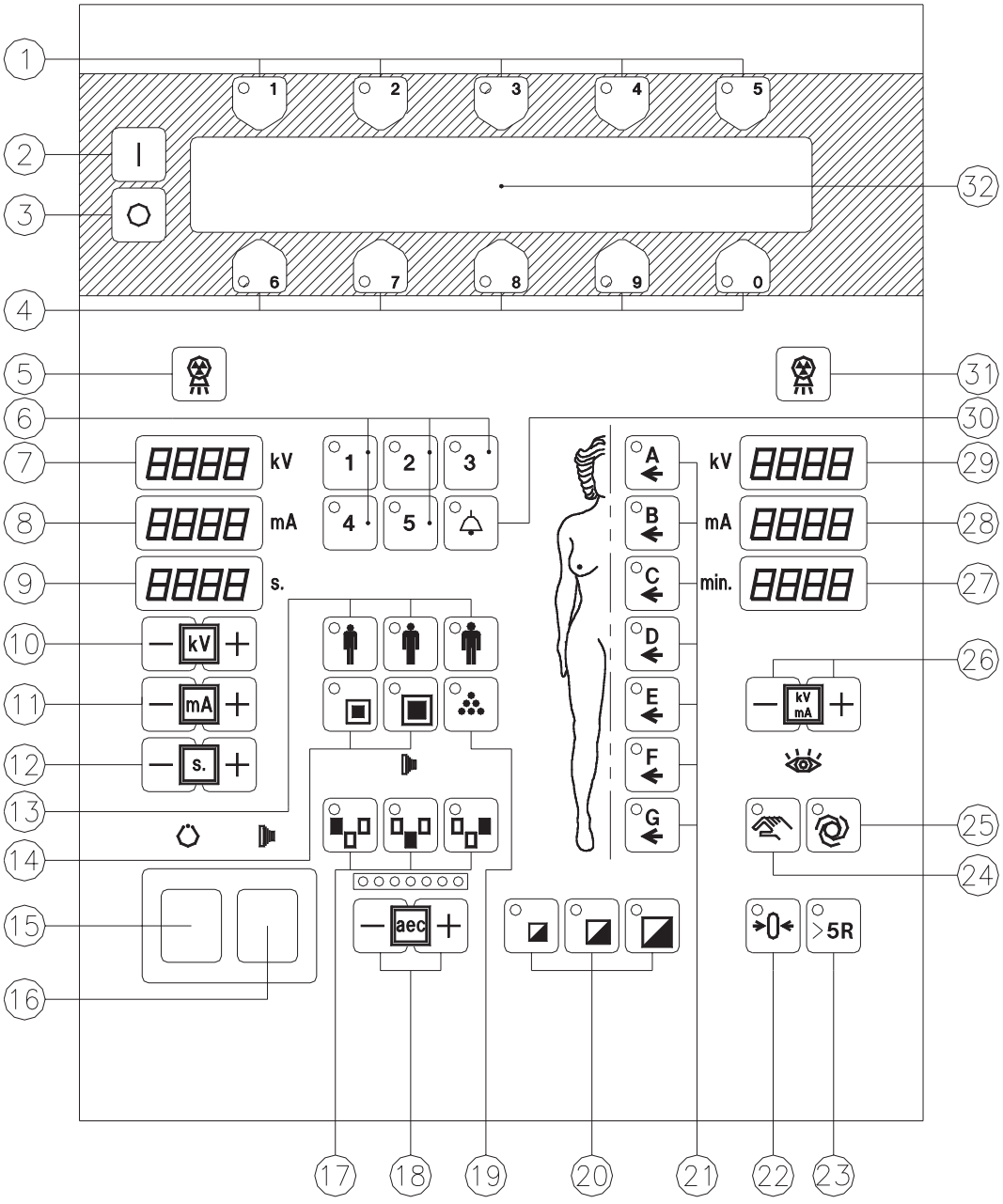
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FIGURE 1

2.2 ON-OFF KEYS

These keys (Pos.2-3 Fig.1) allow the generator to be switched ON or OFF.
When the generator is ON, if about 60 minutes are elapsed without no work in fluoroscopy or no one X-Ray preparation made, the switching OFF of the control console arrives automatically. The switching ON of the console can be done again by pushing the key ON.
Other events that can cause the automatic switching OFF of the Console are described at chap.3.1.3.

2.3 ANATOMICAL SELECTION

2.3.1 Body Vertical Level

Selection Keys and indicators (Pos.21 Fig.1)

The vertical body Level is selected trough the seven keys for the seven available levels. The visualisation of the selected level is made trough the luminous indicator contained in the selection keys. For each level the name of five anatomical parts and the name of five different projections will appear on the alphanumerical indicator (Pos.32 Fig.1).

2.3.2 Organ Selection

Alphanumeric Luminous indicator (Pos.32 Fig.1)

Selection Keys (Pos.1 Fig.1)
The upper line of the alphanumerical indicator is divided in five fields, each one comprising seven characters.
Each field describes the name or the abbreviation of an organ.
The selected field is visualised in capital letters limited with two brackets.
The selection is made by the push-button on the top of the alphanumerical indicator.

2.3.3 Projection Selection

Alphanumerical Luminous Indicator (Pos.32 Fig.1)

Selection Keys (Pos.4 Fig.1)
The bottom line of the alphanumerical indicator is divided in five fields each one consisting of seven characters.
Each field describes the name or the abbreviation of a projection.
The selected field is visualised in capital letters and limited with two brackets. The selection is made by the push-button on the top of the alphanumerical indicator.

2.3.4 Anatomical Programme Data

The visualisation of the data contained in an anatomical programme modifies the console control in the following way:

a) Luminous alphanumerical indicator (Pos.32 Fig.1)
We abandon the anatomical format (five organs on the top line and five projections on the bottom line).
We enter in the new format called DATA composed in such a way:
On the top line, reading from the left appear the name of the organ previously selected, the name of the examination table to which the exam is combined with, the number of the tube of that working place, the focal spot of the x-ray tube,the selected tube and the numerical value of the time-current product (mAs) of the preadjusted values.
On the bottom line, reading from the left, will appear the name of the projection previously selected,the value of the total thermal actual units cumulated on the anode of the selected X-ray tube, the value of the thermal unit concerning the exposure being to be made,and a fifteen character field where is written the status of the machine or the alarm messages.

b) Luminous kV-radiography indicator (Pos.7 Fig.1)
The kV-radiography value for normal person is indicated, and at the same time, the luminous indicator placed over the normal person key (Pos.13 Fig.1) is lit.

c) Luminous mA-radiography indicator (Pos.8 Fig.1)
The mA-radiography value is indicated.

d) Luminous sec-radiography indicator (Pos.9 Fig.1)
The value of the preadjusted time for the exposure is indicated.
If an exposure made with the Automatic Exposure Device (AEC) is taken into consideration, the indicated value is the maximum safe time calculated in function of the maximum load of the x-ray tube. In case of exposure without the AEC utilisation, the indicated time will be the real one pertaining to this exposure.

e) Automatic Exposure Control (AEC) (Pos.17 - 18 - 20 Fig.1)
The luminous indicators placed over the selection keys of this device will be lighted only if a chamber is installed on the working station selected and if during the anatomical programming the user decided to utilise the AEC device.

f) Fluoroscopy parameters (Pos.22-23-24-25-26-27-28-29-31 Fig.1)
The keys concerning the fluoroscopy and the luminous indicators are lighted only if the working station selected is attested to this use and if during the anatomical programming the user decided to utilise the fluoroscopy.

2.3.5 kV Lean, normal, strong person

Keys (Pos.13 Fig.1)

Luminous Indicator (Pos.7 Fig.1)

When the console is on the Anatomical Procedure, it is possible the kV radiography value selection by hitting one of the three selection keys.

When the console is on Data Procedure, the kV radiography luminous indicator shows the value referred to the lit key.

It is enough to push one of the two keys with the indicator off to obtain the commutation of the kV radiography value and switching on of the indicator of the pushed key.

2.3.6 FOCAL SPOT SELECTION

Keys (Pos.14 Fig.1)

When the console is on the Data Procedure it is possible the focal spot selection by hitting the proper keys or running the mA value up to twelve for the small focus or 400 for the large focus.

2.3.7 ALARM RESET

Key (Pos.30 Fig.1)

When the console is on the Data Procedure it is possible to annul an alarm status by the proper reset key. If the alarm cause still exists, the console returns in the alarm status again after the reset.

2.4 FREE TECHNIQUE SELECTION

2.4.1 kV radiography Adjustment

Keys (Pos.10 Fig.1)

Luminous indicator (Pos.7 Fig.1)
Adjustment range from 40 to 150 kV in radiography.
Adjustment steps of one kV.
When the console is on the DATA procedure, the luminous indicator (Pos.7 Fig.1) shows the kV radiography value for a normal person,then it is possible to change this value in function of the patient structure. In fact in the anatomical programme two other values associated to LEAN and STRONG person are stored.

The keys allowing these selections are:

- lean and strong persons (Pos.13 Fig.1)

There is too the possibility of selecting whatever value (included on the range of the possible values) indipendently from the three programmed values, by operating on the increasing or decreasing value keys (Pos.10 Fig.1) to change the programmed value.
A single touch will change the indicated value of one kV, keeping pushed the key, the change is speeded up and is stopped when the pressure on the key is released.
When adjusting the kV radiography values (the ones not programmed), on the field of the alphanumerical indicator dedicated to the status of the machine, you will read FREE SELECT.
This writing appears everytime when the stored programmed radiography parameters are modified.

2.4.2 mA Radiography Adjustment

Keys (Pos.11 Fig.1)

Luminous indicator (Pos.8 Fig.1)
Adjustment range from 8 to 1250 mA for HF 100 kW unit
Adjustment range from 8 to 1000 mA for HF 80 kW unit
Adjustment range from 8 to 800 mA for HF 65 kW unit
Adjustment range from 8 to 600 mA for HF 50 kW unit

The available values on the small focus are:

8 - 12 - 25 - 50 - 75 - 100 - 150 - 200 - 300 mA.

The available values on the large focus are:

25 - 50 - 75 - 100 - 150 - 200 - 300 - 400
500 - 600 $_{50\ kV}$ - 700 - 800 $_{60\ kV\ -\ 1000\ 80\ kW}$ - 1250 $_{100\ kW}$mA

The indication of the selected value is possible when the console is on the DATA status and it can be read on the luminous indicator (Pos.8

Fig.1). The first appearing value is the one stored on the anatomical selected programme. This value can be changed by pushing the plus minus mA keys (Pos.11 Fig.1).
The change of the value is made on the focal spot shown on the top line of the alpha-numeric indicator (Pos.32 Fig.1) and also to the lit led on the focus key (Pos.14 Fig.1).
To change from the large focal spot to the small one, you have to select the 12 mA value pushing the minus mA key radiography.
To change from the small focal spot to the large one, you have to select the 400 mA radiography value pushing the plus mA key radiography.
It's also possible to change focus by the pressure of the proper key (Pos.14 Fig.1).

2.4.3 Radiography time Adjustment (sec.)

Keys (Pos.12 Fig.1)

Luminous Indicator (Pos.9 Fig.1)
The selectable radiography times values are:

0.002 - 0.003 - 0.004 - 0.005 - 0.006 - 0.008
0.010 - 0.012 - 0.016 - 0.020 - 0.025 - 0.030
0.040 - 0.050 - 0.060 - 0.080 - 0.100 - 0.120
0.160 - 0.200 - 0.250 - 0.300 - 0.400 - 0.500
0.600 - 0.800 - 1.000 - 1.200 - 1.600 - 2.000
2.500 - 3.000 - 4.000 - 5.000 - 6.000 - 8.000
10.00 - 15.00 - 20.00 sec.

The change of the stored value in the anatomical programme is made by pushing the plus minus sec. keys (Pos.12 Fig.1).
The indication of the selected value is read on the digital sec. indicator (Pos.9 Fig.1).

2.4.4 Working Station Selection

Keys (Pos.6 Fig.1)

It is possible to change the working station keeping constant the radiography parameters, if wished. The change can be done when the console is in the free technique status by operating on the key changing the working station. Every key has associated the five auxiliary units, and the name of the selected accessory is shown on the top line of the alpha-numerical indicator.

2.4.5 Alarm Message Reset .

Key (Pos.30 Fig.1).
This key is active during an alarm status and it is used to reset this message, so that you can proceed to a new selection or new attempts of resetting.
The alarm message is certified by a message on the right field of the bottom line of the alphanumerical indicator and by an intermittent buzzer sound.

2.5 AUTOMATIC EXPOSURE CONTROL AEC

2.5.1 General Description

The automatic exposure device (AEC) controls the radiation dose during an exposure and then determinates the time of the exposure itself so that the film darkness is constant.
This device is optional, nevertheless the control keys are present on the console even when the AEC device is not mounted.
When an anatomical programme, where is possible to utilise the AEC device, has been selected and the console has been commuted on DATA procedure, the luminous indicators placed over the following keys must be lighted:

- FIELDS (Pos.17 Fig.1) - 3 keys - at least one indicator must be lighted
- DARKNESS (Pos.18 Fig.1) - 2 keys - plus / minus one indicator only lighted
- RESET (Pos.30 Fig.1) - 1 key - not lighted
- SCREENS (Pos.20 Fig.1) - 3 keys - one only lighted (the one selected)

The radiography time shown on the sec.indicator (Pos.9 Fig.1) is not the one stored on the anatomical programme but it is the maximum allowed by the limit load of the X-Ray tube focal spot where the work is done.
This radiography time is utilised as a maximum time if the automatic device does not receive a enough X-Ray dose.
In this case when the limit time has expired, the luminous indicator placed on the reset time will be lighted (Pos.30 Fig.1) and an acoustic intermittent signal is on.

To proceed to make a new adjustment on the control console, you have to push the RESET key (Pos.30 Fig.1).This operation certifies that the operator is informed of the faulty exposure.

2.5.2 Fields Selection

Three keys (Pos.17 Fig.1) with their own luminous indicators placed on the key itself.
The lighted luminous indicator means that the field measuring the radiation has been selected.
A pressure on the key selects the field if it was not previously selected,and a pressure on the key of a field already selected disconnect it (switches off it).
The selection of the dominant Left-Central-Right or whatever possible combination depends on the anatomical part you wish to expose.
The field or the combination of the fields can be stored in every anatomical programme.The imperative necessary condition is that the working station to which the programme is joined should have an exposure chamber.
The switching off of all the three field luminous indicator causes the complete disconnection of the automatic exposure device and the return

to the work having the fixed exposure time. This time is stored on the anatomical programme and shown at (Pos.9 Fig.1).

2.5.3 Screen Selection

Three keys (Pos.20 Fig.1) with their own luminous indicators placed on the same keys.
The key is active when the luminous indicator is lighted.
One only of the three keys is active because the pressure on the not active key will disconnect the previously active key and activate the pushed key.
The function of these three keys is the one of adapting the sensibility of the automatic exposure device to the three types of different screens.
During the installation the adjustment of the sensibility joined to the three keys is made in function of the type of the screen used by the user,typically, at the left key identified by the small square we give a high sensibility value for use with rare heart screens and at the right key we give the sensibility value for the high definition screens that are notoriously slower and then needing higher doses.
These keys are moreover utilised to switch on the automatic exposure device if it has been switched off by the disconnection of the three measuring field, or if an anatomical programme has been selected where the device has been not appositively selected while the working station has been programmed for it.

2.5.4 Darkness selection

Keys and luminous indicators (Pos.18 Fig.1)
At the commutation of the console from the ANATOMICAL to the DATA procedure one of the seven luminous indicators placed over the two adjustment keys, will light. This arrives only if the anatomical programme foresees the use of the automatic exposure device.
By lack of adjustments already made, the luminous indicator lighted will be the central one.
When the luminous indicator lighted is the central one the automatic exposure device works with a medium sensibility, that is with the installation value.
If during the work a darkness variation of the film should arrive due to the different conditions of the developing machine, you can adjust the AEC sensibility to obtain the wished darkness.
Every pressure on the MINUS key makes the indicator light to run to the left and this means a reduction of the exposure time with a consequent darkness reduction.
Every pressure on the PLUS key makes the indicator light to run to the right and this means an increase of the exposure time with a consequent darkness increase.

2.5.5 Darkness adjustment of the anatomical programme

For each anatomical programme it is possible the adjustment of the AEC sensibility.
The instructions to perform these changes are explained at the chapter 3.4 Anatomical Programmes changes.

2.5.6 Faulty exposure reset

If, at the end of an exposure made with the AEC device, the internal console buzzer sounds intermittently and at the same time on the field dedicated to the alarm message of the luminous alphanumerical indicator is written MAX AEC TIME, it means that the exposure time has been cut by the timer and not by the AEC device.
In this case the operator must understand why it arrived and provide to the necessary actions.
The cause of this alarm is due to the fact that a too reduced radiation dose has been received by the ionisation chamber.
To proceed to new selections on the console the alarm status must be reset by pushing the Pos.30 Fig.1 key.

2.6 X-RAY PUSHBUTTON

The X-Ray push-button has two keys : (Pos.15-16 Fig.1)

First key - PREPARATION
After a delay of 1,5 sec from its action the unit is ready for an exposure.
During this delay the heating filament reaches its emission temperature in function of the current value (mA) selected, the anode is launched into rotation to reach the required speed of 2800 or 8500 revolutions per minute,and the tension that determines the kV value during the exposure is selected.
To confirm that all above said arrived in a correct way on the luminous alphanumericalal indicator message field must be written (READY - X-RAY)

Second key: X-RAY RADIOGRAPHY
The action of this second key allows the X-Ray exposure to be made immediately if it arrives on the READY - X-RAY procedure.
If both keys are pushed at the same time, the exposure takes place after a 1.5 sec delay.

2.7 ANATOMICAL PROGRAMMES CHANGE KEY

Key switch (Placed on the console base)

This key has two positions:
0 position for normal work
1 position to modify the anatomical programmes

The 1 position, that is the modification of the anatomical programs, is accepted only when the console is in the ANATOMICAL procedure.

The description of the programmes modification is made in the chapter 3.4

2.8 FLUOROSCOPY

2.8.1 General information

The work of the unit in fluoroscopy is subjected to the following condition:

- the anatomical selected programme allows the fluoroscopy work.

2.8.2 kV-mA Adjustment

Plus minus Keys (Pos.26 Fig.1)
In fluoroscopy the mA and kV values are simultaneously adjusted.
In normal condition work trough the keys ± kV/mA you operate on the kV and mA values. When activating the high dose function key (Pos.23 Fig. 1,) it is possible to attend to the high dose fluoroscopy values.

2.8.3 Manual-Automatic Adjustment

Selections keys (Pos.24-25 Fig.1)
To utilise the plus and minus ± kV-mA keys it is necessary to be on Data Procedure and to have selected an anatomical programme where the fluoroscopy is foreseen and have selected too the MANUAL adjustment.
The confirmation that the manual adjustment has been selected is given by the lighting of the luminous indicator over the key.
The manual selection being active,you can pass to the automatic adjustment by pushing the apposite key, in this case the luminous indicator is switched off and the automatic fluoroscopy indicator will light.
The procedure of automatic fluoroscopy enables the ± kV-mA keys and only increase or decrease signals arriving from the automatic device will be accepted.

2.8.4 High Dose

Key (Pos.23 Fig.1)
When activating the high dose function key (Pos.23 Fig.1) it is possible to have access in the high dose fluoroscopy field.

2.8.5 Fluoroscopy Time

Luminous numerical indicator (Pos.27 Fig.1)

Reset key (Pos.22 Fig.1)
The totalisator system of the real fluoro time can be selected between two ways having two different time limits.

The two time limits are the following:

- 5 minutes
- 90 minutes

Their selection can be made during the phase CONFIGURATION OF THE WORKING STATION and can be executed by the installation engineer.
5 minutes limit time means that when 4 minutes and 30 seconds of total fluoroscopy time has past, an acoustic indicator will sound intermittently and when the 5 minutes time has been reached, the fluoroscopy is automatically cut out. The acoustic indicator stays on up to when the fluoro request is in force.

If the fluoroscopy is requested again without resetting the time, only the acoustic indicator will sound.
The reset time key (Pos.22 Fig.1) is active at every totalled time period (from 0,01 to 5,00 minutes) both during fluoroscopy and during the stand by.
90 minutes limit time means that every 5 minutes we have an acoustic signal lasting for 30 seconds and the cut out of the fluoroscopy arrives only at the expiring of the 90 minutes.
The acoustic signal lasting for 30 seconds arrive 30 seconds before the expiring of each 5 minutes period and it can be reset during fluoroscopy by pushing the proper key (Pos.22 Fig.1).

The total fluoroscopy time (from 0,01 to 90 minutes) can be always reset under the condition that the generator is in stand by procedure.

2.8.6 X-Ray Exposure indicator

Yellow luminous Indicator (Pos.31 Fig.1)

The switching on of this indicator declares the presence of the console in the X-RAY FLUOROSCOPY procedure with emission of X-Rays from the tube involved in this specific work.

2.9 ALPHA-NUMERICAL INDICATOR

Luminous indicator (Pos.32 Fig.1)

This indicator is composed by two superimposed lines having 40 characters each. The indicator shows all the information concerning the values and the selections during every phase of generator work.

Values not shown are the ones provided with digital dedicated indicators.

2.9.1 Warning at the switching on.

At the unit switching on, the alphanumerical indicator shows for a determined time the following message:

WARNING: The unit can be dangerous both to the patient and the operator if the safety data and the operative instructions are not observed.

This means that the following risks are present:

RADIATION HAZARDS

It is dangerous for any person to operate this equipment without having appropriate training which have included instruction in the means for using X-Ray radiation without hazard to patient, user and surroundings.
The purpose of these instructions is to inform the user about the technical functioning of the equipment for the intended purpose(s);they do not cover any aspects of radiation protection or other aspects of safety relating to the application of the equipment.
The user must be aware of all regulations and requirements that may be applicable governing the installation and use of equipment producing ionising radiation for medical purpose.

ELECTRIC SHOCK HAZARD

Do not remove any high voltage cable connection to an X-Ray tube.
Note also that such a cable may retain an electric charge or be connected to other components retaining a charge after the equipment has been switched off.
Do not remove any covers or panels giving access to live parts.
Any cover requiring the use of a tool for its removal can be assumed to be in this category.

EXPLOSION HAZARD

This equipment is not classified as anaesthetic proof and may ignite flammable anaesthetics.
Flammable agents used for skin cleaning or disinfectant may also produce an explosion hazard..

HEALTH & SAFETY AT WORK

All the equipment manufactured and supplied by this Company has been tested and examined to ensure as far as is reasonably practicable,that it safe and without undue risk to the health when properly used.
The condition under which our equipment will operate safely and without undue risk to health are specified in our Operating Instructions and users should ensure that they fully understand the technical conditions regarding safe operating of the equipment and are conversant with and observe regulations and codes of practice which relate to X-Ray equipment.

It is also the duty of the employer to ensure that this employees fully understand the regulation and operating instructions.

2.9.2 Anatomical procedure

Control console is on the anatomical procedure when the alphanumerical luminous indicator shows on the upper line five names of anatomical organs and in the bottom line the name of five different projections.
You enter this procedure by pushing one key of the Anatomical vertical keys (Pos.21 Fig.1) or automatically when the unit is switched on after the SWITCHING ON WARNINGS.
In this procedure you can make the anatomical selection. The selection vertical keys (Pos.21 Fig.1) allow the choice of one of the seven levels where the body is divided in.
In each level five organs and five projection are stored.
The upper keys (Pos.1 Fig.1) allow the choice of one of the five organs, the down keys (Pos.4 Fig.1) allow the choice of the projection.
The selected organ and projection appear in capital letters.

2.9.3 Data procedure

The control console is in DATA procedure when the alphanumerical indicator gives the following information:

Upper line

- name of anatomical part
- name of the working station
- number of the X-Ray tube
- X-Ray tube focal spot
- mAs value preindication

Bottom line

- name of the projection
- total anode thermal units
- thermal units of the exposure in progress
- 14 character message field

The digital radiography indicators show the values stored in the anatomical programme. The digital fluoroscopy indicators show the value of the last made fluoro. The fluoro values are shown only if the present anatomical programme foresees fluoro work.
You enter this procedure performing the following action:

Request for RADIOGRAPHY PREPARATION
Request for FLUOROSCOPY

In this procedure the key for the selection of the radiography parameters are active under the condition that fluoroscopy or radiography preparation are not on. The keys for the selection of the fluoroscopy parameters are active and are de-activated only during the radiography preparation.
The exit of the console from the DATA procedure is done by pushing one of the vertical anatomical selection (Pos.21 Fig.1)key.
The selection made by one of the body level key gives the possibility of the choice of an anatomical programme.

Index Chapter 3

3 OPERATIONS

3.1 SWITCHING ON

3.1.1 Switching on

Key (Pos.2 Fig.1)

A pressure of this key switches on the unit if the main supply is connected to the generator.
After a 5 sec. delay from the pressure of the key, on the alphanumerical luminous indicator will appear the warning message and then the control console will change into the anatomical procedure.
The switching on again of the unit is possible only after five seconds, if this condition is not satisfied it turns off automatically.

3.1.2 Switching off

Key (Pos.3 Fig.1)

A pressure of this key switches off the unit.

3.1.3 Automatic switching off

The unit can be switched off automatically if the following conditions arrive.
During the stand by status there are three conditions:

a) Lack of one of the three feeding phases

b) Inversion of the cyclic ways of the feeding phases

c) Stand by grater than one hour without that a fluoroscopy or radiography preparation has been called.

During the status of radiography preparation and x-ray exposure the automatic switching off conditions are the following:

a) X-Ray tube filament current overload

b) Radiography current overload

c) Radiography time overepassing the preadjusted one

After the automatic unit switching off, it is sufficient to switch on the unit again by the Switch on key.
Should the automatic switching off be constant, it is better to stop the action of switching on and call for the technical service.
In this case it is better not to disconnect the feeding line (wall manual or automatic remote switch) so that the unit can store the cause of the malfunction making easier to the technical service its work.

3.2 RADIOGRAPHY

3.2.1 Anatomical Selection

1) By the switching on key (Pos.2 Fig.1) switch on the unit and wait for 5 seconds that the console enter the anatomical procedure.

2) By the vertical anatomical selection keys (Pos.21 Fig.1) select the body level.

3) By the anatomical part selection keys (Pos.1 Fig.1) select one of the five options.

4) By the projection selection keys (Pos.4 Fig.1) select one of the five options.

5) If there is the certainty that the data stored in that anatomical programme do not need any change, you can proceed to the x-ray request without further selections.

6) In a doubtful situation or if you wish to select a different kV value for lean or strong person,you have to push the kV lean or kV strong person key (Pos.13 Fig.1).
When this choice has been done you can proceed for the x-ray radiography request.

3.2.2 Anatomical selection with AEC

1) By the switching on key (Pos.2 Fig.1) switch on the unit and wait for 5 seconds that the console enter trough the anatomical procedure.

2) By the vertical anatomical selection keys (Pos.21 Fig.1) select the body level.

3) By the anatomical part selection key (Pos.1 Fig.1) select one of the five options.

4) By the projection selection keys (Pos.4 Fig.1) select one of the five options.

5) If there is the certainty that the data stored in that anatomical programme do not need any change you can proceed to the x-ray request without further selections.

6) In a doubtful situation or if you wish to select a different kV value for lean or strong person,you have to push the kV lean or kV strong person key (Pos.13 Fig.1).

7) Being the console in the DATA status it is possible to proceed to the change of the parameters of the automatic exposure device (AEC).
More in detail to the change of the darkness (see 2.4.4), to the selection of a new dominant (see 2.4.2) or to the change of the screens (see 2.4.3).

Or simply to the temporary exclusion of the AEC device (see 2.4.2 for the temporary switching off and 2.4.3 for the eventual switching on without exit from the anatomical programme).
When this choice is done you can proceed for the x-ray radiography request.

3.2.3 Free Technique

1) By the switching on key (Pos.2 Fig.1) switch on the unit and wait for 5 seconds that the console enter the anatomical procedure.

2) By the vertical anatomical selection keys (Pos.21 Fig.1) select the body level.

3) By the anatomical part selection keys (Pos.1 Fig.1) select one of the five options.

4) By the projection selection keys (Pos.4 Fig.1) select one of the five options.

5) In this status it is possible to read on the apposite luminous indicators the values of the radiography parameters stored in the anatomical programme.
By the keys in Pos. 10 - 11 - 12 of Fig.1 it is possible to make the wished changes.
You can make a selection of the working place using the keys Pos.6 Fig. 1.
When even if only one value has been changed, on the luminous alphanumerical indicator (Pos.32 Fig.1) appears the writing:

FREE TECHNIQUE.

6) After a time less than 0,5 sec on the alpha-numerical luminous indicator message side, if the new chosen parameters are compatible, will be present the writing:

READY - PREP

or the cause of not acceptance of the x-ray preparation request will be shown.
This calculation and messages situation is obtained not only pushing the ENTER key but even with a request of X-RAY PREPARATION.
If the writing READY - PREPARATION does not appear but an alarm message is shown, automatically the control console blocks itself and an acoustic signal sounds.
This force the operator to notice on the console the cause of this alarm and then to proceed to new choices it is necessary to push the reset key (Pos.30 Fig.1).
For the description of the Alarm Messages see at chapter 3.5.

3.2.4 Free technique with AEC

1) By the switching on key (Pos.2 Fig.1) switch on the unit and wait for 5 seconds that the console enter the anatomical procedure.

2) By the vertical anatomical selection keys (Pos.21 Fig.1) select the body level.

3) By the anatomical part selection keys (Pos.1 Fig.1) select one of the five options.

4) By the projection selection keys (Pos.4 Fig.1) select one of the five options.

5) In this status you can read on the luminous indicators the values of the radiography parameters stored on the anatomical programme.
By the keys pos. 10 - 11 Fig.1 you can do the wished changes.
You can make, also, the selection of the working place using keys Pos.6 Fig. 1.
When even if only one value has been changed, on the luminous alphanumerical indicator (Pos.32 Fig.1) appears the writing:

FREE SELECT.

6) Being the console in DATA procedure,it is possible to proceed to the change of the AEC parameters.
More in detail to the change of the darkness (see 2.4.4),to the selections of the new fields (see 2.4.2) or to the changes of the screens (see 2.4.3) or simply to the temporary exclusion of the AEC device (see 2.4.2 for the temporary switching of and 2.4.3 for the switching on again) without exiting from the anatomical programme.

7) After a time less than 0,5 sec on the alpha-numerical luminous indicator message side, if the new chosen parameters are compatible, will be present the writing:

READY FOR PREPARATION

or the cause of not acceptance of the x-ray preparation request will be shown.
This calculation and messages situation is obtained not only pushing the ENTER key but even with a request of X-RAY PREPARATION.
If the writing READY FOR PREPARATION does not appear but an alarm message is shown, automatically the control console blocks itself and an acoustic signal sounds.
This force the operator to notice on the console the cause of this alarm and then to proceed to new choices it is necessary to push the reset key (Pos.30 Fig.1).
For the Alarm Messages description, see paragraph 3.5.

3.3 FLUOROSCOPY

3.3.1 Manual - Automatic Adjustment

1) By the switching on key (Pos.2 Fig.1) switch on the unit and wait for 5 seconds that the console enter the anatomical procedure.

2) By the vertical anatomical selection keys (Pos.21 Fig.1) select the body level.

3) By the anatomical part selection keys (Pos.1 Fig.1) select one of the five options.

4) By the projection selection keys (Pos.4 Fig.1) select one of the five options.

5) If there is the certainty that the stored data in this anatomical programme do not need any change, you can proceed to the request for x-ray fluoroscopy without further selections.

   Doing that the console changes automatically to the DATA procedure and the automatic adjustment of fluoroscopy parameters (kV-mA) will be in force.
   Then the values of kV-mA parameters are adjusted from the automatic brightness device of the imagine intensifier.

   In this case the kV-mA keys (Pos.26 Fig.1) are not active.

   The introduction of the automatic adjustment is be done automatically only if the Imagine Intensifier is supplied with this device, otherwise the manual technique is selected automatically with an average value of 80 kV or with the last adjusted value.

   If the start of fluoroscopy is made automatically by the automatic adjustment device, it is possible in any case by releasing the fluoroscopy, to pass to the manual adjustment by pushing the MANUAL key (Pos.24 Fig.1).
   The AUTOMATIC or MANUAL procedure will be confirmed from the lighting of the relative luminous key indicator.
   On the manual adjustment procedure the ± kV-mA keys (Pos.26 Fig.1) (See par. 2.7.2, pag. 31) are active.

3.4 CHANGE OF THE ANATOMICAL PROGRAMMES

1) By the switching on key (Pos.2 Fig.1) switch on the unit and wait for 5 seconds that the console enter the anatomical procedure.

2) Turn the key switch (placed on the console) from position ZERO to position ONE. On the luminous alphanumerical indicator for a few seconds is shown the writing:

CHANGE PROGRAMS

then the indicator will revert to the anatomical procedure.

3) In this status the three anatomical selections groups are active (Pos. 21-1-4 Fig.1)
Trough the keys for the anatomical vertical selection (Pos.21 Fig.1) select the body level.
Trough the anatomical selection keys (Pos.1 Fig.1) select one of the five organs.
Trough the projections selection keys (Pos.4 Fig.1) select one of the five projections.

4) On the left side of the alpha numerical top line is shown the writing:

ORGAN TUBE 1220 PROJECTION DIGITAL 064

This written text and the future one is function of the programme being modified. The selection of the organ name is made by the keys (Pos. 1 Keys n.4 and 5 Fig.1) running forward and backward the content of the vocabulary.
The selection of the projection name is made by the keys (Pos.4 Keys n.9 and 10 Fig.1) running forward and backward the content of the vocabulary.

5) When this above written phase is ended, please confirm the selection by pushing >5R key (Pos.23 Fig.1); the alpha-numerical indicator will be modified as follows (if the confirmation is made trough the triangular key (Pos.19,Fig.1) the content of the Programme is erased):

```
TUBE 1                          DIGITAL RA  T1 LF   PRE
mAs 10,0
DIGITAL                      kHUT        kHU 6  AEC
Sens  xxx
```

The control console is now in a similar situation as the one in DATA mode, so it is possible to modify all radiography parameters, and to clear or not the Fluoroscopy or theAEC, while the X-Ray preparation and X-Ray exposure keys with the Fluoroscopy footswitch are inhibited .
On the Radiography numerical display are shown the kV values associated to the selected person (Pos13,Fig.1) as for mA and Time values. On the Fluoroscopy display are shown the Fluoro default values,if fluoro has been entered on the work station and into the selected programme.
It is possible to store the data shown on the control console by the key >5R (Pos.23, Fig.1); in this situation the >5R push-button has the function as for the enter key. It is possible in every moment to exit from the anatomical programming procedure without storing the entered data by turning the key on vertical position.

Lean, normal, large kV adjustment

On the kV red numeric display (Pos.7 Fig.1) is shown the kV value of the selected person (the selected person push button has its led lit) (Pos.13 Fig.1); Using ± kV it is possible to change to a new value. To each person it is possible to associate a different kV value.
At the start up of the programme, the kV value shown, is the one of the normal person, then trough the person size selection keys (Pos.13,Fig.1) you can visualise and then to change if wished the kV value relating to the three person size.

mA radiography adjustment

It is possible to change the mA value on the anatomical programme trough the ± mA Keys (Pos.11,Fig.1)
The range of the mA RADIOGRAPHY values that can be selected is:

SMALL FOCUS

0008 - 0012 - 0025 - 0050 - 0075 - 0100 - 0150 - 0200 - 0300

LARGE FOCUS

25- 50- 75 - 100 - 150 - 200 - 300 - 400 - 500 - 600 $_{50\ kW}$ 700 - 800 $_{60\ kW}$ - 1000 $_{80\ kW}$ - 1250 $_{100\ kW}$ mA

The above mentioned values are given in a four-figure number and are selected by the ± mA keys (Pos.11 Fig.1).

The selection of the focus for the values 25 - 50 - 75 100 - 150 - 200 - 300 mA, common to both focus (small and large), is made arriving from 12 mA if you wish that these values belong to the SMALL FOCUS or arriving from 400 mA if you wish that they belong to the LARGE FOCUSor simply pushing the proper keys (Pos.14, Fig.1).
The focus selection is shown on the upper line of the alphanumerical display (Pos.32,Fig.1) by the FS or FL writing, and also by the led lit on the push-button of the selected one focus.

Time radiography adjustment

It is possible to select the new time value on the anatomical programme trough the ± sec keys (Pos.12,Fig.1)

At every time change in the alpha-numerical indicator also the mAs value preindication (upper line at left) and the kHU value are reset; it is possible, in this way, to choose the time in relation of preindicated mAs value. The range of the RADIOGRAPHY times is the following:

0.002 - 0.003 - 0.004 - 0.005 - 0.006 - 0.008
0.010 - 0.012 - 0.016 - 0.020 - 0.025 - 0.030
0.040 - 0.050 - 0.060 - 0.080 - 0.100 - 0.120
0.160 - 0.200 - 0.250 - 0.300 - 0.400 - 0.500
0.600 - 0.800 - 1.000 - 1.200 - 1.600 - 2.000
2.500 - 3.000 - 4.000 - 5.000 - 6.000 - 8.000
10.00 - 15.00 - 20.00 sec.

The indication is given in milliseconds up to 8 sec.; Indication is given in seconds for the times 10 - 15 - 20 seconds.

When selecting these values you must consider the product TIME - mA. This product must not overpass the 600 mAs value.

The value of RADIOGRAPHY TIME here selected is the real Time value when the AUTOMATIC EXPOSURE CONTROL AEC device is not on use. When the AEC is in use, the value of the limit time is calculated by the computer in function of the power of the X-RAY TUBE used.

Work station selection

Using the work station push-button (Pos.6 Fig.1) it is possible to couple the anatomical programme with the wished work station.
For this installation the given configuration is the following:

WORKING STATION	EXAMINATION TABLE	TUBE NUMBER
1		
2		
3		
4		
5		

When the selection is made, immediately the name of the EXAMINATION TABLE changes and the selected name is shown together with the tube number to which the new examination table has been associated.The led placed on the work station selected key is lit too.

Expomat parameters

If the work station is complete with the Automatic Exposure Device, You can activate it by using the screen pushbuttons (Pos.20,Fig.1), for the selected anatomical programme you are changing.

If you wish, even if there is a ionisation chamber installed in this Work Station, for this particular Anatomical Programme to not utilise the AEC, it is sufficient to exclude all the three fields.(Pos.17,fig.1)to obtain it.

If the AEC has been selected, it is possible to modify its sensibility.The associated value to it is shown on the bottom line of the alpha-numerical indicator;this value can be modified by the ± sensibility keys (Pos.18,Fig.1) and the value it can assume is within 020 and 300.

The figure 100 shows that the coefficient of variation of the SENSIBILITY from the base reference adjustment of the considered CHAMBER is 1, that is the BASE CHAMBER SENSIBILITY. This value can be modified between 020 and 300. The 020 value means that the SENSIBILITY has been reduced to 1/5 from the base sensibility of the chamber (100/5 = 20). Then the radiography time will be increased and the darkness too. The 300 value means that the SENSIBILITY has increased three times the base sensibility of the chamber. Then the radiography time will be cut and the darkness will decrease.

Fluoro activation

If the selected work station has associated the possibility of making Fluoroscopy, You can,using the Automatic Fluoro push-button (Pos.25,Fig.1), enter the Fluoroscopy in the selected anatomical

programme.

Should you not need the FLUOROSCOPY possibility in this ANATOMICAL PROGRAMME, push the AUTOMATIC key and immediately the two digital indicators of FLUOROSCOPY will switch off.

6) At the end, when you are sure that all the parameters are correctly selected and you wish store them , push the 5R> push-button (Pos.23 Fig.1); doing that the anatomical programme is stored.
During the data storing on the alpha numerical indicator it appears the writing:

Please Wait

The end of parameters storing is signalled by a buzzer.
Then the selection of a new ANATOMICAL PROGRAMME is proposed to start a new programme change. Now you can proceed to a further modification or, by turning the key in vertical position, to revert to the normal work.

3.5 ALARM MESSAGES

3.5.1 General information

The messages that are shown on the alpha numerical indicator are three types:informative,indicative and alarming.They represent the status where the unit is located in that very moment.
We define as:
a) INDICATIONS, the messages that do not generate any alarm,they represent the status where the unit is during its normal operation.
b) information,the messages that require a manual or automatic action to reset the normal work conditions.Generally this is due to a wrong selection or wrong manoeuvre of the user,then it is sufficient to remove the cause and proceed to further operations.
c) ALARMS , the messages that need a reset action to settle again the normal work conditions. Generally this is due to a faulty working of the unit, then after the reset, it is possible to continue.

If the alarm cause stays, you have to call the technical service.

3.5.2 INDICATION MESSAGES

We define as INDICATIONS the messages that allow the operator to understand in which status of procedure the generator is. They are:

(FREE SELECT)	Free technique adjustment It is a static condition advising that the x-ray parameters at present visualised are not a part of an anatomical programme but they are the result of further adjustments.
(READY-PREP.)	Ready for x-ray preparation It is a static condition advising that the x-ray parameters at present visualised have been checked and that the exposure is possible. This status can be abandoned too by pressing one push button concerning the anatomical selection (Pos.21,Fig.1)or by a change of the radiography parameters (kV - mA - sec).
(PREPARATION)	Preparation in progress It is a dynamic condition lasting 1,5 or max 3,0 seconds. From this status you proceed to the condition of Ready for X-Ray (READY - X-RAY) or to a condition of alarm, or to an alarm.
(READY EXPOSURE)	Ready for radiography x-Ray exposure

It is a static condition where the user is advised that all is ready for a prompt x-ray exposure. The unit is waiting for the signal arriving by pushing of the exposure button.

(POTTER ACTIVE) Potter call
It is a dynamic short time condition where the Potter has been energised by the generator and its reply is waited to start the x-ray exposures. This dynamic condition can revert in a static one if the Potter, for any reason, does not give the signal to the generator that it is in a position to accept the exposure.

(X-RAY) X-Ray on
It is a dynamic condition of x-ray exposure.
Exit from this condition is given by the following causes:
a) natural time end of the exposure
b) time end of the exposure caused by an automatic exposure device
c) exposure key release from the user
d) automatic cut-off explained from the alarm messages

(END RAD EXPOS.) X-Ray exposure end
It is a condition lasting up to the moment that user keep pushed the x-ray push-button, provided that the exposure is normally ended for the expiring of the prefixed time or by the proper and correct work of the automatic exposure device (AEC).

(FLUORO START) Fluoro X-Ray preparation start

(FLUOROCONTaut) Fluoro X-Ray on with kV-mA automatic adjustment. It is the condition of x-ray fluoroscopy in progress with automatic adjustment selection.

(FLUOROCONTman) Fluoro X-Ray on with kV-mA manual adjustment

It is the condition of x-ray fluoroscopy in progress with manual adjustment selection.00

(FLUORO PULSaut) Pulse fluoro X-Ray on with kV-mA automatic adjustment
It is the condition of x-ray fluoroscopy in progress with automatic adjustment selection.

(FLUORO PULSman) Pulse fluoro X-Ray on with kV-mA manual adjustment

3.5.2 INFORMATION MESSAGES

The messages that belong to this family are :

[kV TOO HIGH] Wrong radiographic parameter.
It shows to the user that the selected kV values are not compatible with the set mA value or with the kV maximum value permitted from the x-ray tube.

[kV TOO LOW] Wrong radiographic parameter.
It shows to the user that the selected kV values are not compatible with the set mA value

[mAs TOO HIGH] Wrong radiographic parameter.
It shows to the user that the selected mA and time value are grater than the maximum permitted (600 mAs)

[mAs TOO LOW] Wrong radiographic parameter.
It shows to the user that the selected mA and time value are lower to the minimum permitted (0,4mAs)

[POWER TOO HIGH] Wrong radiographic parameter.
Power overcharge. It shows that the kV mA combination overpasses the maximum generator power. You have to change the kV or mA value to clear the work.

[TUBE OVERLOAD] X-Ray tube overload
It shows to the user that the mA, kV and time selected value combination overpasses the maximum generator power admitted in this time, that is the maximum load of the tube.

[kHUT TOO HIGH] Thermal X-Ray tube overload
It shows that the heat quantity accumulated in the anode of the X-Ray tube overpasses the maximum limits fixed by the manufacturer of the tube. You have to wait for some time and after you can proceed into your job. Being the console in the DATA procedure, it is possible to read on the bottom line of the alphanumerical indicator the residual thermal units accumulated in the anode (kHU)

[PARAMETERS ERR] Faulty X-Ray parameters
This is a dynamic condition and shows to the user that the selected parameters for the exposure are faulty, they overpass the maximum load or the mAs minimum or maximum value.

[NOT EXISTENT] Anatomical programme not existent
The anatomical selected programme does not contains data, it is missing all the parameters necessary for performing an exposure.You have to proceed to the selection of another programme utilising one of the vertical body selection areas (Pos.21,Fig.1).

[?HEAT RADIO ?] Filament Heating not possible.
We have this message at the end of the CHECKING phase when the filament heating value calculated by the micro computer overpasses the limit fixed by the tube manufacturer.This arrives at high mA values with low kV values. It is sufficient to reduce the mA radiography value or to increase the kV radiography value to go on working.

[FLUORO TIMEOUT] 5 minutes full fluoroscopy achievement
Alarm present during the fluoroscopy work.It is sufficient to make the reset by the proper push button (Pos.22,Fig.1) and then to go on working.

3.5.3 ALARM MESSAGES

These messages need a reset action (Pos.30,Fig.1) to settle again the normal work conditions.

TIME-OUT PREP.	Maximum preparation time safety. This alarm shows that 20 seconds have elapsed from the start of the x-ray preparation and no exposure has been performed.In case you are working with a cine digital unit, this alarm can signal that the time correct sequence has not been received.
TOMO PREP. SAF	Tomographe safety This message shows that a preparation on work station n. 5 has been requested (Automatic Tomography) having the AEC device included and angles and speeds have not been selected on the tomo unit.
AEC NOT READY	AEC safety. This message shows that in preparation the AEC device is not ready to the dose measurement.
ANODE SAFETY	Anode rotation safety This alarm arrives at the end of the x-ray preparation procedure due to a faulty performance of the x-ray tube anode rotation.
[PWS SAFETY]	Power Supply safety During preparation the main inverter power contactor doesn't close. The capacitors of the converter are not charged.
[DIG.FIL.SAFETY]	Filament heating safety This message shows that during preparation the selected focal spot is switched off.
[GENERAL SAFETY]	General safety Many conditions make this alarm active: a) system clock on control printed circuit board is faulty b) primary current crossed the maximum permitted value c) phase cycle is wrong d) Tube current crossed the maximum

permitted value
e) kV crossed the maximum permitted value

[INVERTER SAF.] Inverter safety
It shows that High frequency converter is in an alarm status. (Bridge not balanced) This status can be accidental, then reset it and proceed with a new preparation.

[HT-CHANGE OVER] HT change over safety
You have this alarm during the EXE procedure due to a wrong operation of the HV change over making the selection of the X-Ray tube.

[DOOR SAFETY] Opening of a x-ray room controlled door
This alarm is shown when a room-controlled door is open when a request for fluoroscopy or radiography preparation is made. Safety give the work interdiction too during fluoroscopy or radiography.

[LOW kV SAFETY] Low kV safety
This alarm shows that during fluoroscopy or radiography the kV real value is not the same as the one by you set.

[AEC DOSE SAF.] Minimum AEC dose safety
This alarm shows that during the first millisecond of AEC exposure the measured istantaneous dose is not sufficient to end correctly the exposure.

[AEC REL. SAFETY] X-Ray push button release safety in AEC mode

This alarm shows that the exposure has not been cut by the AEC but from the release of the preparation or exposure button.

[AEC TIME-OUT] AEC Safety
This alarm shows that the exposure has not been cut by the AEC within the limit time permitted from the tube maximum load.

[TOMO REL.SAF.] AEC Safety x-ray push button release
This alarm shows that the exposure has not been cut by the tomographe pendulation but

from the preparation or exposure button release

[TOMO TIME-OUT] AEC Safety in tomography
This alarm shows that the exposure has not been cut by the tomographe within the limit time permitted by the tube maximum load.

[MAX TOMO SAF.] High dose AEC Safety in tomography
This alarm shows that kV value set by the user is to high to accomplish the exposure in a correct way.

[MIN TOMO SAF.] Low dose AEC Safety in tomography
This alarm shows that kV value set by the user is to low to accomplish the exposure in a correct way.

[mA RADIO SAF.] mA Safety
During radiography time the computer has detected a series of mA values too out of the regulation range, so it decided that was impossible to reach the correct value.

[kV RADIO SAF.] kV safety
During the exposure the computer noticed a series of kV values outside the nominal adjustment value and decided that it was not possible to reach the correct value

[RAY OFF SAFETY] End of exposure safety
The computer at the end of the exposure did not succeed to drop the HT, then the unit is switched off.

[THERMAL OVERLD] Thermal overheating safety
The alarm arrives when the heat quantity cumulated in the anode of the X-Ray tube exceed the limits fixed by the manufacturer. You must wait for the anode cooling.

[?HEAT FLUORO?] Fluoro heating safety
This message shows that the microprocessor is not in a position to evaluate the small focus heating filament requested value to obtain the fluoro mA indicated on the control panel.

[KV FLUORO SAF.] kV fluoroscopy protection

This message shows that the microprocessor during the fluoroscopy evaluated the kV real fluoro value outside the variation interval

[mA FLUORO SAF.] mA fluoroscopy protection
This message shows that the microprocessor during the fluoroscopy evaluated the mA real fluoro value outside the variation interval

[TU-1 THERM-SAF] Tube n.1 thermal safety
This message shows that the microprocessor during x-ray radiography preparation found the tube n. 1 thermal safety active. Wait for the tube cooling.

[TU-2 THERM-SAF] Tube n.2 thermal safety
This message shows that the microprocessor during x-ray radiography preparation found the tube n. 2 thermal safety active. Wait for the tube cooling.

[TU-3 THERM-SAF] Tube n.3 thermal safety
This message shows that the microprocessor during x-ray radiography preparation found the tube n. 3 thermal safety active. Wait for the tube cooling.

[BEAM FAULT SAF.] Converter not ready safety
This message shows that the converter does not talk with the ready signal at the request of x-ray fluoro or radio from the microprocessor.

[X-RAY CMD ON] Press and Release every control (Hand switches and Footswitches) to be sure that no-one is still pressed.
Press key to proceed.
If the error window appear again and the generator do not evolve in Stand-By mode switch OFF the generator and ON again using the I and O keys on the control console.

The same error can happen when the external accessory asserts a “ready” state before the generator’s “state” question. In this case call the technical service for a system revision.

If the problem remains call the technical service indicating the ALARM CODE “172”.

Index Chapter 4

4 SAFETY PRECAUTION

4.1 GENERAL NOTICE

Laws or regulations for both operating and/or services must be respected.

To assure patient, operator and people that could came in contact with the X-Ray system is better to make a service every 12 month.
More severe control must be done if generator is working out of the specified range of compliance or in condition that do not meet manufacturer specifications reported in the tables.

It is better to contact your dealer about services and maintenance contract

The installation parts that can be dangerous must be controlled every 12 months by qualified people and if necessary changed.

If laws or regulations about maintenance more restrictive and severe exist they must be complied and respected.

Before using the equipment, the operator has to check that all functionality is integer. Pay attention to the leds, display and alpha-numerical indicators in order to control that no fault occurs.
The X-Ray yellow lamp must flash only for radiography or fluoroscopy time.
If this indicator remain lit the equipment must be switched off and you have to call the technical service.

Manufacturer and installation people disclaims all responsibility on any equipment malfunctioning if:

- installation, functional extensions, calibration, maintenance, have not been done by people qualified by us.
- components directly involved in generator safety are replaced with other not reported in schematics
- electrical installation doesn't meet IEC 601 - 2 -7 regulation
- misuse of equipment

4.2 Safety

4.2.1 Safety Against Explosion

This equipment was not designed to work in areas where explosion hazard can occur.

4.2.2 Safety Against Radiation

Operator must follow all the regulations and facilities on safety against radiation hazard.

4.2.3 Functional Test of Automatic Systems

Caution!
Before starting with tests, protective wear has to be put on, a safety distance must be respected, and - if necessary - use personal dosimeter far all the tests requiring X-Ray emission.

Automatic exposure test
Close the collimator. If necessary cover it.
Make one exposure by constantly pushing the X-Ray button and be sure that A.E.C. is activated.
The X-Ray yellow lamp must lit for all exposure time.
Warning! don't take care about the alarm that appears when exposure is blocked, this is quite normal if the collimator is closed and it means that A.E.C. is working well.

Open the collimator.
Make another exposure. In this case the X-Ray yellow lamp must be lit for a very short time < 0.1 s.

Automatic Brightness control test
Close the collimator. If necessary cover it.

Make a fluoroscopy, maintain constantly pushed the fluoro footswitch and be sure that A.B.S. is activated.
The X-Ray yellow lamp must lit for all the fluoro time.
Warning! the dose, reported on the console generator by kV-mA meter on the left display, must go to the maximum (maximum value of kV-mA).

Open collimator.
Make a new fluoroscopy. In this case the X-Ray yellow lamp must lit and the dose has to go down to the minimum.
Release fluoro.

4.2.4 Cleaning

Equipment must turned off before making any cleaning action
Clean it by using cotton cloth and don't use abrasive detergent.
Do not use organic solvent or any kind of detergent containing any kind of solvent.

Do not utilise Spray, It can penetrate into the equipment and damage the electronics inside.

To disinfect equipment parts we recommend to use a water solution based on aldeide. We recommend to not utilise aggressive detergent based on Alcool.

Do not utilise Spray disinfectant. Some of its components are harmful for the health

4.3 Performance and Safety Tests

4.3.1 Daily Tests

Before starting with examinations make a visual inspection of the equipment.
During examinations look for the right functioning of the X-Ray yellow indicator.

4.3.2 Monthly Tests

Make test reported in the page behind on good A.E.C. (option) and A.B.S. (option) working.

4.3.3 Annual Service

In order to maintain all the functions of the equipment we recommend an annual control made by people qualified by us.

If a malfunctioning occurs, call the technical service:

Address of local dealer:

_____

_____

_____

_____

Index Appendix

Appendix A Simbology

Electrical Symbol

3~	3 Phase
I	Close (Line ON)
O	Open (Line OFF)
L1	Phase 1
L2	Phase 2
L3	Phase 3
	Attention High Voltage
	It is forbidden to work on electrical equipments under tension
	Ground

General Symbol

	European Mark CE
	Equipments type B IEC601
	Attention Read the Documentation
	Radiography
	Fluoroscopy
	X-Ray

Graphic Symbol

	Start Sequence
	Press Key
	Capability of press key
	Programming Keylock Position
	Normal Operating Keylock Position
	Acoustic Message (Beep)
	Read Dictionary
	Make Exposure
	Switch On Fluoroscopy

Console Symbol

	ON key
	OFF key
	Reset Allarm
1	Working Station n.1
2	Working Station n.2
3	Working Station n.3
4	Working Station n.4
5	Working Station n.5
	Small Person
	Normal Person
	Large Person
	Small Focus
	Large Focus

	Function Key
	Dominant n.1
	Dominant n.2
	Dominant n.3
	Chamber Field AEC n.1
	Chamber Field AEC n.2
	Chamber Field AEC n.3
	Fluoroscopy Timer Reset
>5R	Fluoroscopy High Dose Selection
	Manual Fluoroscopy Selection
	Automatic Fluoroscopy Selection
	Decrease Parameter
	Increase Parameter
A.....G	Anatomical Vertical Selection

Index Section 2

1 Icons Directory

Start Sequence

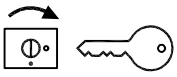
Press this key only if previous operating working-way was different from the current one

Key Press

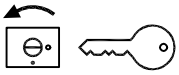
Press the specified key

Possibility to Press a Key

Pressing the specified key is conditioned by:
- **operator's wish to change a pre-programmed walue**
- **the presence of a particular (optional) device**

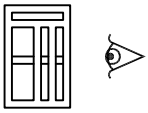


Programming Keylock Position



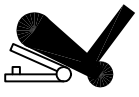
Normal Operating Keylock Position

Acoustic Message (Beep)



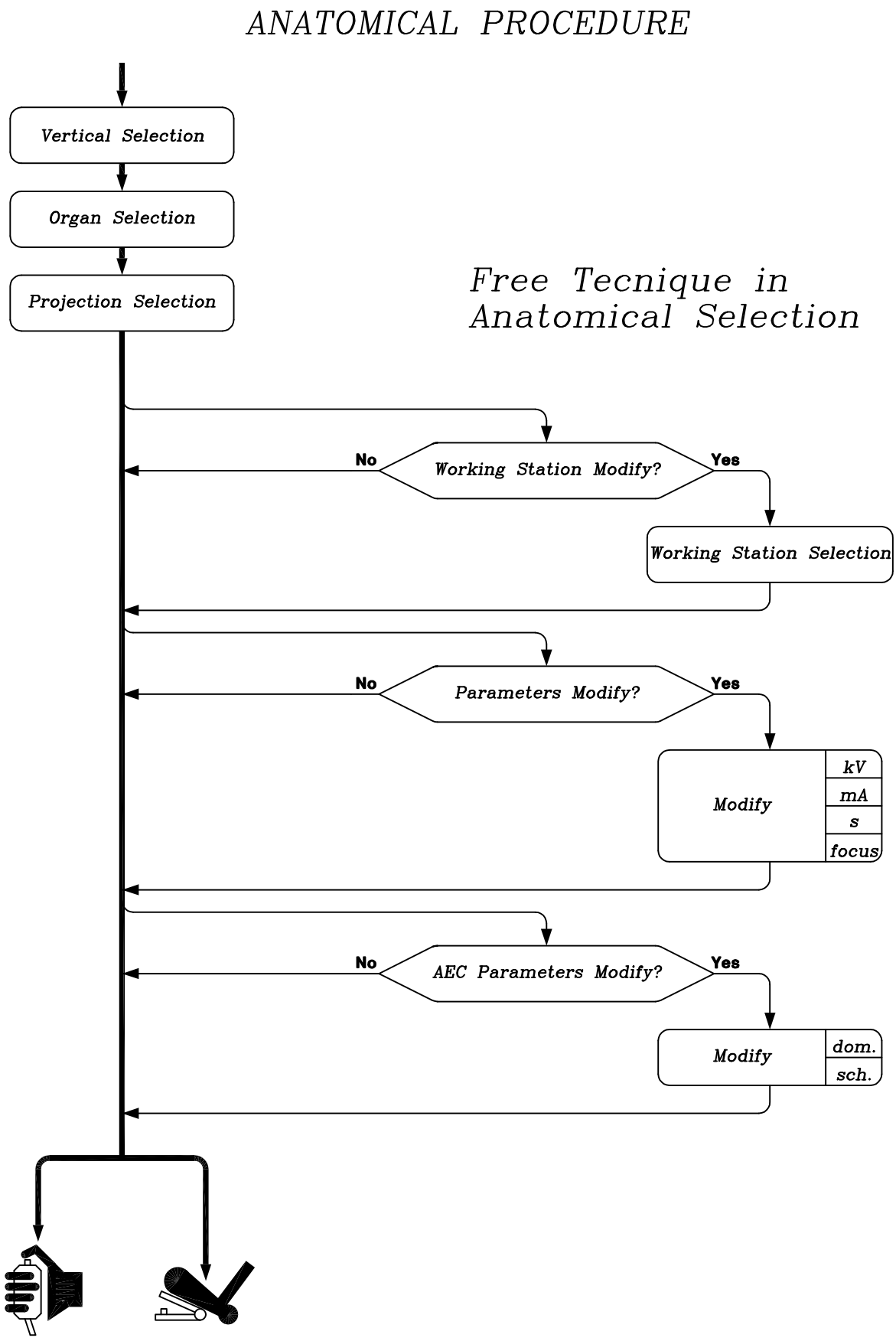
Read a Term from the Dictionary

Make Exposure



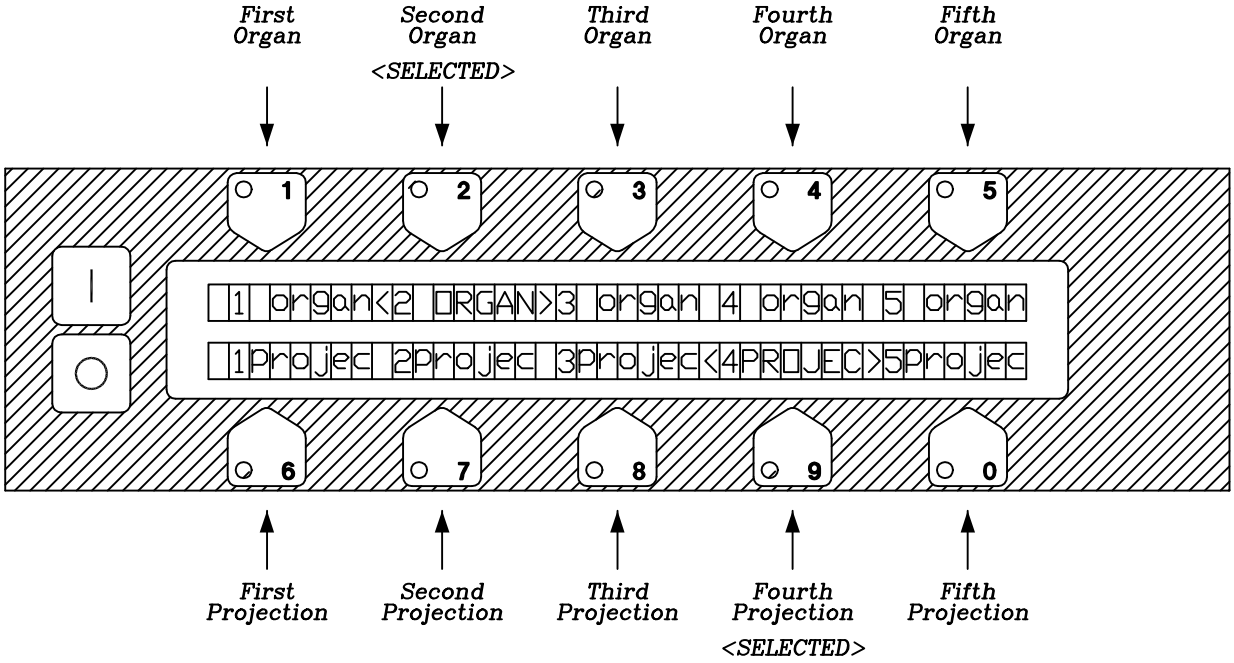
Switch On Fluoroscopy

2 Operating Remote Generator's Console

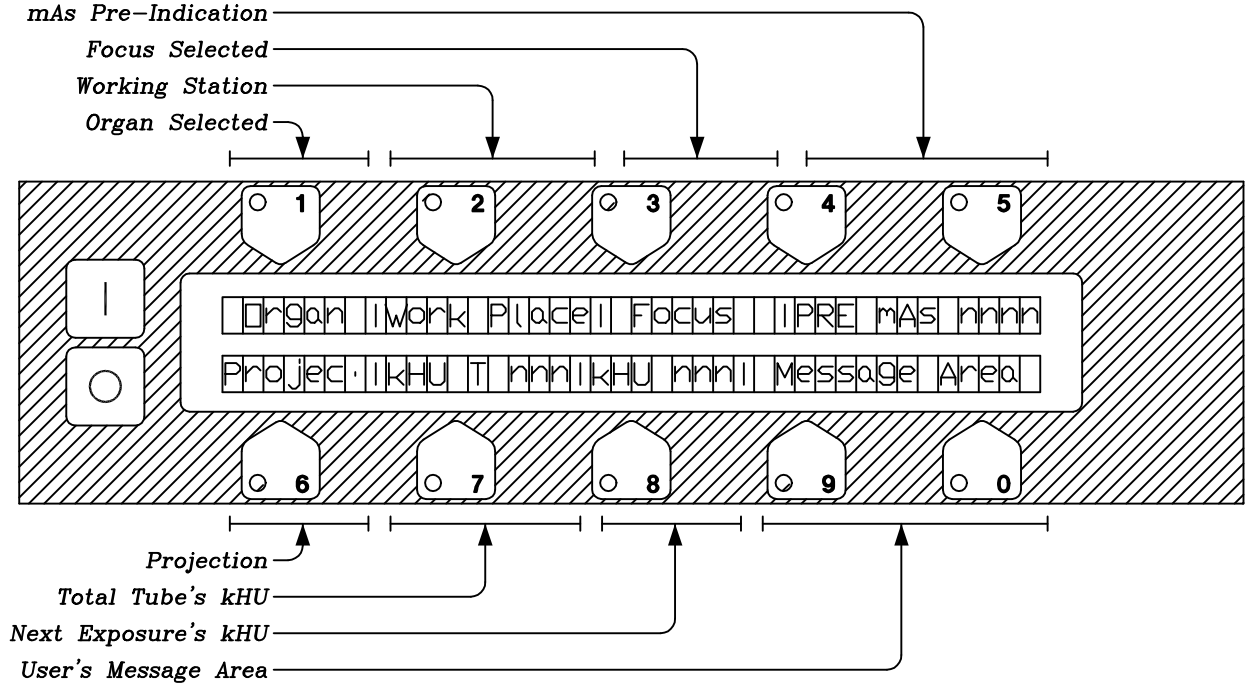


3 FIP Format

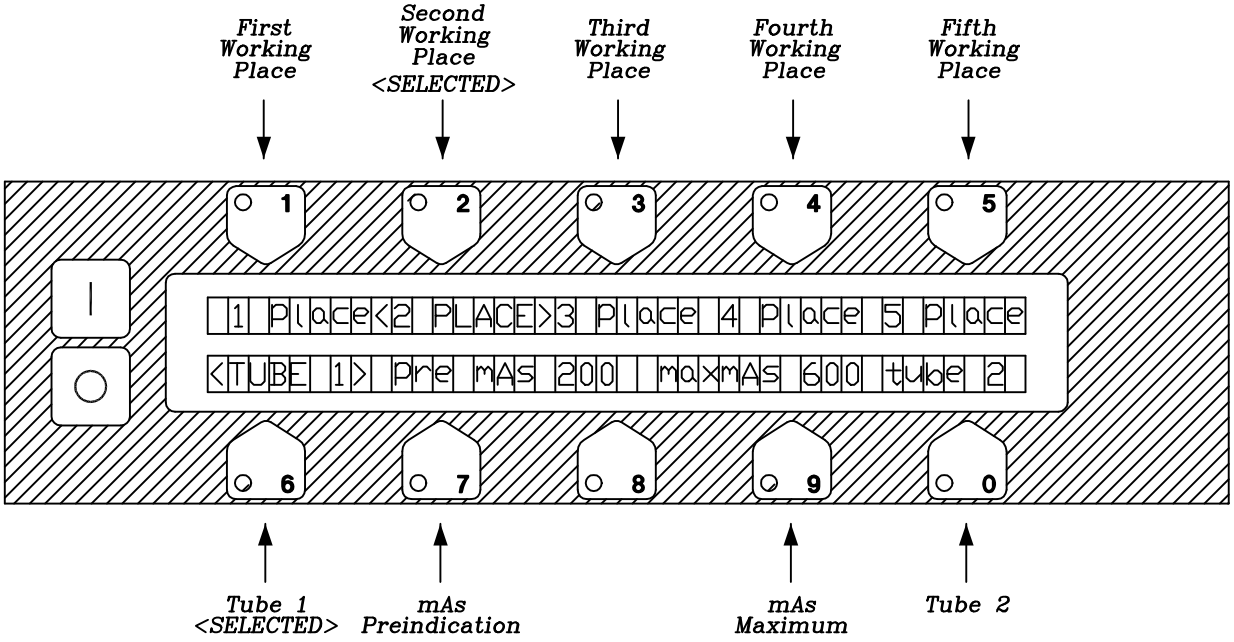
ANATOMICAL SELECTION FIP Format



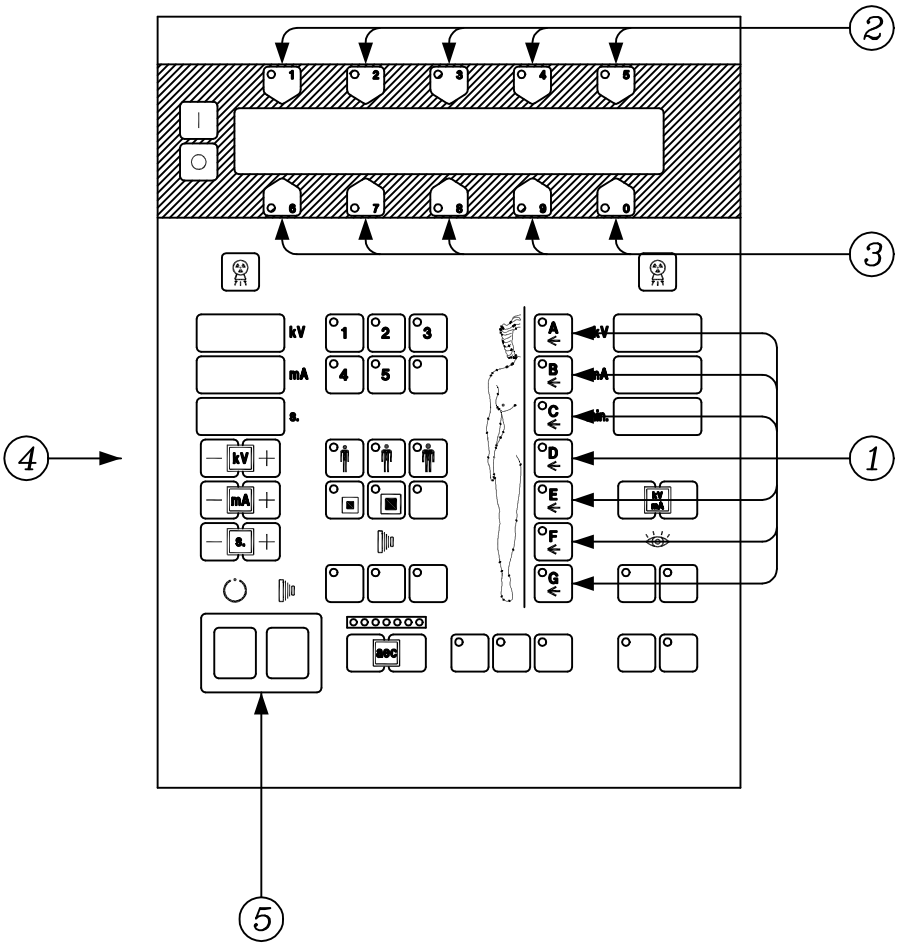
OPERATING STATUS (DATA) FIP Format



4 FIP format in Falling Load



5 Anatomical Procedure



1 *Anatomical Working–Way Selection*
Anatomical Vertical Level Selection

2 *Organ Selection*

3 *Projection Selection*

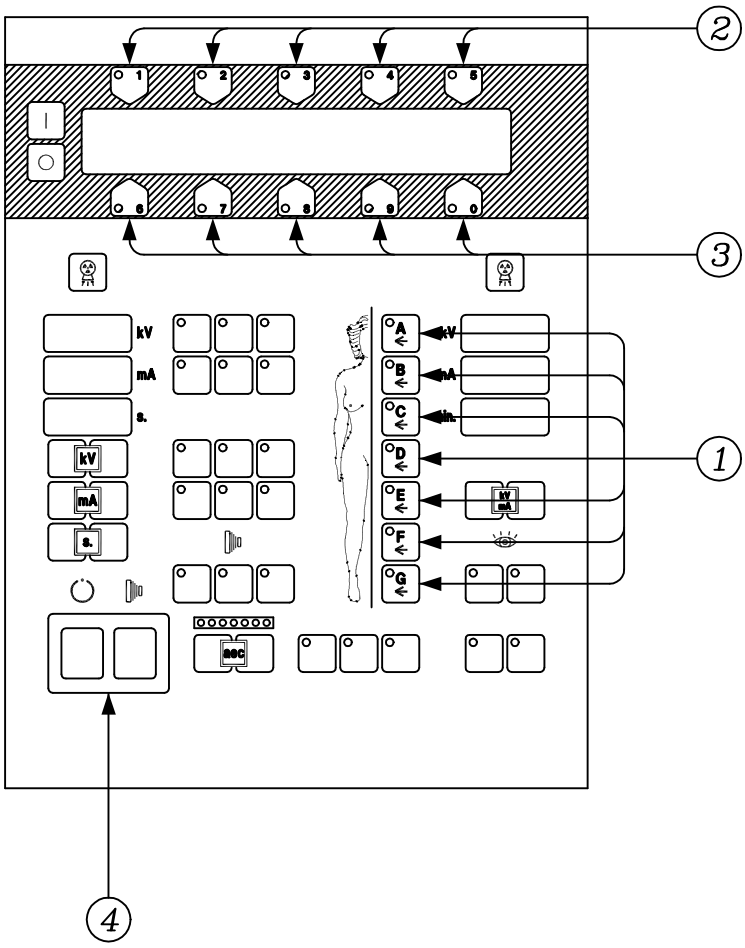
4 *Exposure Parameters Display & Modify*

Adaptation to Patient Trasparency Possibility

Override Programmed Exposure Parameters Possibility

5 *Exposure*

6 Quick Anatomical Procedure



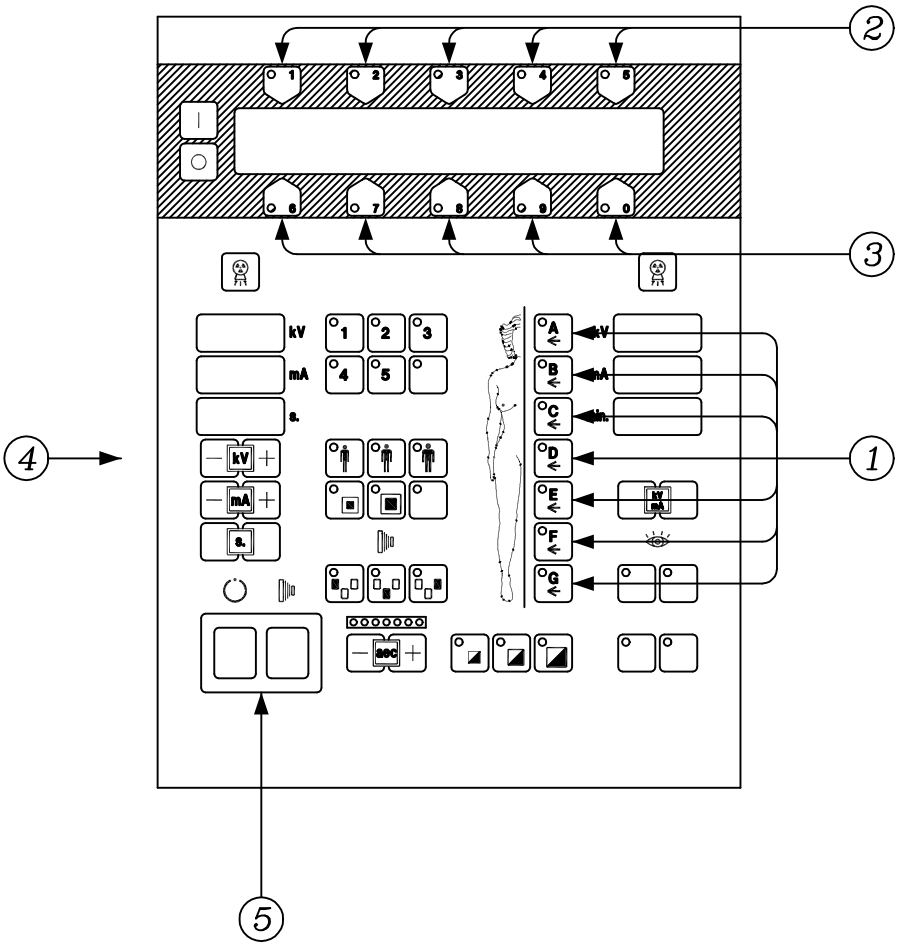
1 — *Anatomical Working–Way Selection*
Anatomical Vertical Level Selection

2 — *Organ Selection*

3 — *Projection Selection*

4 — *Exposure*

7 AEC Assisted Anatomical Procedure



1 *Anatomical Working–Way Selection*
Anatomical Vertical Level Selection

2 *Organ Selection*

3 *Projection Selection*

4 *Exposure Parameters Display & Modify*

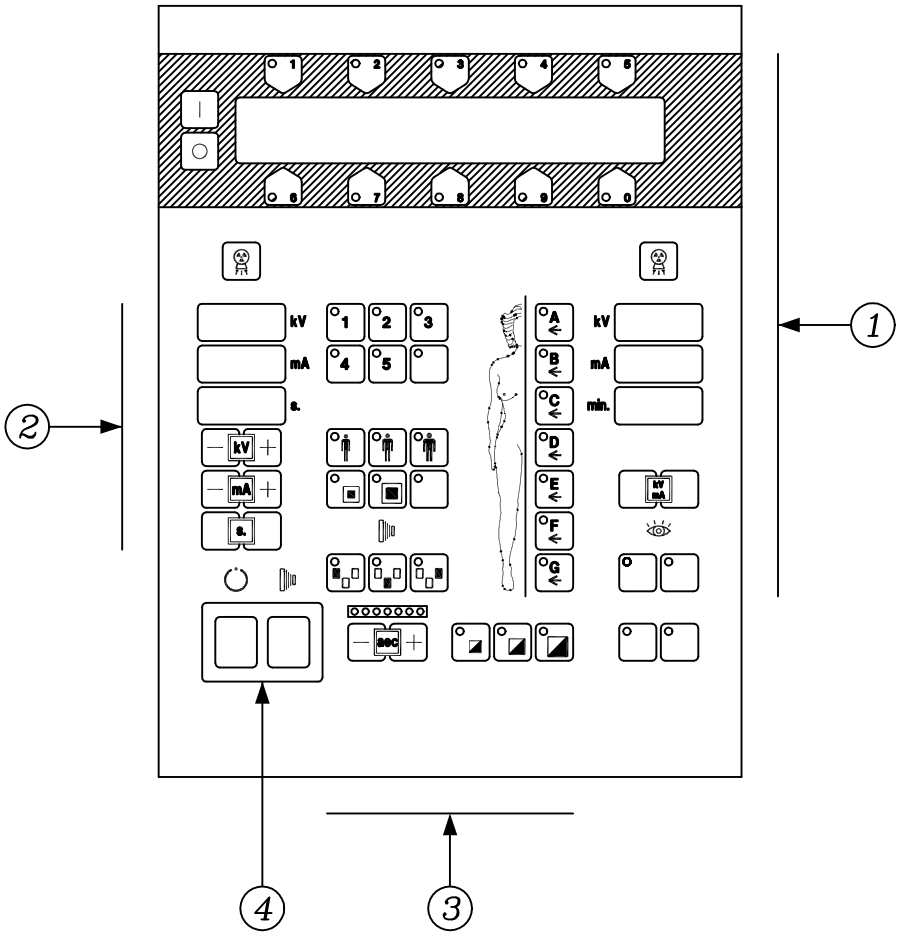
Adaptation to Patient Trasparency Possibility

Override Programmed Exposure Parameters Possibility

Override Programmed AEC Parameters Possibility

5 *Exposure*

8 AEC Assisted Anatomical Procedure with Falling Load



1 *Anatomical Working–Way Selection*
Anatomical Program Selection

2 *Working Station Selection Possibility*

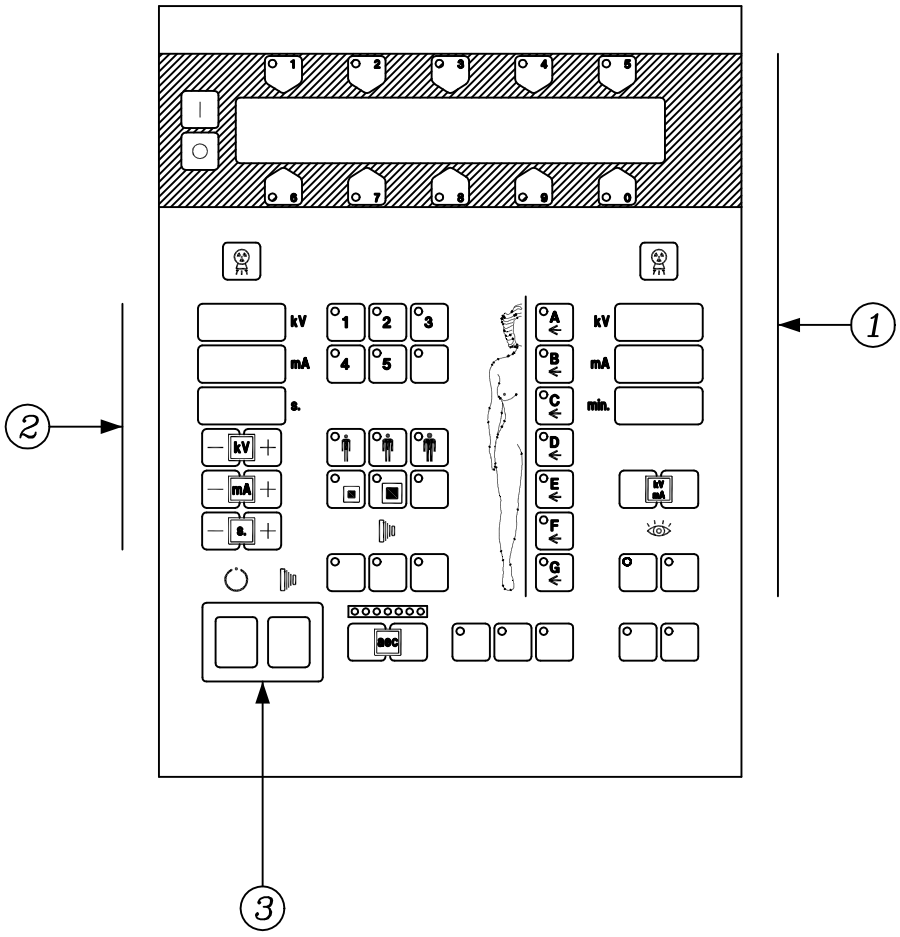
Small/Large Focus Selection Possibility

Adjust Exposure kV Possibility

3 *Adjust AEC Parameters Possibility*

4 *Exposure*

9 Free Technique in Anatomical Selection



1 — *Anatomical Working–Way Selection*
Anatomical Program Selection

2 — *Working Station Selection Possibility*

Small/Large Focus Selection Possibility

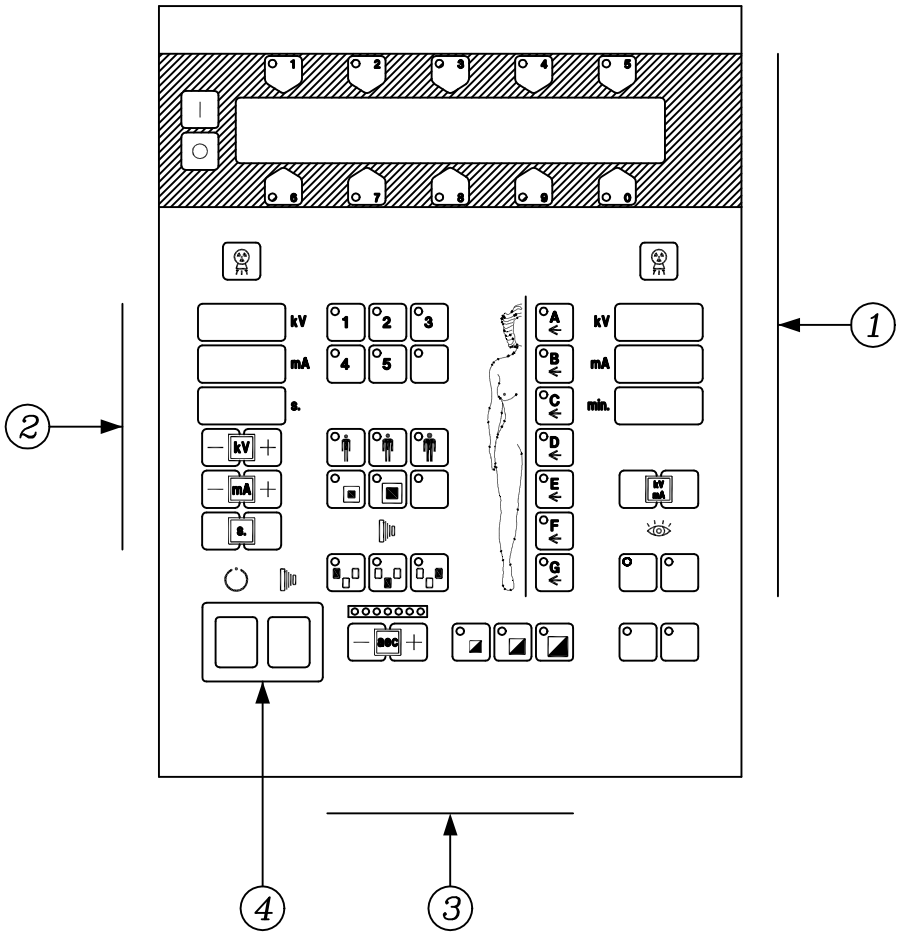
Adjust Exposure kV Possibility

Adjust Exposure mA Possibility

Adjust Exposure Time Possibility

3 — *Exposure*

10 AEC Assisted Free Technique in Anatomical Selection



1 *Anatomical Working–Way Selection*
Anatomical Program Selection

Working Station Selection Possibility

Small/Large Focus Selection Possibility

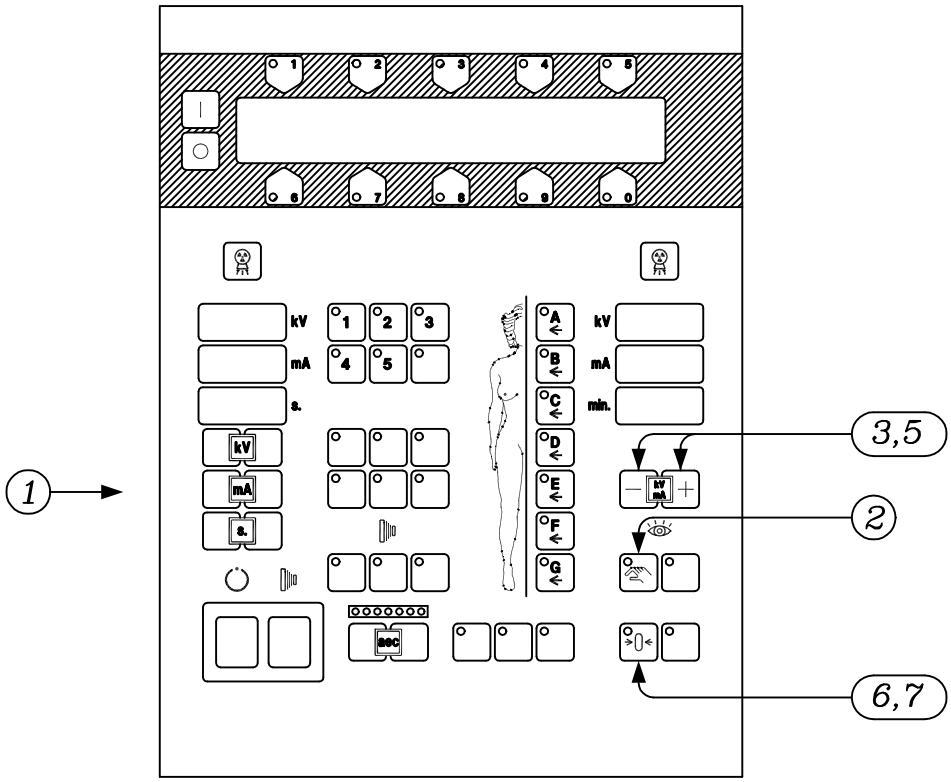
2 *Adjust Exposure kV Possibility*

Adjust Exposure mA Possibility

3 *Adjust AEC Parameters Possibility*

4 *Exposure*

11 Manual Fluoroscopy



1 *Anatomical Working–Way Selection*
Anatomical Program Selection
with Fluoroscopic Operation Associated

2 *Manual Fluoroscopy Selection*

3 *kVmA Value Adjust*

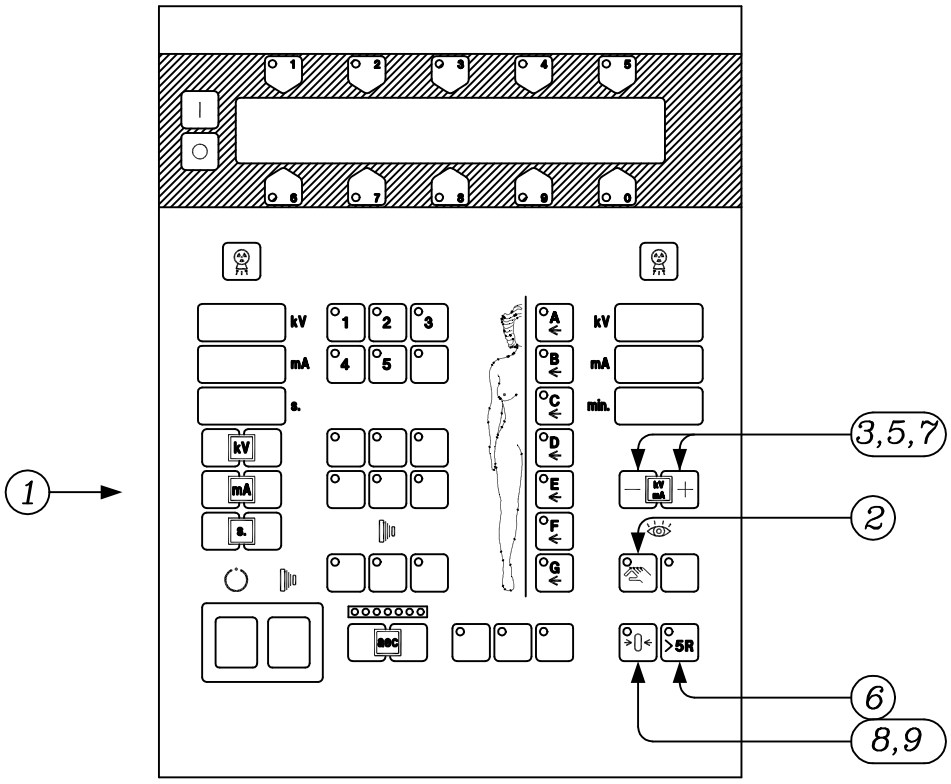
4 *Switch On Fluoroscopy*

5 *kVmA Value Adjust Possibility*

6 *After 4.5 minutes fluoroscopy, the Buzzer Sounds: Press "reset" to Continue*

7 *On Completion of Fluoroscopy Press "reset": Time to Zero (New Patient)*

12 High Dose Manual Fluoroscopy



① *Anatomical Working–Way Selection*
Anatomical Program Selection
with Fluoroscopic Operation Associated

② *Manual Fluoroscopy Selection*

③ *kVmA Value Adjust*

④ *Switch On Fluoroscopy*

⑤ *kVmA Value Adjust Possibility*

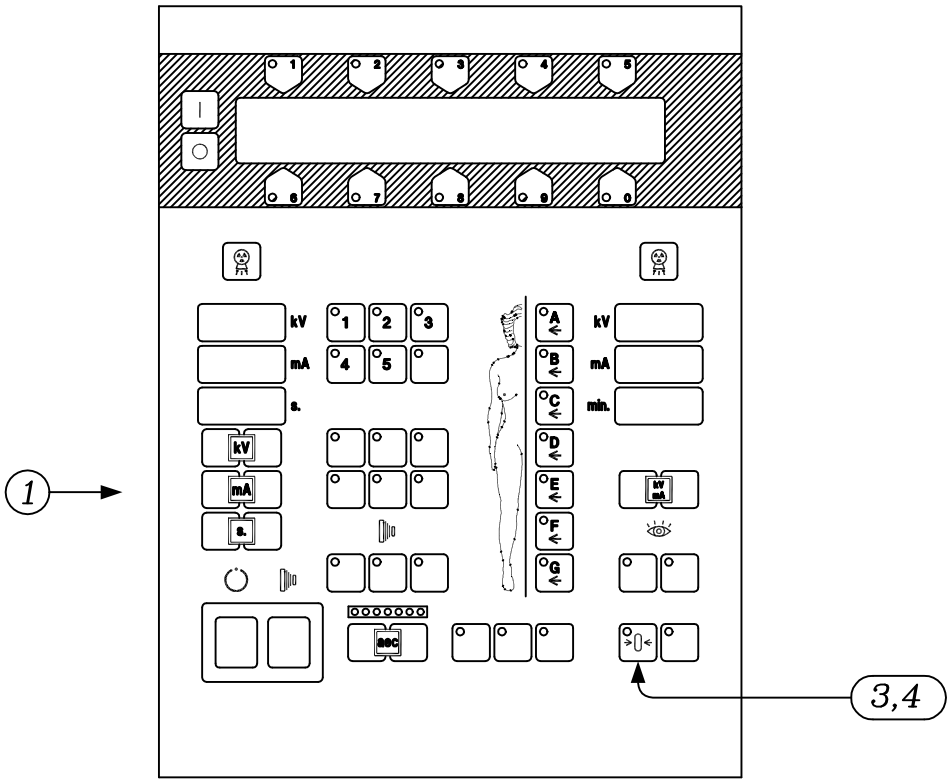
⑥ *Reached First kVmA Limit*
Press [>5R]
to Enter in High Dose Fluoroscopy

⑦ *kVmA Value Adjust Possibility*

⑧ *After 4.5 minutes fluoroscopy, the*
Buzzer Sounds: Press "reset" to Continue

⑨ *On Completion of Fluoroscopy Press*
"reset": Time to Zero (New Patient)

13 Automatic Fluoroscopy



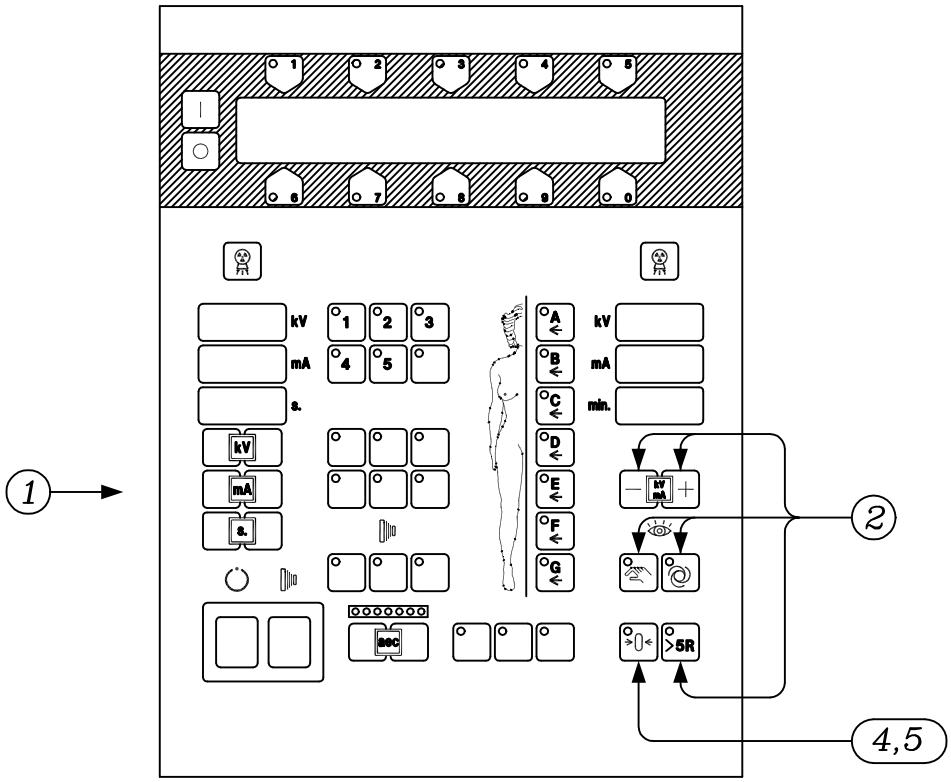
1 *Anatomical Working-Way Selection*
Anatomical Program Selection
with Fluoroscopic Operation Associated

2 *Switch On Fluoroscopy*

3 *After 4.5 minutes fluoroscopy, the Buzzer Sounds: Press "reset" to Continue*

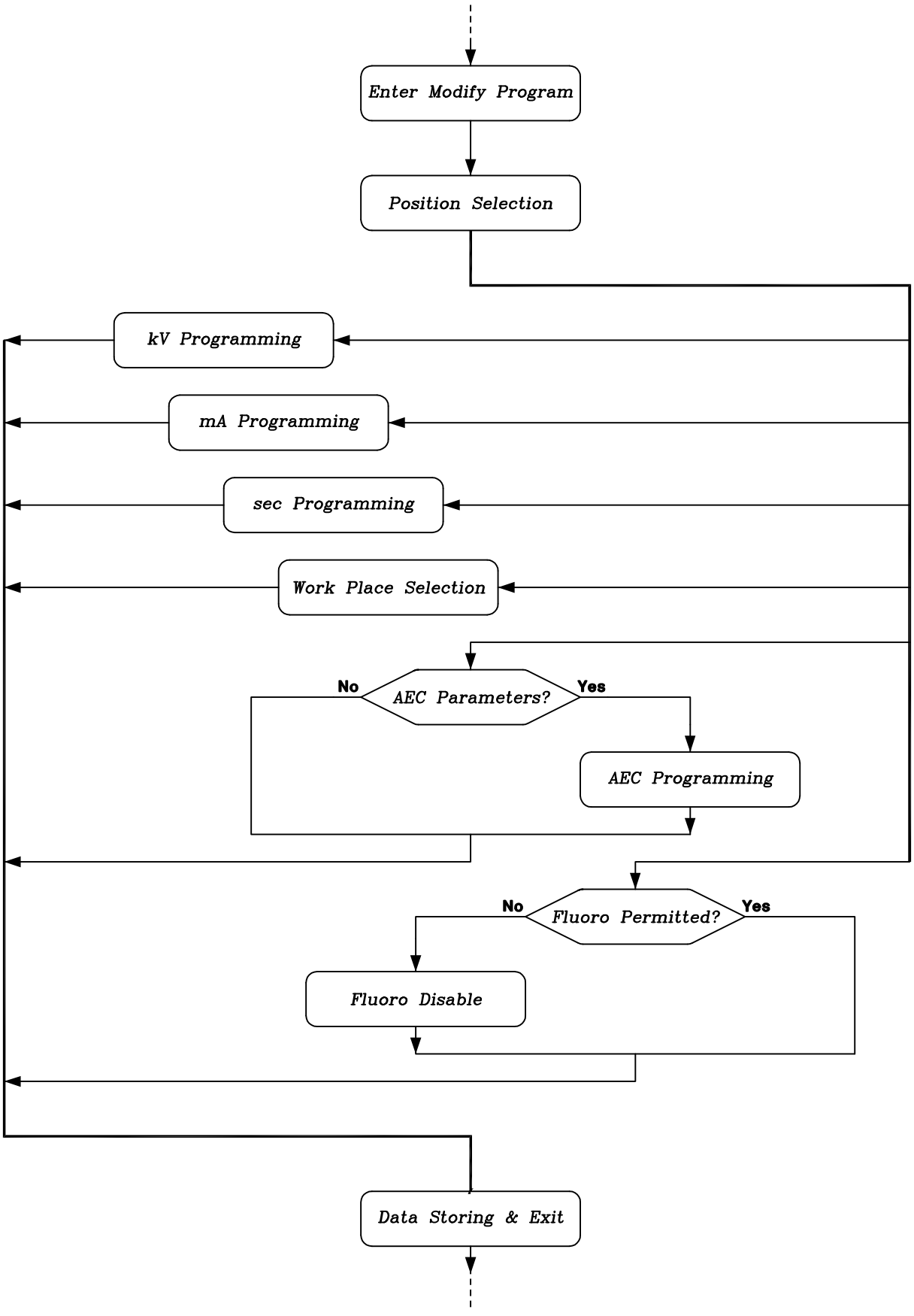
4 *On Completion of Fluoroscopy Press "reset": Time to Zero (New Patient)*

14 Pulsed Fluoroscopy

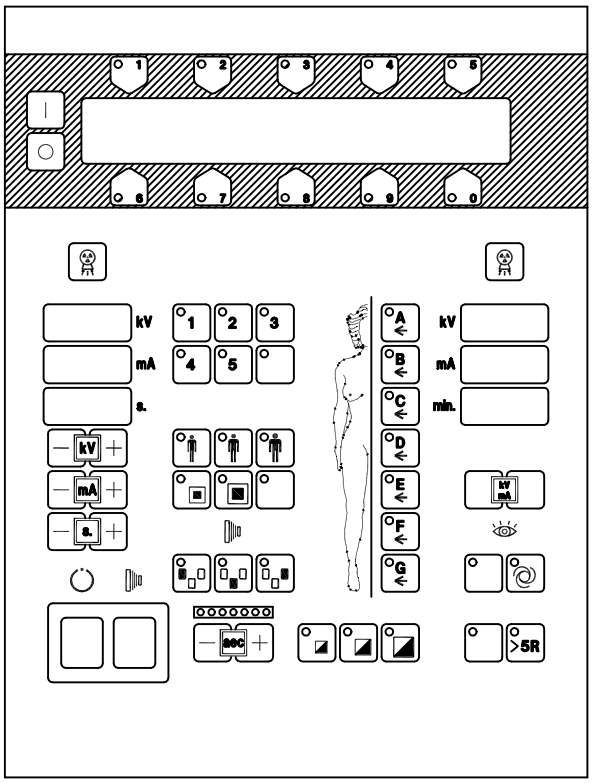


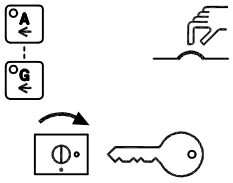
1		*Anatomical Working–Way Selection* *Anatomical Program Selection* *with Pulsed Fluoroscopy*
2	>5R	*Select [>5R] to change Parameters*
		By the automatic fluoro selection
		you can change mA value *(S.F.30/60/90) (L.F. 100/150/200/300)*
		By the manual fluoro selection
		you can change kV value *(Min 40kV Max 120kV)*
3		*Pulsed Fluoro Run*
4		*After 4.5 minutes fluoroscopy, the* *Buzzer Sounds: Press "Reset" to Continue*
5		*On Completion of Fluroscopy Press* *"Reset": Time to Zero (New Patient)*

15 Anatomic Programs Modify



16 Anatomical programs Modify



(1) 

Select one Anatomical Vertical Level.

Modify Programs: Turn Right the Keylock

On F.I.P. will appear "Program Modification"

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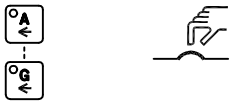
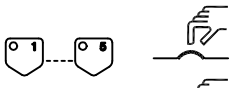
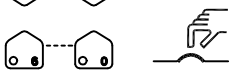
(2) 

Select the Anatomical Vertical Level

(3) 

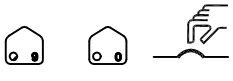
Select the Upper FIP Position (Organ)

(4) 

Select the Lower FIP Position (Projection)

(5) 

Using Keys "4" and "5" Select the Organ Name for Upper FIP Position

(6) 

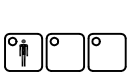
Using Keys "9" and "0" Select the Projection Name for Lower FIP Position

(7) 

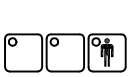
Press ">5R" Key to continue

⑧  *Select "Normal Patient Trasparency"*

⑨  *Select "Normal Patient Trasparency" kV Value*

⑩  *Select "High Patient Trasparency"*

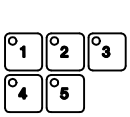
⑪  *Select "High Patient Trasparency" kV Value*

⑫  *Select "Low Patient Trasparency"*

⑬  *Select "Low Patient Trasparency" kV Value*

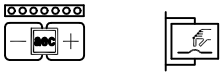
⑭  *Select mA Value*

⑮  *Select Exposure Time Value*

⑯  *Select the Associated Working Station*

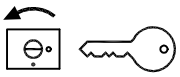
⑰  *If AEC is Present*
Select EXPOMAT Screen Parameters

⑱  *Select the Dominants*

⑲  *Select EXPOMAT Sensibility Value*
(a Value on FIP between 20 – 300)

⑳  *The Possibility of Fluoroscopy*
can be Enabled or Disabled
trough this Key (Lighted = Enable)

㉑  *Press ">5R" Key*
to Accept the Program's Values

㉒  *Exit the "Modify Programs" Procedure, turning*
the Keylock Left, in normal Operation Position"

Index Vocabulary

1.1 Part of body / Abbreviatin / Code

1.2 Projection / Abbreviation / Code

1.3 Working Station / Abbreviation / Code

70mm camera	70mm CAM	002
100mm camera	100mm CAM	003
angiography	ANGIO	000
arteriography	ARTERIO	001
bucky	BUCKY	033
bucky table	BUCKYTABLE	053
c arm	C - ARM	005
ceilling tube mount	CEIL-SUSP	032
cine	CINE	010
control table	CONTROL	055
digital	DIGITAL	016
direct	DIRECT	017
wall bucky	ERECTBUCKY	057
Film changer	FILM CHAN	004
fluoro	FLUORO	039
fluoro	FLUORO	042
horizontal bucky	HORI-BUCKY	018
horizontal table	HORI-TABLE	029
image subtraction	IMAGE-SUBT	045
kimographe	KIMOGRAPH	019
mammographe-biopsy	MAMMO-BIOP	025
mammographe	MAMMOGR	024
mass miniature	MASS-MINI	043
No buck	NO-BUCKY	041
colangiographe	OP - COLE	012
planigraphe	PLANIGR	034
puck	PUCK	008
radiography	RADIO	038
radiography	RADIOGR	009
remote controlled table	REMOTE TA	058
spot film device	S-F-D	013
serial changer	SERIAL CH	044
skull unit	SKULL-UNIT	011
spinal bucky	SPINEBUCKY	007
spot	SPOT	047
stereography	STEREO	046
subtraction	SUBTRACT	014
television set	TELEVISION	056
tilting bucky	TILT-BUCKY	020
titlting table	TILT-TABLE	027
tomography	TOMOGR	054

1.4 Console Status / Abbreviation / Code

INFORMATION

	NOT EXISTANT	00
free thecnique	FREE SELECT	01
x-ray parameters error	PARAMETERS ERR	02
ready for preparation	READY - PREP.	03
preparation on	PREPARATION	04
ready for radio	READY EXPOSURE	05
bucky call up	POTTER ACTIVE	06
radiography on	X - RAY	07
radiography end	END RAD EXPOS.	08
fluoroscopy on	FLUORO START	09
continuous manual fluoro	FLUORO CONTman	10
continuous automatic fluoro	FLUORO CONTaut	11
pulsed manula fluoro	X-RAY PULSman	12
pulsed automatic fluoro	X-RAY PULSaut	13
kV radio too high	kV TOO HIGH	14
kV radio too low	kV TOO LOW	15
mAs radio too high	mAs TOO HIGH	16
mAs radio too low	mAs TOO LOW	17
radiographic power too high	POWER TOO HIGH	18
tube overload	TUBE OVERLOAD	19
anode overheat	ANODE OVERHEAT	20

ALARM

	NOT EXISTANT	00
preparation time out	TIME-OUT PREP.	01
tomograph not responding	TOMO PREP. SAF	02
not possible radiography	? HEAT RADIO ?	03
AEC not ready	AEC NOT READY	04
anode is not rotating	ANODE SAFETY	05
power supply safety	PWS SAFETY	06
digital filament safety	DIG. FIL. SAF.	07
general safety	GENERAL SAFETY	08
inverter safety	INVERTER SAF.	09
H.T. change over safety	HT-CHANGE OVER	10
tube thermal safety	TUBE THERM-SAF	10
door safety	DOOR SAFETY	11
kV value too low	LOW kV SAFETY	12
AEC dose safety	AEC DOSE SAF.	13
AEC safety	AEC REL. SAF.	14
AEC time out safety	AEC TIME-OUT	15