

ARCOMA STITCHING – how-to guide for Precision system

Stitching is the process of combining multiple images with overlapping fields of view to produce a larger image.

When imaging long parts of the human body, there is need for an image with extended length. In digital radiography the image size is limited due to the sensitive area of flat-panel detectors. In order to produce a large image, images are assembled from multiple exposures with a small, spatial overlap.

Stitching is possible at both Table and Wallstand.



Composite Image

Guide overview

ARCOMA A ARCOMA Stitching - calibration and settings: Canon NE Stitching - calibration and settings: Arcoma SSW The following steps are describing how to perform the setup needed in Canon NE - tying together This guide assumes that installation and calibration A 10 (10 per spenter peter is performed according to Installation and Service what we did in Arcoma SSW with the protocols... manual delivered with the system. Confirm this before following the steps from here on. Kin ode Kin ode Kak (Sine) Sine (This is done in Canon NE ServiceTool. First, we need the autoposition setup to be made in 4 steps using Arcoma service software: 1) Calibrate the Stitching autoposition 2) Note number of autoposition slot 3) Confirm Stitching parameter settings 4) Confirm detector size settings 11 A ARCOMA Stitching -How to perform the examination 6 26

Stitching – calibration and settings: Arcoma SSW

🔥 ArcoCeil - [System configu	ation]			
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System 👎	×			
⊕ ArcoCeil	Control nodes Master Guard Display SignalInterface Collimator	Motor nodes Node Z Driver Node X Driver Node A Driver Node B Driver Bucky Driver Node WS Driver	Modes Free Auto position Film tracking Tomo Pendulum Table flexible Wall flexible	
System messages				
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This guide assumes that installation and calibration is performed according to **Installation and Service** manual delivered with the system. Confirm this before following the steps from here on.

First, we need the autoposition setup to be made in 4 steps using Arcoma service software:

- 1) Calibrate the Stitching autoposition
- 2) Note number of autoposition slot
- 3) Confirm Stitching parameter settings
- 4) Confirm detector size settings



1) Calibrate the stitching auto position

uto p 'os. D 1	Mode Free Mode Auto position	FFD 0 1100	Position (1710 mm) Node X Node Y Node Z Node A Node B Bucky Node WS 18659 13950 12745 899 2 20113 12747
234557	Auto position Film tracking Pendulum Table flexible Stitching Table Table flexible	1100 1100 1100 1100 1100 1100 1100	Position Mode Offset Z FFD Stitching Wall I274 1800 No Wall
3	Table flexible	1100	Write Remove
9	Auto position	850	
10	Wall flexible	1100	
11	Stitching Wall	1100	
12	Wall flexible	1800	
13	Stitching Wall	1800	WRITE
14	Wall flexible	1100	Select mode and set FFD distance (also offset for 'Table flexible' and no 2
15	Auto position	0	wait for 'Wall flexible'). Press the WRITE button to add the position to



2) Note number of auto position slot

Note the number of the auto position slot – in this example slot 13.

This will be used when defining the protocols in Canon NE.

3) Confirm parameter settings:

• Go to Master node view and press "Stitching param."

Press "Read", check the values and adjust if needed.
 These are default values recommended:



ust Stitching parameters		
Delay(mSec): 3000		
Overlap(mm): 10		
Collimator Adjustment(mm): 0		
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Txposure request is delayed after that	g mode: new data is received. This	
system some time to be stable.		· ·
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B node	Tabletop offset	X/Y zero pos1
Bucky node	Set distance 120	
Control nodes	Beta offset (deg.)	1
	U	Observe that all motor nodes must have been calibrated be
Guard node		table position should be set.
SignalInterface node	Pendulum param.	SET POS. 1
Collimator node	Wall Flexible param.	Detector Parameters
	Stitching param.	
-		



A brief explanation of the parameter settings on previous page:

• Delay(mSec): 3000

This is related to timing between Canon image system and Arcoma positioning system during stitching sequence. Default setting is 3000 and there is normally no reason to adjust this.

• Overlap(mm): 10

This is defining an overlap of the images. Meaning a surface in mm that will be radiated twice just to avoid visible stitches (white lines) between the images. Default setting is 10 and there is normally no reason to adjust this.

Collimator Adjustment(mm): 0

This is an additional setting related to overlap of the images.

If the system is calibrated according to manual and the above parameters are set to default – but still there is visible stitches (white lines) between the images. Then this setting can be increased, to compensate for collimator mechanical tolerances etc.

Example:

Default setting is 0. When changing value to 10 mm the collimator size will be 10 mm larger between images.



	JET POS. 1	
"am.	Detector Parameters	
letector		Wall Detecor
pe Arcoma Single	•	Type Stationary
Detector 1	Detector 2	Detector 1
ight 430	Height 0	Height 430
		Offset 0

4) Confirm detector size settings:

- Go to Master node view and press "Detector Parameters"
- Make sure the measurements (stated in mm) for Width and Height are corresponding with installed detectors in your system
- Confirm Offset setting:

For a 43x43 detector it should be 0.

For a 43x35 detector it should be 38.

NOTE!

Not all detectors are 43X43 or 43x35 cm.

For example full size Canon compacts actual size is 415 x 426. In that case, stating 430 x 430 as Width and Height in service software will result in incorrect calculations and failure to stitch images properly!



Stitching – calibration and settings: Canon NE



The following steps are describing how to perform the setup needed in Canon NE - tying together what we did in Arcoma SSW with the protocols...

This is done in Canon NE ServiceTool.





Menu selection							
X-ray Generator and Sensor	X-Ray Generator	Sensor	Grid	AP/LNK	Maintenance Tool		
DICOM Setting	DICOM Common Setting	MWL	MPPS	Storage	Printer	Media output	Report
System Setting	Application Setting	User Account Management	Annotation	Log Setting	Add-in Setting		
Utility Setting	Protocol Editor	Protocol Import and Export	Data Collection	Migration	Image Import and Export	License	
Input Assist Setting	Barcode Reader	Magnetic Card Reader					

We will now create a new protocol that supports stitching functionality.

(Note though, there might be stitching protocols created already that can be used for this. If hesitant, consult responsible application engineer)

Select Protocol Editor



Protocol Protocol name Body part Laterality Comment •••••••••••••••••••••••••••••	otocol Editor							0	
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ew protocol - (1/4)	
Property	
Protocol name:	Stitching Wall 3 images SID 180
Comment:	
🔲 Enlarge Croppi	ng Area in Image
Mark Placement	
🗏 L 🛛 Preset po	sition: Middle center 🔹
🔲 R 🛛 Preset po	sition: Middle center 🔹
Use this m Use this m It sets Unp placed.	arks as DICOM Laterality attribute(0020,0062). Daired when none or both of the laterality marks are
DICOM Attribute	
Modality:	DX 👻
Body part:	
Patient orientatio	n: L\F 🔹
Laterality:	L
View Position:	
Series description	n:
	Next >> Cancel

Type an appropriate protocol name (in this example "Stitching Wall 3 images SID 180") and confirm settings are according to this picture

Press "Next"



New protocol - (2/4)	
Default workspace Wall-710C	Select the workspace (detector) to be used in this protocol
Workspace information	
Position type: Stand	
Detector group: 70C	
Detector:	
Model Name Serial number Detector group	Change Exposure type from "Static" to "Stitch"
CXDI710C Wir 280000EB 70C	
	Then press "Next"
Source image receptor distance (SID): mm	
Source object distance (SOD):	
Exposure type: Static 🔹	Stitch
Grid detectability type: Or detectable	
Grid ID: None 🔹	
<< Back Next >> Cancel	



ew protocol - (3/4)	
Number of images: Target exposure index(EIt):	₿Ţ
Image processing condition:	
Stitch\Unknown	
⊡- Stitch - Whole Spine - Full Leg - Unknown	
Direction:	Other •
	<< Back Next >> Cancel

Select number of images for this protocol.

Maximum images for one Stitching examination on Wallstand is 4 and Table is 3.

Note! If uncertain on how many images are required, always select one more image rather than one too less. This since it will determine maximum allowed images in the examination – if on the other hand the last image is not needed, it can be cancelled.

Then press "Next"



DICOM	
Modality	DX
BodyPart	
PatientOrientation	L\F
ViewPosition	
SeriesDescription	
Mark Setting	
Mark	U
Property	
ProtocolName	Stitching Wall 3 images SID 180
Comment	
ImagePreviewMode	AllArea

Confirm the settings are according to your previous selections (according to this picture) and press "Finish"



K Menu selection		
X-ray Generator and Sensor	X-Ray Generator Sensor Grid AP/LNK Maintenance Tool	
DICOM Setting	Image: Dicom I	Report
System Setting	Application Setting	
Utility Setting	Protocol Protocol Import Protocol Editor Protocol Import and Export Data Collection Migration	
Input Assist Setting	Barcode Reader Magnetic Card Reader	

Return to Menu selection and go to "Application Setting"



K Application setting	
Operation	Stitch setting
Patient information	 Show stitch screen automatically after ending every exam Send condition set command after an image captured in stitch protocol
Protocol	Creating stitched images: Higher speed Improve the quality of transferred images Higher quality
Study information	Output stitch partial image Add the exposure conditions to stitched image
Examination screen 1	Positioning method
Examination screen 2	Align images using markers
Static image	Use positional information
Stitch image	Prine-tune the position by image analysis
Screen saver	
Display	
Output	
HDD/Memory	
Database	
Select list	
	OK Cancel Apply

Select "Stitch image" and confirm that settings are according to this picture



Kenu selection		
X-ray Generator and Sensor	X-Ray Generator Sensor Grid AP/LNK	
DICOM Setting	DICOM Common Setting MWL MPPS Storage Printer Media output	Report
System Setting	Application Setting Image: Constant of the setting	
Utility Setting	Protocol Protocol Protocol Image Import and Export Image Import and Export Protocol Editor Data Collection Migration Export License	
Input Assist Setting	Barcode Reader	

Return to Menu selection and go to "Protocol Editor"

Create a new protocol for stitching

Protocol Editor					[
e lws AP	Protocol name	Body part	Laterality	Comment		*
	UNTERSCHNEKEL LAT	LEG		ONDERBEEN AP		
	Wall stitch test Jli Wallstand Horizontal	CSPINE TESTIS	L			
OBERSCHENKEL LAT	ZEHE AP ZEHE SCHRAEG	TOE		TEEN AP TEEN 3/4		
	AEC Stitching Wall 3 images	ABDOMEN SID 180	1	AEC		Ţ
PATELLA P = RIPPEN					Add Delete	Сору
GRAEDEL AP	Property Dependency					
General Contraction of the second secon	Property	hing Wall 3 images SID 180				18
e SCHULTER AP 15* EXO e Stitching Wall 3 180 cm (3exp)	Comment:	ing wan 5 inages 515 100				
	🔄 Enlarge Cropping A	rea in Image				
	Mark Placement					
	🔲 L 🛛 Preset pos	sition: Middle center		•		
UNTERSCHNEKEL LAT	🔲 R 🛛 Preset pos	sition: Middle center		•		
Wallstand Horizontal	🔲 Use this mar It sets Unpai	ks as DICOM Laterality attri red when none or both of t	bute(0020,006 he laterality m	2). arks are placed.		
E ZERE AP	DICOM Attribute					
Stitching Wall 3 images SID 180	Modality:	DX		Body part:		•
Wall-/10C	Patient orientation:	LVF	•	Laterality:	Ĺ	•
- ☆ Radiography (1) - ☆ Radiography (2)	View Position:		•	Series description:		
⊟੫ [™] Workspace -≗ 701						
– ਯਿ CXDI-710C –≗ Table sim						
I - I - I - I - I - I - I - I - I - I -				ОК	Cancel	Apply

Select the protocol we just created - in this example "Stitching Wall 3 images SID 180".

Now as you can see there are 3 submenus called *Radiography (1) Radiography (2) Radiography (3)* These are one menu for each image.

Select the first one - "Radiography (1)"

Create a new protocol for stitching

Protocol Editor						3 6 0
🖷 🛲 KNIE LAT	Exposure mode APRID APRName Trigger					
🗄 🛲 LWS AP	Shitch 1					
🖶 🛲 LWS LAT	Radiography (1)					
🖶 🛲 OBERARM	Radiography (2) 1					
B B OBERARM COPY1	Radiography (3) 1					
🗉 🚥 OBERARM PA						
🛛 📾 OBERSCHENKEL						
B DBERSCHENKEL LAT						
🖶 🚥 OSG AP						
🖲 🚥 OSG LAT						
🖶 🚥 PATELLA						
🖲 🚥 RIPPEN						
🖶 🛲 RIPPEN SCHRAEG						
B SCHAEDEL AP						
SCHAEDEL LAT						
B SCHULTER AP						
SCHULTER AP 15* EXO						
🖶 🚥 Stitching Wall 3 180 cm (3exp)	IP Parameter X-ray Parameter					
Stitching Wall 3 180 cm (3exp) Copy2						
🗄 🛲 Table stitching (3exp)	Long exposure					
🗉 🚥 THORAX AP	APR-ID:					
🗄 🚥 UNTERARM AP						
🗉 📾 UNTERARM LAT						
B D UNTERSCHNEKEL AP			· ·			
🗉 🚥 UNTERSCHNEKEL LAT	Pluoro SensorArea MaxPulseWidth	Body Size	e medium	•		
🖲 🚥 Wall stitch test ili	SeriesInstanceUID NU	NAME	Very Small	Small	Medium	Large ^
🗄 🛲 Wallstand Horizontal	Lef	eft Field	NO	NO	NO	NO
E ZEHE AP	ADC.POT T	enter Field	YES	YES	YES	YES
🗄 📾 ZEHE SCHRAEG	Big	ight Field	NO	NO	NO	NO
B 💷 AEC		acaptor	1	1	1	1
Stitching Wall 3 images SID 180	Cine/Ser. Rad. MaxPulseWidth	leceptor	-	-	-	-
⊟ II ∾ Wall-710C	Binning SeriesInstanceUID	ensity		0	0	0
-B Stitch	Tomosynthesis Option	EC Fields Orient.	1-2-3	1-2-3	1-2-3	1-2-3
-😤 Radiography (1)	ADC-ROI Tomo Height(mm)	utoPosition On	NO	NO	NO	NO
Radiography (2)	Au	uto Position	0	0	0	0
Radiography (3)	Au	uto Pos Offset	-9999999	-999999	-999999	-999999
E Pre-packed Protocol	Re	eceptor Ori. On	NO	NO	NO	NO
ell [™] Workspace	Rad Img ROI Height 200 SeriesInstanceUID Por	ortraitLandscape	Portrait	Portrait	Portrait	Portrait 🗧
<u>-</u> <u>2</u> 701	Img ROI Width 150 Stitch/Temperaphy Option Filt	ilter On I	NO	NO	NO	NO
-18 CXDI-710C	Filt	ilter	0	0	0	0
- <u>&</u> Table sim		olimator On	NO	NO	NO	NO
-r≗n Table sim table		olimatorWidth	-10	-1.0	-1.0	-1
음 TISCH		allimatorHoight	1.0	1.0	1.0	-
-JL∞ Wall sim		omnatorneignt	-110	-1.0	-1.0	
ା ^l ୭ Wall-710C	Col	oiimatorCentering	N/A	N/A	N/A	IN/A
- 😤 Wireless in table	SIL	ID On I	NO	NO	NO	NO
Ŷ Wireless on top of stand	SIL	ID	-1.0	-1.0	-1.0	-1.0 +
Uiew	· · · · · · · · · · · · · · · · · · ·			m		•
Button Layout		_	_	_	_	

Create a new protocol for stitching – Radiography (1) - first stitching image

NAME	Very Small	Small	Medium	Large
Receptor	3	3	3	3
Density	0	0	0	0
AEC Fields Orient.	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrai
AutoPosition On	YES	YES	YES	YES
Auto Position	13	13	13	13
Auto Pos Offset	-999999	-999999	-999999	-999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	YES	YES	YES	YES
Filter	0	0	0	0
Collimator On	YES	YES	YES	YES
CollimatorWidth	430.0	430.0	430,0	430.0
CollimatorHeight	350.0	350.0	350.0	350.0
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	NO	NO	NO	NO
SID	0.0	0.0	0.0	0.0
GridInfo	DISABLED	DISABLED	DISABLED	DISABLED

The stitching specific parameters that needs to be adjusted for "Radiography 1" and the correct values are:

AutoPosition ON	YES	YES	YES	YES
Auto Position	13	13	13	13
Collimator ON	YES	YES	YES	YES
Collimator Width	430	430	430	430
CollimatorHeight	350	350	350	350

(*Note:* Width/height is depending on size needed for examination and limited by actual detector size)

Adjust settings accordingly, press "Apply", save changes and go to "Radiography(2)"

Create a new protocol for stitching – Radiography (2) - second stitching image

NAME	Very Small	Small	Medium	Large
Receptor	3	3	3	3
Density	0	0	0	0
AEC Fields Orient.	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait
AutoPosition On	YES	YES	YES	YES
Auto Position	13	13	13	13
Auto Pos Offset	-999999	<mark>-999999</mark>	-999999	-9999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	YES	YES	YES	YES
Filter	0	0	0	0
Collimator On	NO	NO	NO	NO
CollimatorWidth	-1.0	-1.0	-1.0	-1.0
CollimatorHeight	-1.0	-1.0	-1.0	-1.0
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	NO	NO	NO	NO
SID	0.0	0.0	0.0	0.0
GridInfo	DISABLED	DISABLED	DISABLED	DISABLED

The stitching specific parameters that needs to be adjusted for "Radiography 2" and the correct values are:

AutoPosition ON	YES	YES	YES	YES
Auto Position	13	13	13	13
Collimator ON	NO	NO	NO	NO
Collimator Width	-1.0	-1.0	-1.0	-1.0
Collimator Height	-1.0	-1.0	-1.0	-1.0

Adjust settings accordingly, press "Apply", save changes and go to "Radiography(3)"

Create a new protocol for stitching – Radiography (3) - third stitching image

NAME	Very Small	Small	Medium	Large
Left Field	NO	NO	NO	NO
Center Field	YES	YES	YES	YES
Right Field	NO	NO	NO	NO
Receptor	1	1	1	1
Density	0	0	0	0
AEC Fields Orient.	1-2-3	1-2-3	1-2-3	1-2-3
AutoPosition On	NO	NO	NO	NO
Auto Position	0	0	0	0
Auto Pos Offset	-9999999	-999999	-9999999	-9999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	NO	NO	NO	NO
Filter	0	0	0	0
Collimator On	NO	NO	NO	NO
CollimatorWidth	-1.0	-1.0	-1.0	-1
CollimatorHeight	-1.0	-1.0	-1.0	-1
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	NO	NO	NO	NO
SID	-1.0	-1.0	-1.0	-1.0

The stitching specific parameters that needs to be adjusted for "Radiography 3" and the correct values are:

AutoPosition ON	YES	YES	YES	YES
Auto Position	13	13	13	13
Collimator ON	NO	NO	NO	NO
Collimator Width	-1.0	-1.0	-1.0	-1.0
Collimator Height	-1.0	-1.0	-1.0	-1.0

Adjust settings accordingly, press "Apply" and save changes



ARCOMA

Stitching –

How to perform the examination

WARNING!-

The Wallstand detector holder will move during stitching. This may cause danger for the patient.

Select a Stitching Wallstand mode examination.

The System display will display the following.



Fig. 4-18 Patient protection



Fig. 4-19 Stitching Wallstand mode examination

The following buttons and information are located in the display, see Fig. 4-19 Stitching Wallstand mode examination

a High position , b Low position

- 1. Activate the mode by pressing the servo button.
 - · The servo mode indication light will flash until both limits are defined.
 - · The OTC will automatically move to its programmed position.
 - · The System will beep when position is reached.
- 2. Install a patient protection in front of the Wallstand.
- 3. Invite the patient and position the patient in front of the Wallstand.
- Verify that the patient protection is placed in front of the Wallstand by pressing the green check button on the display.
- Move the focus point to the middle of the planned composite image. This could be done by moving the tube in Z direction.

Rotate the x-ray tube in order for the lower edge of the collimator light field to indicate the lower limit for the composite image.

7. Press the button to indicate the lower limit. The button turns green.



Fig. 4-20 Lower limit indication

- 8. Rotate the x-ray tube in order for the upper edge of the collimator light field to indicate the upper limit for the composite image.
- 9. Press the button to indicate the upper limit.

· The button turns green to indicate that the limit is set.



Fig. 4-21 Stitching mode - upper and lower limit set

- When both limits have been defined the total length of the composite image and the number of exposures will be shown.
- The servo mode indication light will be fixed.
- 10. Modify the exposure settings if necessary.

Note! -

For a stitching procedure, a change of the patient size or change of exposure parameters for the first image included in the sequence, is not kept for the following included images.

- 11. Activate the Exposure button and keep it activated during the procedure.
- The starting position is always at the top edge of the composite image. Activate the Exposure button and keep it activated until the exposure procedure is completed.
- · The System will move to the correct starting position.
- · When the System is in the correct position for the first image, the first image is captured.
- After exposure, the System moves to the next, correct position and the second image will be captured.
- · This is repeated until all images for the composite image has been captured.
- . The System will beep when the sequence is finished. Release the button.

4.7.4 Stitching Table Mode (Option)

Note! ----

Stitching Table Mode is not available according to the described procedure with CR systems.

Select a Stitching Table mode examination.

The system display will display the following, see Fig. 4-13 a) Left position and b) Right position.



Fig. 4-13 a) Left position and b) Right position.

Activate the mode by pressing the servo button.

· The servo mode indication light will flash until the left and right positions are specified.

The OTC will automatically move to its programmed position.

· The system will beep when position is reached.

Invite the patient and position the patient on the table.

Move the focus point to the middle of the planned composite image. This could be done either by moving the tabletop or by moving the column in X (or Y) direction.

Rotate the x-ray tube in order for the right edge of the collimator light field to indicate the right limit for the composite image.

Press the button (F1) to set the right limit, see Fig. 4-14.

· The button turns green to indicate that the limit is set.



ARCOMA STITCHING – end of presentation