# HOW TO SET AND ADJUST AEC

#### **APPLICABLE TO:**

Omnera 400/500 systems



#### **INFORMATION:**

The Omnera 400/500 systems are equipped with Automatic Exposure Control (AEC) functionality in the Table and Wall stand detector holders. The systems use ionization type AEC-chambers, and this instruction shows how to calibrate the function.

### **REQUIRED TOOLS:**

- Standard service tools.
- CanonNE + AEC protocol

On delivery of the system, the AEC function is pre-calibrated and should only need minor adjustments. For instructions on how to adjust cut-off dose, skip to point 2 followed by point 3 (Table) or point 4 Wall stand.

In case a new AEC chamber (spare part) is installed, proceed as follows:

# 1. After installation of new AEC chamber (spare part)

1a. Factory default settings – AEC preamplifier potentiometers.

Instruction applicable for both Wall stand and Table chambers.

- 1. Locate the AEC-chamber potentiometers on the back of the detector holder.
- 2. Turn the MASTER potentiometer clockwise all the way to its end limit.
- 3. Then turn it 3,5 rounds back counterclockwise.



Location of AEC pre-amplifier potentiometers on Wall stand.



Location of AEC pre-amplifier potentiometers on Table.

4. Turn each of the three field balance potentiometers (Field A-C) in one direction until it clicks, then turn 7,5 turns back to set the center of range.

### 2. Preparations

- 1. Launch GenwareMP and select the AEC menu. Click on the AEC Setup tab.
- Select the Channel Number you are working on (Wall stand = 1, Table =2). Confirm this in the Receptor setup and with the connections in the System Cabinet at the AEC board.
- Ensure that the correct receptor is selected under Programmed Receptors (R1 = Table, R3 = Wall stand).
- 4. Ensure that the correct Film Screen is selected under Film Screen (1 = Table, 2 = Wall stand).
- 5. Click on the Film Screen Options tab.
- 6. Ensure that the Film Screen Active Box has the correct Film Screen selected for the Table and Wall stand workspaces. If not; Select the AEC Setup tab first, ensure the Receptor and AEC channel number is correct, then click the Film Screen Options tab, and ensure that only one Film Screen is selected under Film Screen Active.

Workspace	AEC Channel	Receptor	Film Screen
Table	2	1	1
Wall Stand	1	3	2

TABLE					
AEC Setup and Calibration			AEC Setup and Calibration		
AEC Setup Film Screen Options	Film Screen Calibration Density	Digita ( ) AEC Channel	AEC Setup Film Screen Options	Film Screen Calibration Density Digita 4	, AEC Channel
Channel Number	<b>)</b> <sup>3</sup> ()	2	Cli Screen Active	]23	2
Chamber Type	elds	Begrouped Recept	tors 50 ms:	0	Programmed Receptors
Field Compensation		R4 R5	R6 500 ms:	0 0	R4 R5 R6
R. Field Compensation	-5	Film Screen	Multiple Spot Compensation Multiple Spot Compensation:	0	Film Screen
C. Field Compensation	-4	Digital Rad	Film Screen Gain F.S. 1 Gain:	0	Digital Rad
1 Eidd Communities	10	▲ 1 2	5 F.S. 2 Gain:	0	• 1 2 3
L. rien Compensation	-10	Apply	F.S. 3 Gain:	0	A Apply Close

Example Table

7. Click on the Film Screen Calibration tab. Record the value for each kV station and Film screen combination in the *Current Film Screen value* column of the charts below.

Table	Target EI:			Receptor 1	AEC Channel	Film Screen 1
	300 (A)				2	
Filter (mm Cu)	kV	Post mAs (B)	EI (C)	Calc. mAs (D)	Current Film screen value (E)	Calculated Film screen value (F)
1	50					
1	55					
1	65					
2	75					
2	85					
2	95					
3	110					
3	130					

Wall	Target EI:			Receptor 3	AEC Channel	Film screen 2
stand	300 (A)				1	
Filter (mm Cu)	kV	Post mAs (B)	EI (C)	Calc. mAs (D)	Current Film screen value (E)	Calculated Film screen value (F)
1	50					
1	55					
1	65					
2	75					
2	85					
2	95					
3	110					
3	130					

3. Adjusting AEC cut-off dose – Table

## 3a. Field balance and Master gain adjustment

1. Launch CXDI NE and start an examination using the predefined AEC protocol for Table.



2. Select an AEC protocol and confirm the exposure parameters.



- 3. Align the x-ray tube with the AEC chamber in the Table. Insert a 2mm copper filter and grid. Use the SID (Source image distance) that matches the grid specification. Normally 40" at the table. If more than one grid is available, use the one with the highest ratio. Adjust the collimator light field to cover all three fields of the AEC chamber.
- 4. Use CXDI NE to make an exposure with the settings from step 2.

NOTE! During the calibration, exposure times should be between 20-40ms. Adjust tube current and repeat exposure if necessary.

- 5. Read the El value, the target is 300.
- 6. If adjustment is necessary, locate the Table AEC chamber preamplifier and the potentiometer for the Center field (FIELD B). Adjust and repeat exposure until the required target EI is reached.



7. Select the Left-side AEC Field and repeat step 2-6 until target EI, is achieved. Adjustments are made on the potentiometer for the Left field.

- 8. Select the Right-side AEC Field and repeat step 2-6 until target EI, is achieved. Adjustments are made on the potentiometer for the Right field.
- 9. If you cannot reach an El of 300 with the cell specific potentiometers, perform steps 2-8 with a target El of 200 for all three fields. Then use the MASTER potentiometer of the preamplifier to bring the El up to 300 once the cells are balanced.

After this step the three AEC fields of the Table is adjusted to stop exposure at the target EI when exposed with 85kV.

### 3b. Film screen calibration – Table

1. Launch CXDI NE and start an examination using the predefined AEC protocol for table.



2. Select the following exposure parameters.



Receptor: 1 – Table Mode: AEC Fields: Center Film screen: 1 kV: 50-130 see chart below mA: 100 Backup time (ms): 200 Density: 0 Collimator filter: OFF = 0mm Al/Cu 3. Align the x-ray tube with the AEC chamber in the Table. Insert a copper filter phantom for each exposure as stated in the chart below. Insert grid. Use the SID (Source image distance) that matches the grid specification. Normally 40" at the table. If more than one grid is available, use the one with the highest ratio. Adjust the collimator light field to cover the Center AEC field.

Table	Target EI: 300 (A)			Receptor 1	AEC Channel 2	Film Screen 1
Filter (mm Cu)	kV	Post mAs (B)	EI (C)	Calc. mAs (D)	Current Film screen value (E)	Calculated Film screen value (F)
1	50					
1	55					
1	65					
2	75					
2	85					
2	95					
3	110					
3	130					

4. Use CXDI NE to make exposure with the settings from the chart above.

NOTE! During the calibration, exposure times should be between 30-100ms. Adjust tube current and repeat exposure if necessary.

5. Record post mAs and EI value in the chart after each exposure and for each kVp/filtration combination. A pre-staged spread sheet can be used to calculate the correction factors (Film screen value) automatically for each kV station.

D = ( A \* B ) / C

F = (D \* E / B)

- 6. When all exposures have been executed and the chart has been populated with numbers, the Canon NE application can be closed.
- 7. Launch GenwareMP. Select the AEC Setup tab and select channel 2 for Table. Confirm that Receptor 1 is selected.
- 8. Select the Film Screen Calibration tab and enter the Calculated Film Screen values from previous step, for each kV station and save the values to the generator.

Date Error St.et Arc Carbo Arc Tude Lords Fig	DAP AX BECKE REAVE COM ANALY	EDwari LicKry Heep About EXIT	
	AEC Setup and Calibration		
	AEC Setup Film Screen Options Film Scr	reen Calibration Density Digita + >	- AEC Channel
	- Film Screen Calibration		4
	50 kV:	3.50	
💳 mA 🕂 🕂	55 LV.		Programmed Recentors
	55 KV:	\$.73	
	65 kV:	3.90	
💳 ms 🚽 🛃 🕂			R4 R5 R6
	75 kV:	4.50	Film Screen
	07137.	L 10	
- DEN +	65 KV:	4.40	
	95 kV:	4.35	
FIELDS			Digital Rad
	110 kV:	4.55	1 2 3
FILM SCREEN	1401.3		
	130 KV:	4.30	Apply Close

- 9. Re-launch CXDI NE and start an examination using the predefined AEC protocol for table.
- 10. Make exposures for each kVp/filtration setting of the chart again and confirm that each exposure results in the target EI = 300.

Table	Target EI: 300			
Filter (mm Cu)	kV	Post mAs	EI	Calculated Film screen value
1	50			
1	55			
1	65			
2	75			
2	85			
2	95			
3	110			
3	130			

11. You can go back into the GenWare application and tweak the Film Screen values if the EI/mAs is outside of the range of +/- 5 percent.

# 4. Adjusting AEC cut-off dose - Wall stand

### 4a. Field balance and Master gain adjustment

1. Launch CXDI NE and start an examination using the predefined AEC protocol for Wall stand.

EXAM	PAST					Ready	AEC Removed	Ws 710 CXDI710C	96% FULL	1 10 85 500	kV 200.0 m mA 10.0 m	. i
🗐 Worklist	🕿 Manual	Examination								(	۲D	On Line
					🗊 Info	Emergency Birth		Fdit	X Ray G	ienerator Se	tings	
						ID : 202409060	)73 Sex :		Tube: 1 H EAP: 0mG	U: 00% Acm <sup>2</sup>	맖	0
						*			kV	85		+
					<u> </u>	AEC		Ws 710	mA	50.0	•	+
						AEC		Ws 710	ms	200.0	•	+
						AEC		Ws 710		AEC Backup		
					HQ	AEC		Ws 710	Density	0		+
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					Mask	Sort	Unselect	Edit Exam				
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					Tool 2	Suspend Exam	Auto Send	Cancel				

2. Select the following exposure parameters.

Ready AEC CXDI710C 9 SID 115, 5 CXDI710C	96% 👾 01 to 50 kV 200.0 ms 100.0 mA 20.0 mAs	Receptor: 3 – Wall stand
		Mode: AFC
Birth : Edit	X-Ray Generator Settings	
	DAP: 0mGycm*	Fields: Center
		Film screen: 2
	mA 100.0 - +	<b>kV:</b> 85
	ms 200.0 - +	<b>m 4</b> : 100
	ACC DACKUP	<b>IIIA.</b> 100
HQ	Density 0 - +	Backup time (ms): 200
	Post mAs AEC	Density: 0
		Collimator filter: OFF = 0mm Al/Cu
L Sort Unselect Edit Exam	No filter	

3. Align the x-ray tube with the AEC chamber in the Wall stand. Insert a 2mm copper filter and grid. Use the SID (Source image distance) that matches the grid specification. Normally 60" at

the wall stand. If more than one grid is available, use the one with the highest ratio. Adjust the collimator light field to cover all three fields of the AEC chamber.

4. Use CXDI NE to make an exposure with the settings from step 2.

NOTE! During the calibration, exposure times should be between 20-40ms. Adjust tube current and repeat exposure if necessary.

- 5. Read the EI value, the target is 300.
- 6. If adjustment is necessary, locate the Wall stand AEC chamber preamplifier and the potentiometer for the Center field (FIELD B). Adjust and repeat exposure until the required target EI is reached.



- 7. Select the Left-side AEC Field and repeat step 2-6 until target EI, is achieved. Adjustments are made on the potentiometer for the Left field.
- 8. Select the Right-side AEC Field and repeat step 2-6 until target EI, is achieved. Adjustments are made on the potentiometer for the Right field.
- 9. If you cannot reach an EI of 300 with the cell specific potentiometers, perform steps 2-8 with a target EI of 200 for all three fields. Then use the MASTER potentiometer of the preamplifier to bring the EI up to 300 once the cells are balanced.

After this step the three AEC fields of the Wall stand is adjusted to stop exposure at the target EI when exposed with 85kV.

### 4b. Film screen calibration - Wall stand

- EXAM PAST Ready t 🕿 Manual 🗐 Exa ۲D Emergency Birth : ID : 20240906073. 🔛 🔘 🚱 8 6 d 50.0 200.0 AEC Ws 710 ₩ AEC Q )**E**( 1 Workspace Unselect Edit Exam Image Measure Annotation Save Protocol i Exit Cancel Tool 2 Susper
- 1. Launch CXDI NE and start an examination using the predefined AEC protocol for wall stand.

2. Select the following exposure parameters.



- Receptor: 3 Wall stand Mode: AEC Fields: Center Film screen: 2 kV: 50-130 see chart below mA: 100 Backup time (ms): 200 Density: 0 Collimator filter: OFF = 0mm Al/Cu
- 3. Align the x-ray tube with the AEC chamber in the Wall stand. Insert a copper filter phantom for each exposure as stated in the chart below. Insert grid. Use the SID (Source image distance) that matches the grid specification. Normally 60" at the wall stand. If more than one grid is available, use the one with the highest ratio. Adjust the collimator light field to cover the Center AEC field.

Wall	Target EI:			Receptor 3	AEC Channel	Film screen 2
stand	300 (A)				1	
Filter (mm Cu)	kV	Post mAs (B)	EI (C)	Calc. mAs (D)	Current Film screen value (E)	Calculated Film screen value (F)
1	50					
1	55					
1	65					
2	75					
2	85					
2	95					
3	110					
3	130					

4. Use CXDI NE to make exposure with the settings from the chart above.

NOTE! During the calibration, exposure times should be between 30-100ms. Adjust tube current and repeat exposure if necessary.

5. Record post mAs and EI value in the chart after each exposure and for each kVp/filtration combination. A pre-staged spread sheet can be used to calculate the correction factors (Film screen value) automatically for each kV station.

D = ( A \* B ) / C

F = (D \* E / B)

- 6. When all exposures have been executed and the chart has been populated with numbers, the Canon NE application can be closed.
- 7. Launch GenwareMP. Select the AEC Setup tab and select channel 1 for Wall stand. Confirm that Receptor 3 is selected.
- 8. Select the Film Screen Calibration tab and enter the Calculated Film Screen values from previous step, for each kV station and save the values to the generator.

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	AEC Setup   Film Screen Options   Film Sc	reen Calibration Density Digita ( )	AEC Channel
	Film Screen Calibration		
	50 kV:	3.50	1
	55 kV:	3.73	Programmed Receptors
		•	R1 R2 R3
	65 kV:	3.90	R4 R5 R6
	75 kV-	450	
	JORY.	*	Film Screen
	85 kV:	4.40	
		-	
	95 kV:	4.35	
			Digital Rad
	110 kV:	4.55	1 2 3
		•	
	130 KV:	4.30 <b>*</b>	Amby
			Appry Close

- 9. Re-launch CXDI NE and start an examination using the predefined AEC protocol for wall stand.
- 10. Make exposures for each kVp/filtration setting of the chart again and confirm that each exposure results in the target EI = 300.

Table	Target EI: 300			
Filter (mm Cu)	kV	Post mAs	EI	Calculated Film screen value
1	50			
1	55			
1	65			
2	75			
2	85			
2	95			
3	110			
3	130			

11. You can go back into the GenWare application and tweak the Film Screen values if the EI/mAs is outside of the range of +/- 5 percent.

# Setting up AEC protocols

1. Open the Service tool and select Protocol Editor and Button Layout. Select an unused Tray and press Edit



#### 2. Enter a new Tray name.

Click and drag the AEC protocols from the drop down list to the button tray.

😼 Edit Button Tray				×
Tray name: AEC		Visible		
✓ AEC	AEC			
CXDI420 17x17 Ta 🚔 📗				
CXDI420 17x17 Ta 🛱				
CXDI420 17x17 W Į∾				
CXDI710C 14x17 홈				
CXDI710C 14x17 🛱				
CXDI710C 14x17 🕼				
CXDI820C 11x14 T 🚔				
CXDI820C 11x14 T 🛱				
CXDI820C 11x14 [10]				
Pre-packed Protocol				
CXDI420 17x17 Wallstand				
Tray position: ROW 0, COLUMN 1.				
		ОК	Cancel	

3. Press OK and confirm that the new Tray is available in the Tray list.

🖳 Protocol Editor								3 <u>101</u> 5		×
	Tray list:				Tray view:					
U View	Tray name	Buttons	Visible	^	AEC	AEC				
Button Layout	44	0	True		0.000000					
	45	0	True							
	46	0	True							
	47	0	True							
	AEC	2	True							
	A001	19	True							
	A002	6	True							
		Up	Down						Edit	
					-	ОК	Cancel		Appl	v

4. Enter protocols, Radiography / X-ray parameters, and set the appropriate settings

	sure mode APRI	APRName	Trigger			
Tib/Fib LAT	raphy kV=40	The second second	1			
TOES		/	- -			
wall flex AP 13007						
wall flex SID 110						
wall flex SID 110 COPY Wall flex SID 150	ameter X-ray Para	meter				
wall stitch 150						
wall stitch AP 13005 AF	R-ID: kV=40,mA	=500,ms=100,Tech	hnique=1,Film=	0,Focus=0,LeftF	ield=0,CenterField	d=1,RightField=0,Receptor=1,Density=0,AECFieldsOrientation=(
Wrist AP						
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AEC Pa	arameters Configuration					
⊕ 😤 CXDI420 17x17 Tab	NAME	Very Small	Small	Medium	Large	^
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B CXDI420 17x17 Tab	RadmA	50.0	200.0	200.0	200.0	
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a l[ <sup>∞</sup> CXDI420 17x17 Wal	ms	10.0	80.0	80.0	80.0	
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유민 CXDI420 17x17 Wal 아유 CXDI710C 14x17 - 1 아유 CXDI710C 14x17 - 1 아민 CXDI710C 14x17 - 1 아민 CXDI710C 14x17 - 1 아민 CXDI710C 14x17 - 1 아유 CXDI820C 11x14 Ta 아마 CXDI820C 11x14 Ta 아민 CXDI820C 11x14 Ta 아민 CXDI820C 11x14 W; Pre-packed Protocol Workspace View	ms mAs Technique Focus Left Field Center Field Right Field	10.0 0.5 MAS SMALL NO YES NO	80.0 16.0 MAS SMALL NO YES NO	80.0 16.0 MAS SMALL NO YES NO	80.0 16.0 MAS SMALL NO YES NO	v
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5. Press Apply to save the settings.

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