Chapter

F

ADJUSTMENT & CALIBRATION

1 SPECIAL REGIONAL & INITIAL SETUPS

1.1 Regional setups before using the unit

The unit is tested and adjusted at the factory, to comply with various regional safety requirements. The software controlled parameters (stored in internal non-volatile memory) should however be verified prior to normal operation, since they could vary from region to region. Also after replacing either the TUBE CPU or the REAR CPU board these setups must be verified and some keyboard controlled calibrations performed.

The list below (a to e) are adjustments that ***must always be performed*** before using the unit for the first time. There is also a number of other adjustments that affect the behaviour of the unit. These are preset at the factory to convenient values, so no readjustment is normally needed. However, chapters "KEYBOARD-CONTROLLED (in normal mode)" on page F-2 and "KEYBOARD-CONTROLLED (in service mode)" on page F-8 contain full details of all available keyboard controlled adjustments.

a) **Maximum allowed mAs**
The maximum allowed mAs (milliampereseconds) can either be 300 mAs, 500 mAs or 600 mAs. See paragraph "06. Maximum regional mAs limit" on page F-15 for details.

b) **Maximum allowed breast compression force**
The unit is capable of compressing the breast up to 25kg (20kg is the factory default). If this limit needs to be changed, please see paragraph "01. Maximum compression force" on page F-15 for details.

c) **Enable/disable height-control during compression**
The unit is delivered so that the height control is inoperative if the breast is compressed. See paragraph "04. Mode of UP/DOWN movement" on page F-15 for instructions how to change this behaviour.

d) **Enable/disable C-arm rotation without foot control activation**
Some countries require that the C-arm motorized movement is not allowed without a continuous activation of a (foot) control switch. See paragraph "02. Mode of C-arm rotation" on page F-15 for instructions how to change this behaviour.

e) **Correct time and date**
See paragraph "Setting correct time and date" on page F-5 for how to set the internal clock and calendar. However, this is not essential for the normal operation of the unit.

1.2 Other setups before using the unit

a) **Film/screen combination**
To ensure correct optical density, please set this parameter according to the type of film and intensifying screens used. Please refer to the "Sophie User's Manual".

b) **Printer/Label type (option)**
Ignore this setup if you do not use a printing device attached directly to the Sophie unit. One of three different printer systems can be used. For printer type selection see "11. Setting type of printer and/or height of labels used" on page F-16 for details.

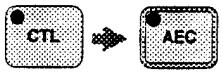
2 KEYBOARD-CONTROLLED (in normal mode)

Some special adjustments can be performed (with the help of the keyboard) by the end-user. The following pages lists all these special adjustments that can be performed in the normal (user) keyboard mode. These are also explained in the "Sophie User's Manual".

Space is reserved under each heading for writing down the current setting for this particular unit. It is a good idea to write down the preferred settings, in the case these is a need to do such service to the unit, where this information is lost (replacing CPU boards).

A complete table with all parameters and their respective factory defaults, with space also reserved for personal preferences, can be found in "Factory preset (recalling settings for all parameters)" on page F-9.

2.1 AEC mode of operation (AEC/AAEC)



Setting in this unit:

Press the **CTL**-key and the **AEC**-key to change the type of the AEC system. This cannot be done if the AEC is off (if the AEC-key LED is off press the AEC-key first). There are two modes:

a) 

Steady LED = Normal AEC is selected. The exposure is terminated when the film has reached the required density.

b) 

Blinking LED = Advanced AEC (AAEC) is selected. The kV-setting is automatically increased or decreased at the beginning of the exposure, to compensate for a originally too low or high kV setting that would produce either a very short or too long exposure. The exposure is terminated when the film has reached the required density. **The factory default is AAEC.**

2.2 Automatic kV mode

Setting in this unit:

Press the **CTL**-key and the **kV**-key to enter the Automatic kV mode setting. The TIME/CM display show the current setting. Use the **PLUS/MINUS** -key to change mode, and press the **CTL**-key to exit.

a) 

Automatic pre-selection of kV is off. The user selection of the kV is used unaltered during the exposures.

b) 

Automatic pre-selection of kV is on. The kV is set automatically according to the compression thickness to a pre-selected value. The user can alter the kV setting as normally if the suggested kV value is considered not to be optimum for the compressed breast. **The factory default in on.**

2.3 Automatic rhodium/molybdenum filter selection mode

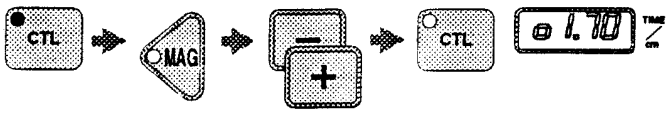
Setting in this unit:

Press the **CTL**-key and then press and hold the **FILT/SPOT**-key for **3 seconds**. Use the PLUS/MINUS-keys to change the setting. The range is from 6.6cm to 9.9cm. Press the **CTL**-key to exit. **The factory default is 7.5cm.**

a)  Automatic rhodium/molybdenum filter selection is on. The breast thickness can be changed with the **PLUS/MINUS**-keys. The user can alter the filter as normally after the breast is compressed and the **FILT/SPOT**-display is flashing. The automatic rhodium/molybdenum filter selection is switched off by pressing the **PLUS**-key after the maximum breast thickness has been reached.

b)  Automatic rhodium/molybdenum filter selection is off. The filter is selected manually. The automatic rhodium/molybdenum filter selection is switched on by pressing the **MINUS**-key.

2.4 Default magnification factor

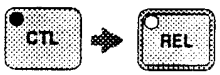


Setting in this unit:

Press the **CTL**-key and the **MAG**-key to set the default magnification factor. The TIME/CM display shows the magnification symbol "o" and the current magnification factor. Use the **PLUS/MINUS**-keys to change the setting (from 1.30 to 1.70 in steps of 0.1), press the **CTL**-key to exit. **The factory default value is 1.70.**

The magnification factor is displayed in the TIME/CM display during the MAG-mode and can be manually set to any value from the 1.30 minimum to the current maximum, simply by pressing the MAG-key repeatedly.

2.5 Automatic release of compression after exposure



Setting in this unit:

Press the **CTL**-key and the **REL**-key to toggle the automatic compression release feature on or off.

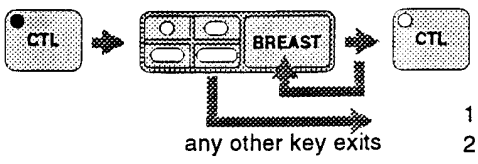
a)  LED OFF = No automatic release. The breast must be released manually by pressing this key after each exposure, or by driving the compression paddle upwards from the controls

b)  LED ON = Automatic release of compression selected. The compression paddle is automatically driven after the exposure to the highest position. **The factory default is on.**

The unit can also be set to run the cassette table automatically into the LOAD position at the same time as the automatic release is selected, see "05. AUTO-LOAD on/off" on page F-15.

CAUTION ***During norma use of the unit it should be noted that the automatic compression release function should always be turned off to prevent inadvertent movement of the compression paddle during biopsy procedures. When the automatic release is switched off, also the (optional) Auto-load movement is inhibited.***

2.6 Programming quick exposure settings



Settings in this unit:

	AEC	Focus	kV	mA(s)	Dens	Sens	Filter
1							
2							
3							
4							

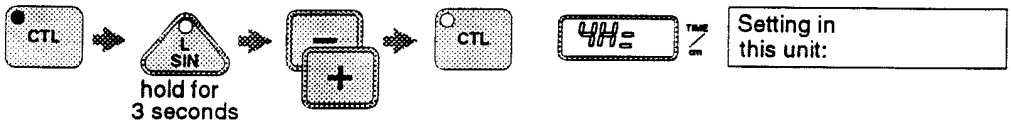
Press the **CTL**-key so that it's LED turns on. Press the **BREAST**-key repeatedly until the desired memory location (one of the 4 symbols) is lit. Press the **CTL**-key to exit and program all current control panel settings into this memory location. If you want to skip the programming, just press any other key than the BREAST or CTL-key.

This function stores all current control panel settings into one of four (4) available memory locations. Any of these can be recalled at any time during normal operation, for a quick recall of all settings.

These are the initial factory default settings, that can be altered as described above.

- BREAST1 (smallest dot) AAEC, Large focus, 25kV, Density 0, Sensor 1, Filter 1
- BREAST2 (next bigger dot) AAEC, Large focus, 29kV, Density 0, Sensor 2, Filter 1
- BREAST3 (next biggest dot) Manual exposure, Large focus, 26kV, 40mAs, Filter 1
- BREAST4 (biggest dot) Manual exposure, Large focus, 28kV, 60mAs, Filter 1

2.7 Maximum compression speed

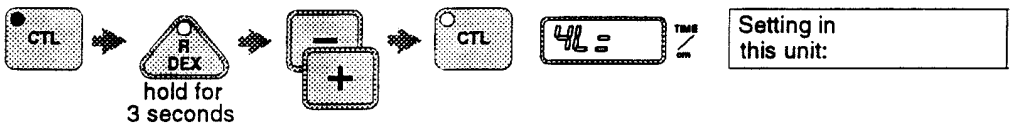


Press the **CTL**-key and then press and hold the **LSIN** key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. The range is from 1 (slowest) to 6 (fastest). Press the **CTL**-key to exit.

This key sequence sets the maximum speed of the compression paddle during compression (down) movement. The TIME/CM-display shows the current setting. The factory default is 5. Using the fastest speed when familiar with the unit is recommended.

NOTE ***The setting 0 (zero) should and can be used only if the compression force measurement is inoperative. In this mode the force measurement is totally ignored. Compression starts at a moderate speed and continues only at crawling speed, after the compression movement is shortly interrupted by releasing the control switch.***

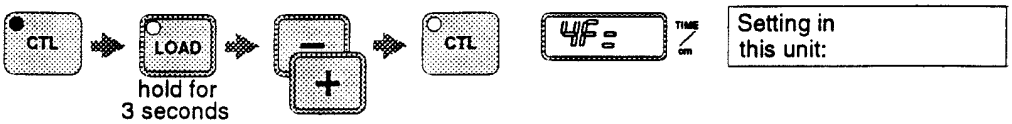
2.8 Compression speed retardation ratio



Press the **CTL**-key and the press and hold the **RDEX**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. The range is from 1 (small ratio; speed decreases only a little) to 6 (large ration; speed decreases a lot). Press the **CTL**-key to exit.

This key sequence set the ratio of the compression speed reduction related to the compression force. The TIME/CM-display shows the current setting. The factory default is 4.

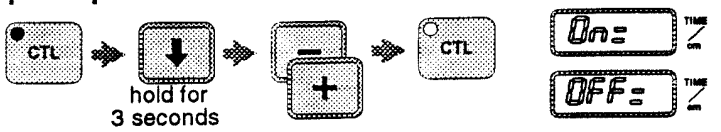
2.9 Intermediate compression stopping force



Press the **CTL**-key and the press and hold the **LOAD**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. The range is from 1 to 25 kg. Press the **CTL**-key to exit.

This key sequence sets the compression force where the compression temporarily stops and changes over to crawling speed. The TIME/CM-display shows the current setting. **The factory default is 15 kg**. The maximum compression force can be set in the service mode, see "01. Maximum compression force" on page F-15

2.10 Twincomp compression on/off

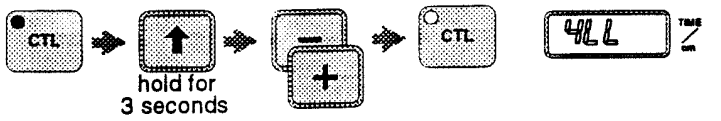


Setting in this unit:

Press the **CTL**-key and the press and hold the **DOWN**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. Press the **CTL**-key to exit.

This key sequence sets the compression method to either traditional (OFF = parallel paddles) or TWINCOMP (ON = tilting upper paddle). The TIME/CM-display shows the setting. **The factory default is ON** (TWINCOMP selected).

2.11 Lift motor crawling speed



Setting in this unit:

Press the **CTL**-key and the press and hold the **UP**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. The range is from 1 (very slow) to 6 (speedy). Press the **CTL**-key to exit.

This key sequence set the lowest crawling speed for the lift motor (UP/DOWN movement of the unit) used for fine-adjusting the height. The TIME/CM-display shows the current setting. **The factory default is 4.** The maximum lift motor speed can be set in the service mode, see "03. Maximum speed of UP/DOWN movement" on page F-15

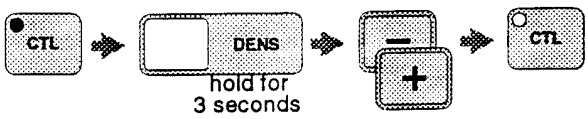
2.12 Setting correct time and date

Press the **CTL**-key and then press the **CLOCK**-key once (or repeatedly) to step to the parameter(s) to be adjusted, the sequence is as illustrated above;

- minutes - hours - day - month - years - century - minutes -

The parameter to be altered with the **PLUS/MINUS**-key is blinking. Press the **CTL**-key to exit at any time. Upon exit the (non visible) seconds counter is zeroed. The clock is set at the factory to local time and should be set to show correct time/date before using the unit.

2.13 Density offset adjustment



Setting in this unit:

Press the **CTL**-key and the press and hold the **DENS**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to set the display to the same value you had to use in the normal user density compensation to achieve YOUR own ZERO density. Press the **CTL**-key to exit.

This key sequence restores the user density display back to zero. In many cases there is a slight deviation from the factory preset density compared with the required density. This adjustment makes possible to show the user a ZERO density, even if the actual density differs from the factory default. Factory default is 0 (zero).

NOTE ***To perform this adjustment the AEC-mode must first be selected!***

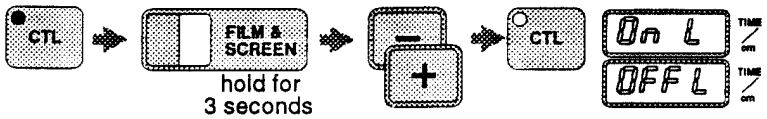
2.14 AAEC contrast adjustment

Setting in this unit:

Press the **CTL**-key and then press and hold the **SENSOR**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to alter the setting. The range is from -3 (higher kV and less contrast but short exposure times) to +3 (lover kV and more contrast but longer exposure times). Press the **CTL**-key to exit.

This key sequence fine-adjusts the contrast/versus exposure time when using the AAEC mode. The factory default is 0 (zero).

2.15 Automatic film labeling (on/off)

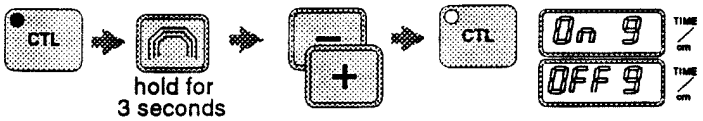


Setting in this unit:

Press the **CTL**-key and then press and hold the **FILM&SCREEN**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. The TIME/CM display the current setting (ON L=Labeling on, OFFL=Labeling off). Press the **CTL**-key to exit.

This key sequence sets the automatic film labeling either on or off. It is useful to disable the film marking, if another film marking system is used, or if the marking system is causing some errors (these would be then ignored). **The factory default is ON.**

2.16 Disabling bucky grid movement

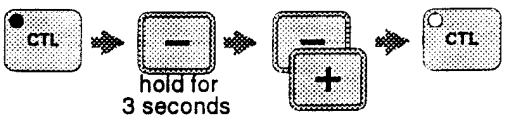


Press the **CTL**-key and then press and hold the **FIELD**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the setting. The TIME/CM display the current setting (ON 9=Grid moves, OFF9=Grid doesn't move). Press the **CTL**-key to exit.

This key sequence sets turns the BUCKY grid movement either on or off. This feature is normally only used for diagnostic purposes. **The factory default is ON.**

NOTE ***Note that the grid movement is always forced ON every time the unit is turned on.***

2.17 Alarm sound frequency (loudness)

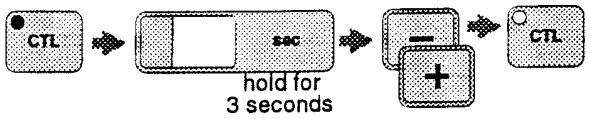


Setting in this unit:

Press the **CTL**-key and then press and hold the **MINUS**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the frequency. Press the **CTL**-key to exit.

This key sequence sets the alarm sound frequency. This frequency is sounded shortly when a key is pressed and also during the exposures. By changing the frequency the loudness can also be somewhat affected.

2.18 Duration of the parameter time-out



Setting in this unit:

Press the **CTL**-key and then press and hold the **SEC**-key for **3 seconds**. Use the **PLUS/MINUS**-keys to change the time. The range is from 3 to 12 seconds. Press the **CTL**-key to exit.

This key sequence sets the time how long a selected setting is blinking and accepting the value to be altered. The factory default is 10 seconds.

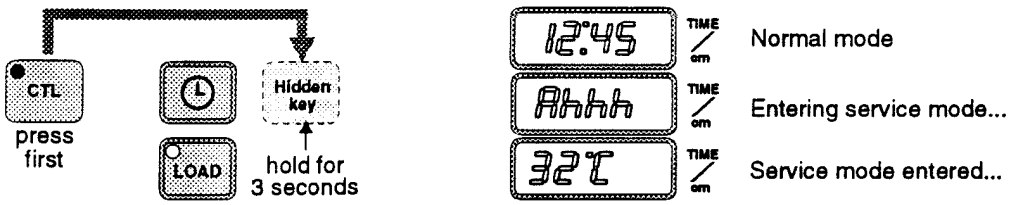
2.19 Service mode keyboard-controlled adjustments

Please note that the Sophie service mode is not intended (under normal circumstances) for the user. Please refer to page F-8 for detailed information how to enter this mode and how to perform the adjustments.

3 KEYBOARD-CONTROLLED (in service mode)

Some more advanced (and also critical) adjustments and functions can be performed in the special service mode. To be able to perform any of the below mentioned calibrations you must first enter the service mode. Additionally, all available special service mode functions are listed in a short-form mode in the chapter "KEYBOARD FUNCTIONS & MODES" on page C-1.

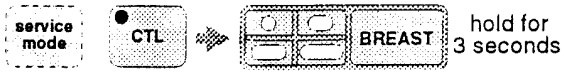
3.1 How to enter the service mode



Press the **CTL**-key and press and hold the **HIDDEN**-key for **3 seconds**. This key sequence enters the special service mode. The normal time-of-day display is briefly replaced by the text "AHHH" and then replaced by the temperature display of the tube head assembly.

CAUTION ***This special service mode is intend only for the experienced service technician, and should not be entered (under normal circumstances) by the user.***

3.2 Factory preset (recalling settings for all parameters)



CAUTION *Performing this function results in loss of all individual setups of all operating parameters. However, these are replaced with factory predetermined settings, leaving the unit fully functional.*

Why and when to make a factory preset

This function is used (as the name indicates) at the factory, to program shipped units to a predefined state. Spare-part CPU boards (that contain the actual parameter memories) are also treated this way. This mode is useful also if the unit has been in use before the installation.

How to perform the factory preset

Being in the service mode, pressing the **CTL-key** and then press and hold the **BREAST-key** for **3 seconds**. The display should report ER87 if the operation was successful

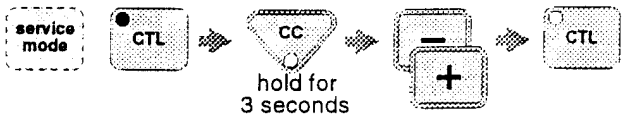
Normal mode parameters affected by the factory default

Parameter	factory default	for details	setting in this unit
AEC -mode of operation	AAEC on	page F-2	
Automatic kV-selection	On	page F-2	
Automatic Rh/Mo filter selection	On, 7.5cm	page F-2	
Default MAG-factor	1.70	page F-3	
Automatic release after exposure	On	page F-3	
Quick exposure settings	Altered	page F-3	
Maximum compression speed	5 (moderate)	page F-4	
Compression retardation ratio	1 (small)	page F-4	
Intermediate compression force	15 kg	page F-4	
Twincomp compression	Yes	page F-5	
Lift motor crawling speed	4 (moderate)	page F-5	
Density offset adjustment	0 (no offset)	page F-5	
AAEC contrast adjustment	0 (normal contrast)	page F-6	
Automatic film labeling	On	page F-6	
BUCKY grid movement	On	page F-6	
Alarm sound frequency (loudness)	5 (moderate)	page F-6	
Duration of the parameter time-out	10 seconds	page F-7	

Service mode parameters affected by the factory default

Special system parameters	factory default	for details	setting in this unit
01. Maximum compression force	20 kg	page F-16	
02. Mode of C-arm rotation	0 (direct movement)	page F-16	
03. Maximum up/down speed	4 (moderate)	page F-16	
04. Mode of up/down movement	0 (not during comp)	page F-16	
05. Auto-load function	1 (on)	page F-16	
06. Maximum regional mAs limit	1	page F-16	
07. Mode of foot-control operation	1 (outer edge comp)	page F-16	
08. BUCKY grid type	1 (Smit roentgen)	page F-16	
09. Film/screen comb. 0 gain	10 (normal)	page F-16	
10. Film/screen comb. 0 steepness	10 (normal)	page F-17	
11. Type of label printer	0 (Admark or none)	page F-17	
12. Type of remote control box	2 (advanced)	page F-17	
13. Density fine-adjustment	0 (no adjustment)	page F-17	
14. LM-key mode of operation	0 (LM selected first)	page F-17	
15. Auto-kV offset	0 (no offset)	page F-17	
16. cm-display offset adjustment	0 mm (no offset)	page F-18	
17. Height of spot-paddle	40 mm (normal)	page F-18	
18. Duration of the filter selection time-out	5 seconds	page F-18	
19. Number of spacing rows in the serial printer	2	page F-18	
20. Mode of MAG/LOAD and release operations	0	page F-18	

3.3 C-arm upright position calibration



Why and when to calibrate

Perform this adjustment whenever the REAR CPU is replaced with another one, or if the C-arm is not straight upwards when in the 0° CC-projection position. The correct upright position information is stored in the REAR CPU, thus this calibration can be done from the keyboards.

Instruments and tools required

A water scale makes the adjustment easier, but it is not necessary.

Performing the calibration

a) Being in the service mode, pressing the **CTL-key** and then press and hold the **CC-key** for **3 seconds**.

b) The C-arm starts first an initial test run where it rotates down to find the position of the hall-sensor and then back up to the normal CC-position. Wait until the movement stops.

c) Adjust the upright position with the ± keys. Placing a water scale on the cassette table makes the adjustment easier.

d) Press the **CTL-key** when ready. Note that the C-ARM now makes an additional movement to both sides (approximately ±15 degrees) to finalize the calibration. To exit without erasing the old calibrated value, press either foot-control.

CAUTION ***In this mode the C-ARM is rotating by itself, make sure there's enough space around the unit. Use the STOP-buttons for an emergency stop.***

3.4 Breast thickness measurement calibration

Why and when to calibrate

Perform this calibration whenever the REAR CPU is replaced with another one, or if you have been servicing the compression mechanism or its sensors. This calibration runs the mechanism from end to end, checking simultaneously the distance between the end sensors.

The flexing of the compression paddle (during the compression) always causes a small error in the actual cm-display. This is, however, compensated for by the software. 1 cm is automatically added to the cm-display for every 10kg of compression force (in MAG-mode 2 cm is added for each 10kg of force).

Instruments and tools required

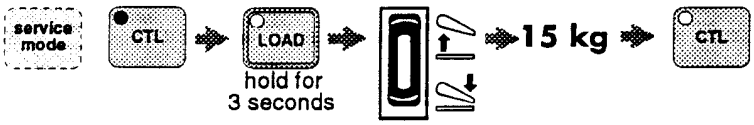
None, but remove all obstacles so that the compression paddle can move freely from end to end.

Performing the calibration

In the service mode, press the **CTL**-key and then press and hold the **REL**-key for 3 seconds. Wait for the movement sequence to end.

NOTE ***For a more precise breast thickness display, the residual gap between the upper and lower compression paddles can be compensated for. Please see page F-18 (special system parameters) how to correct or zero the display reading.***

3.5 Compression force measurement calibration



Why and when to calibrate

This calibration must be performed whenever the REAR CPU and /or the COMPRESSION FORCE sensor is replaced with another one, or whenever there is doubts about the measurement accuracy. The calibration is performed by the REAR-CPU, which stores the parameters on-board nonvolatile (EEPROM) memory.

Instruments and tools required

You need a small accurate scale of the bathroom type or equivalent, or preferably a compression calibration gauge (accessory part number 7003030).

Performing the compression force measurement calibration

a) Remove the lower compression paddle (BUCKY) and cassette, but not the upper compression paddle.

b) Place the gauge (or scale) in line with the front edge of the cassette table. If you use a scale, place on the top of the scale a soft pad (about 5-10 cm thick), could be a piece of soft foam-plastic or a 1/2 liter soft bottle of infusion fluid (or equivalent).

c) In the SERVICE mode, press the **CTL-key** and then press and hold the **LOAD**-key for **3 seconds**. The C-arm will now run to the CC-position (upright) if not already in this position.

d) The upper compression paddle will now drive automatically to it's highest position where a zero force calibration takes place (lasts for about a second). During this time you should not touch or load the compression paddle.

e) Drive the paddle normally downwards (with the help of either the foot-controls or the switches on the sides of the cassette table) so that the center of the soft pad is at the center of the AEC-sensor markings on the upper compression paddle.

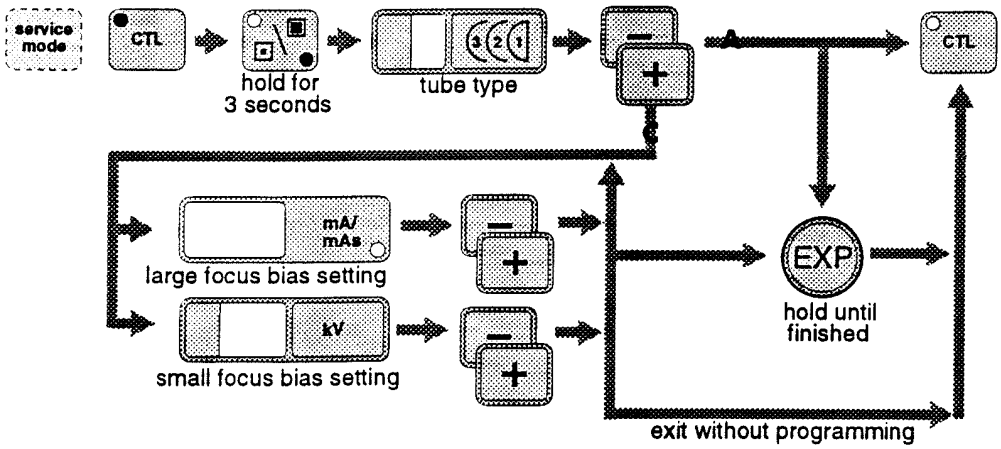
f) Increase the compression until the scale shows 15 kg. Tap gently the scale to get a truthful reading.

g) Press the **CTL**-key to exits and store the new parameters into memory.

CAUTION ***The C-arm will automatically move to the CC-position (upright) if not already in this position. Make sure there is room around the unit for this movement.***

NOTE ***For convenience, the old calibration values are not overwritten if the signal from the force sensor it totally out of range.***

3.6 X- ray tube filament preheating voltage calibration



CAUTION ***Some X-ray radiation is emitted during this function (duration from 60 to 120 seconds) even if the light field beam mirror is not driven out of the X-ray beam. Always shield yourself against the radiation. Be sure to set the right tube type (A or C) before performing the calibration. Additionally, if the type is C, set also the bias values properly. Failing to do this could damage the anode of the x-ray tube.***

Why and when to calibrate

This calibration must be performed whenever the TUBEHEAD and/or the TUBE CPU (alone or together with the POWER SUPPLY) is replaced. No special tools or instruments are needed for the calibration. It is also recommended that this calibration in performed during the annual maintenance of the unit to compensate for any possible changes in the tube parameters.

Currently there are two tube types in production, the tube type in use (and bias voltage parameters for type C) must be set before continuing with this filament calibration. The tube type data (and bias parameters) can be found on the labels on the tube assembly and also on the original C-arm top cover.

These bias parameters for tube type C determines (one for each focus size) the correct voltage to the internal bias-grid, to guarantee the optimum and safe size of the focal spot.

Entering the filament voltage calibration mode (all tube types)

a) In the SERVICE mode, press the **CTL-key** and then press and hold the **FOCUS**-key for **3 seconds**.

b) The currently selected tube type is displayed in the **AEC-sensor** display. If tube type is wrong, select the tube type with the **PLUS/MINUS** -keys from these two possibilities;

- **A** = TOSHIBA E7236 tube
- **C** = TOSHIBA E7272 tube

Presets that must be set only for tube type C

a) The currently set bias value for the normal size focus is displayed on the mA-display. If the value is wrong, press **the mA-key** and then use the **PLUS/MINUS** -keys to set it right. Check the correct value from the tube label.

b) The currently set bias value for the small focus is displayed on the kV-display. If the value is wrong, press **the kV-key** and then use the **PLUS/MINUS** -keys to set it right. Check the correct value from the tube label.

Performing the calibration procedure

a) Go to the exposure switch and stand behind a radiation shield.

b) Press and hold the **EXPOSURE** switch and wait until the series of exposures ceases. Press the **CTL**-key to exit. Releasing the switch during the calibration cycle is allowed, the calibration continues when the switch is again activated. The cycle must be successfully completed, otherwise the system could produce ERROR messages **ER12, ER30** or **Er33**. If **Er17** is appearing to the display, then the bias parameters for the tube type C are not properly set.

3.7 AEC-sensor calibration

Why and when to calibrate

This calibration must be performed whenever the AEC-sensor, TUBEHEAD or the TUBE CPU (alone or together with the POWER SUPPLY) is replaced with an other one, or during the annual service to ensure the AEC-performance.

Instruments and tools required

You need a special manufactured test phantom (spare part number **7003002**) to be able to perform this calibration properly. Please note that entering this calibration mode and pressing the EXPOSURE-switch, erases the previous calibration results. This makes the AEC-system inoperable, until the calibration is performed to the end.

Performing the AEC calibration

a) Remove all obstacles between the AEC-sensor surface and the tube head, including ALL compression paddles, cassette and any other objects that would obstruct the beam.

b) Place the test phantom directly on the AEC-sensor surface (on the black area at the front of the cassette table). Select **filter 1** (30µm Mo).

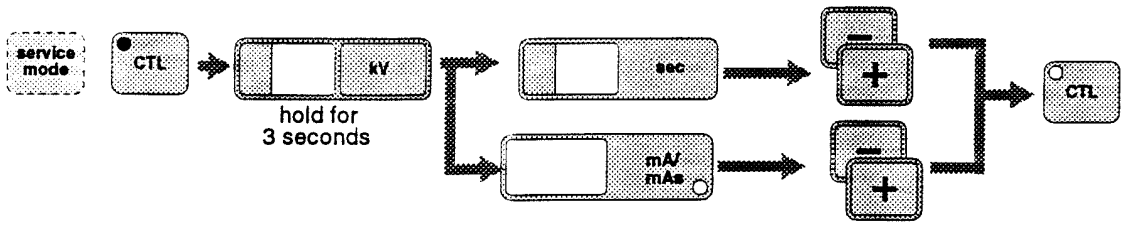
c) Being in SERVICE MODE, press the **CTL-key** and then press and hold the **AEC**-key for **2 seconds**. Go to the exposure switch and stand behind the radiation shield.

d) Press and hold the EXPOSURE switch until the series of exposures ceases. Press the **CTL**-key to exit. Releasing the switch during the calibration cycle is allowed as the calibration continues when the switch is again activated. The cycle must be completed, otherwise the AEC-system could later produce ERROR messages **ER14** or **ER15**

e) If one of the (3) sensors is faulty the unit would produce an error. The calibration can however be continued by clearing the error (using the CTL-key) and continuing the cycle. Only those sensors that are calibrated properly can be used during AEC exposures.

CAUTION ***Radiation is emitted during the whole calibration cycle (duration ≤ 30 sec). Always shield yourself again unnecessary radiation.***

3.8 kV-value fine-adjustment



CAUTION ***The kV calibration is performed at the factory and these parameters are set to zero. These parameters should be changed only when it is necessary to satisfy the local needs. Use this feature with care.***

The kV value can be adjusted with two parameters: offset and gain. The offset parameter is used to shift kV values up or down. The range is from -0.8 kV to +0.8 kV, one step equals 0.2 kV. The gain parameter is used to change the kV ramp steepness: the 35 kV value remains unchanged while the 20 kV value will be shifted up by the parameter value selected. The range is from 0 kV to 2.0 kV, one step equals to 0.2 kV.

a) In the service mode press the **CTL**-key and then press and hold down the **kV**-key for 3 seconds. The kV-display shows the message CA, the SEC-display shows the kV gain value and the mA-display shows the kV offset value.

b) Press the **mA**-key to change the kV offset value. The value in the mA-display starts to flash.

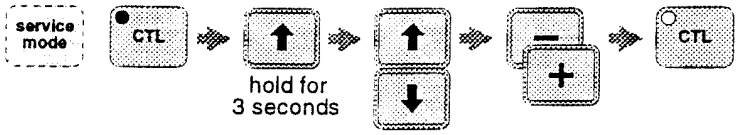
c) Use the **PLUS/MINUS**-keys to change the value.

d) Press the **SEC**-key to change the kV gain value. The value in the SEC-display starts to flash.

e) Use the **PLUS/MINUS**-keys to change the value.

f) Press the **CTL**-key to exit and store the new parameter values into memory.

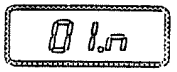
3.9 Special system parameters setup



In the service mode, press the **CTL**-key then press and hold the **UP**-key for **3 seconds**. Use the **UP/DOWN**- keys to move to the desired mode. Change the parameter value with the **PLUS/ MINUS**-keys. Exit by pressing the **CTL**-key. This key sequence enters the special system parameter setup mode.

Currently there are 20 different parameters available. If the actual number of parameters documented differs from the actual unit, please make sure that you are using a manual that is compatible with the software installed in the unit.

01. Maximum compression force



n = maximum compression force (kg).
The range is from 5 to 25 kg.
Factory preset is 20 kg.

Setting in this unit:

02. Mode of C-arm rotation

n = 0; C-arm moves directly but Stereotactic movement needs footpedal
n = 1; All C-arm movements need foot

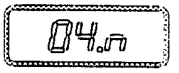
Setting in this unit:

03. Maximum speed of UP/DOWN movement

n = speed of UP/DOWN movement.
speed range: from 1 (slowest) to 6 (fastest),
factory preset is 4

Setting in this unit:

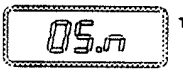
04. Mode of UP/DOWN movement



n = 0; Cannot run during compression
n = 1; Can run at any time

Setting in this unit:

05. AUTO-LOAD on/off



n = 0; load movement always manual only
n = 1; load movement is also automatic if user selects AUTO-release

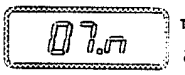
Setting in this unit:

06. Maximum regional mAs limit

n = 1; 500mAs/50Hz, 550mAs/60Hz (FIN)
n = 2; 600mAs/50Hz, 600mAs/60Hz (ENG)
n = 3; 300mAs/50Hz, 300mAs/60Hz (NY)

Setting in this unit:

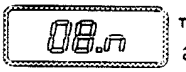
07. Mode of FOOT CONTROL operation



n = 0; outer edge releases, inner compresses
n = 1; inner edge releases, outer compresses

Setting in this unit:

08. Type of BUCKY grid



n = 1; Smith roentgen bucky (factory default)
n = 1; Gilarfioni bucky

Setting in this unit:

09. Film/screen combination 0 (zero) gain

n = film/screen combination 0 gain value
range: from 2 (darkest) to 99 (lightest),
factory default is 10

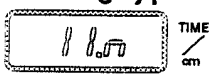
Setting in this unit:

10. Film/screen combination 0 (zero) steepness

n = film/screen combination 0 steepness value
range: 0 (low contrast) to 20 (high contrast),
factory default is 10

Setting in this unit:

11. Setting type of printer and/or height of labels used



n = 0; Admark system (or no marking system)
n = 1; STAR thermal label printer
n = 2; standard serial label printer
n = 3; Livingston film ID system

Setting in this unit:

a) With selection **code 0** the PLANMECA **ADMARK** darkroom film marking system can be used, that prints all office, patient and technic setting information directly onto an unprocessed film in the darkroom. The patient and office information is entered by the keyboard provided.

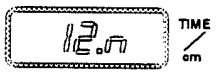
b) With selection **code 1** the **COSTAR ASCII Label Writer II** label printer can be used, that prints all technic setting information on a thermal label. The patient and office information is manually written to the label, before exposing the information on the label to the film.

c) With selection **code 2** a standard **RS-232 serial printer** can be used, that prints all technic setting information on form-feed labels. The printer should be set to 9600 baud. The number of spacing rows between the labels is determined with parameter 19. The patient and office information is manually written to the label, before exposing the information onto the film.

d) With selection **code 3** the **LIVINGSTON** Film ID System can be used, that exposes all office, patient and technic setting information directly onto a film after an exposure. The patient information and the date is entered by the system's keyboard.

NOTE ***Please note that only one of the above mentioned systems can be simultaneously used. A serial printer cannot be used without a special Sophie compatible adapter.***

12. Setting type of remote control box

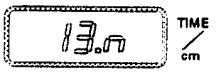


n = 1; Traditional remote with 1 indicator
n = 2; Advanced remote with 2 indicators

Setting in this unit:

The factory default is n = 2 (Advanced remote control). If you use the old box and have the unit set for the new one, then the EXP-led would be on all the time in the remote box. If you use the new control box and the unit is set for the old one, then the remote box READY-led would not function (EXP works as before).

13. Density fine-adjustment

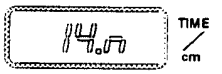


n = density fine adjustment value
range: from -5 (lighter film) to 5 (darker film),
one step equals 2.6% of OD (or 1/5 of the coarse density control setting)

Setting in this unit:

The factory default is n = 0 (no adjustment). Use this fine adjustment to fine-tune the film density if one normal density step is too coarse.

14. LM-key mode of operation

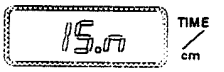


n = 0; LM is selecting by pressing the LM-key, ML by pressing and holding
n = 1; ML is selected by pressing the LM-key, LM by pressing and holding

Setting in this unit:

The factory default is n = 0 (LM-key will select LM-projection if pressed shortly, or alternatively the ML-projection is selected if you press and hold the key).

15. Auto-kV offset

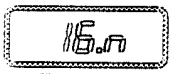


n = Auto-kV system kV-offset value
range; from -3 to +3kV, one step equals one kV

Setting in this unit:

The factory default is n = 0 (uses factory default Auto-kV values). Use this adjustment to change (fine-tune) the suggested Auto-kV setting, if the suggested kV value differs from the desired.

16. cm-display offset adjustment



n = cm-display offset
range: -9...+25 mm, one step equals one mm

Setting in this unit:

The factory default is n = 0. Use this feature to cancel the error between the actual cm-display and the minimum distance between the compression paddles.

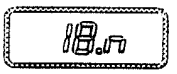
17. Height of SPOT-paddle

n = height of SPOT paddle (millimetres)
range: 30...90 mm, one step equals one mm

Setting in this unit:

The factory default is n = 40. Use this feature to compensate for the different thicknesses in different type of SPOT-paddles. After programming the correct height of the SPOT-paddle in use, the compression thickness display will show correct values with all paddles, including the SPOT.

18. Duration of the filter selection time-out

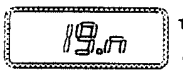


n = filter selection time-out
range: 1-10 sec., one step equals one sec.

Setting in this unit:

The factory default is 5 seconds. This feature changes the duration of the filter selection time-out in the AEC mode. The rhodium filter is automatically changed to the molybdenum filter if the kV-value goes below 27 kV. The filter is changed after this preset time or when the exposure switch is pressed.

19. Number of spacing rows in the serial printer



n = number of spacing rows between labels
range: 0-20, one step equals one row

Setting in this unit:

This feature changes the number of spacing rows between the labels printed with the serial printer.

20. Mode of MAG/ LOAD and release operations

n = 0; normal operation
n = 1; manual MAG/LOAD operation
n = 2; manual MAG/LOAD and release operations

Setting in this unit:

a) n=0; normal MAG/LOAD and release operations. The factory default is n=0.

b) n=1; manual MAG/LOAD operation. The MAG- or LOAD-key must be pressed and held down to move the C-arm.
The AUTO-LOAD can not be selected.The REL-key operates normally.

c) n=2; manual MAG/LOAD and release operations. The MAG- or LOAD-key must be pressed and held down to move the C-arm. The REL-key must be pressed and held down to drive the compression paddle open.
The AUTO-release can not be selected.