

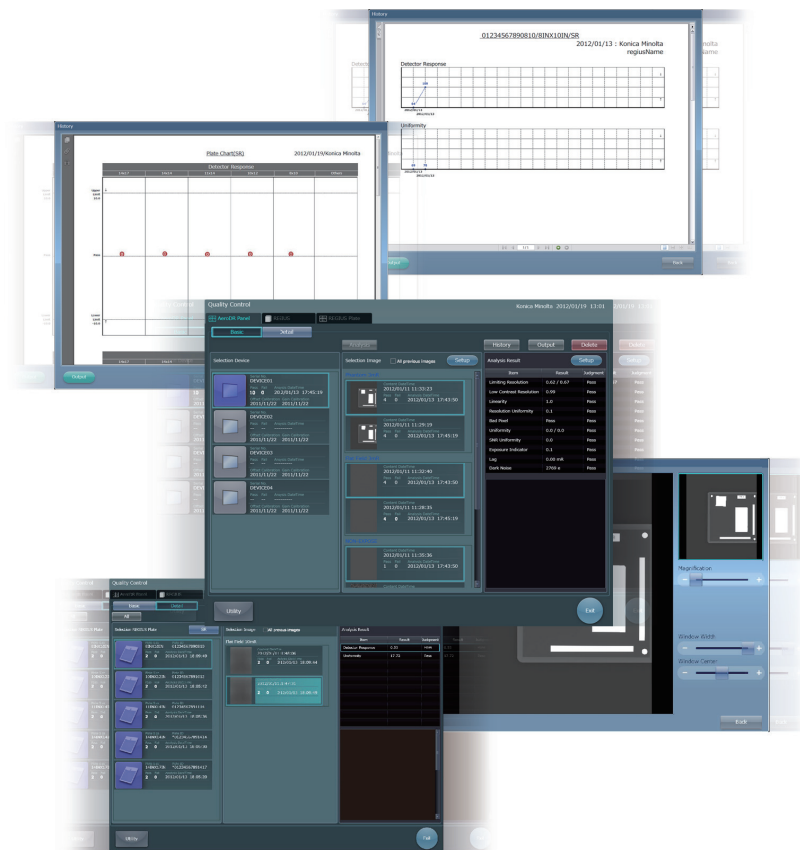


KONICA MINOLTA

# Simple Check QC for *CS-7*

Version 1.20

## Operation Manual



CE 0197



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EN

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# Introduction

# Introduction

How to operate the Quality Assurance Program (hereinafter referred to as Simple Check QC) developed for AeroDR SYSTEM / REGIUS Console CS-7 is described in this manual.

For other information such as function/operation/precaution, please refer to "CS-7 Operation Manual" and "CS-7 User Tool Operation Manual" respectively.



- **This operation manual describes instructions on how to operate the Simple Check QC. Before operations, read the respective Operation Manual of the AeroDR SYSTEM / CS-7 to obtain an understanding of the basic functions and precautions.**
- **This operation manual describes instructions on the basic functions for operation of this device. Those operating this device for the first time should read this manual beforehand. Also, store this manual close to this device after reading it through, so it can be used as a guide to allow optimum operating conditions.**

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## Term description

The meanings of terms used in this operation manual are as follows:

Terms	Description
AeroDR SYSTEM	Collective term indicating AeroDR Detector, AeroDR Interface Unit, AeroDR Generator Interface Unit, AeroDR Battery Charger, AeroDR Access Point, etc.
AeroDR Detector	Collective term indicating both AeroDR 1417HQ, AeroDR 1417S, AeroDR 1717HQ, AeroDR 1012HQ and AeroDR 2 1417HQ.
Detector	Refer to the AeroDR Detector and REGIUS Cassette/Plate.
CR	An acronym for computed radiography
DR	An acronym for digital radiography
REGIUS	Refer to the REGIUS series. When indicated individually, they are shown as "REGIUS 110", "REGIUS 110HQ", "REGIUS 170", "REGIUS 190" and "REGIUS 210".
REGIUS SIGMA/SIGMA2	Used as the collective terms for "REGIUS SIGMA" and "REGIUS SIGMA2".
REGIUS Cassette	Refer to REGIUS Cassette and REGIUS Plate.

## Structure of pages

(1) **2.2 • Measure the exposure dose**

(2) **1 Set the X-ray device and a detector.**

Do not use any additional filter or grid.

Set the exposure distance to 150 to 200 cm.

Collimate the exposure field a little larger than the Detector.

Align the positioning mark (center)

Lead Sheet (for protection of back scattering)

**For the AeroDR Detector**  
Konica Minolta logo side is set closer to the anode (+)

**For the REGIUS Cassette**  
Set the blue line of the REGIUS Cassette to the side of anode (+)

**For the AeroDR Detector**  
Adjust the position of the Phantom using the positioning tool. (Perform the exposure after removing the positioning tool.)

**For the REGIUS Cassette**  
Press the side of Phantom against the inside edge of aluminium frame of the REGIUS Cassette.

**About the setting**

- Place the anti-scatter lead sheet, and place the detector on this sheet.
- Place the detector with its center aligned to the center of the exposure field, and adjust the size of the exposure field to fit to the detector size or to the size slightly larger (up to approx.3cm larger) than the detector.
- The AeroDR Detector and REGIUS Cassette have different Marks for arrangement.
  - For the AeroDR Detector**
    - Make sure that Konica Minolta logo side is set closer to the anode (+) of the tube.
  - For the REGIUS Cassette**
    - Make sure that the blue line of the REGIUS Cassette is set closer to the anode (+) of the tube.

**IMPORTANT**

- If it is difficult to set the Detector with its blue line or Konica Minolta logo side oriented to the anode side of the X-ray tube due to the reason of X-ray generator's positioning, it is also accepted that the Detector is positioned at 180 degrees rotated from the recommended position (as the result, the blue line or Konica Minolta logo side is oriented to the cathode side of the X-ray tube). However, please remember that once the Detector is positioned in this way, it has to be kept so through all test procedures.

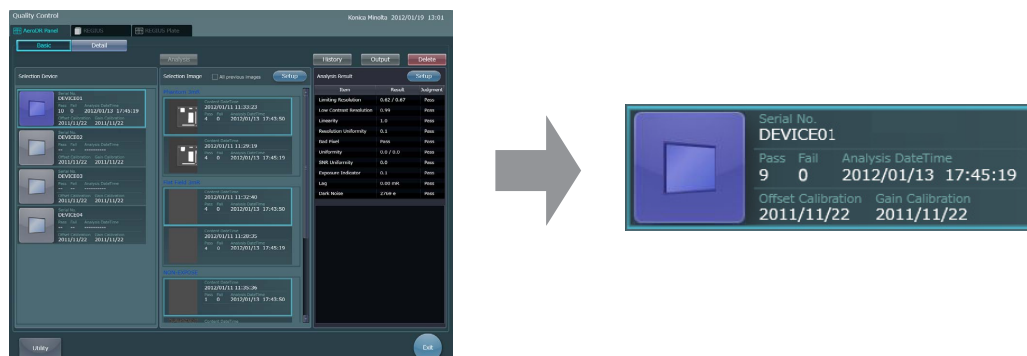
(3)

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Number	Item	Description	Icon
(1)	Item heading	Describes the titles of described content.	-
(2)	Operation procedure	The operating procedure is described in sequential numerical steps.	-
	Screen display	Shows a screen on which operations are performed.	-
	Reference	Describes reference items. Refer to these as necessary.	Reference
(3)	Important items	Describes important items for operation. Be sure to read them.	IMPORTANT
	Hint	Describes important information.	HINT

## Screen display

Note that explanatory screens may be omitted from this manual when not needed.

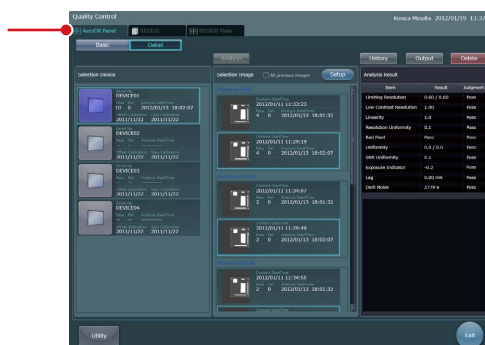


## Characters and icons displayed on the screen

Characters and icons displayed on the screen are shown with [ ].

Notation example of tab:

[AeroDR Panel] tab  
 [REGIUS] tab  
 [REGIUS Plate] tab



Notation example of button:

[History] button  
 [Output] button  
 [Delete] button

## Notation of operation methods

This manual describes main operation methods as follows.

Notation	Description
Press	Operation to touch the screen or click with a mouse to operate operation targets such as buttons.
Select	Operation to select from several options such as from a pull-down menu or tabs.
Input	Operation to enter any string using a keyboard or the input panel displayed on the screen.
Drag	Operation to move an operation target while touching or clicking it.
Drop	Operation to release the operation target being dragged by quitting touching it or releasing the button being clicked.

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# Chapter 1

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## Outline of the Simple Check QC

This chapter describes the Outline of the Simple Check QC.

## 1.1 • Outline of the Simple Check QC

The Simple Check QC is designed to implement the quality assurance/quality control of the CR/DR System. The Simple Check QC is the independent software, not a part of the CS-7 software. Its operation can be initiated using the User Tool of the CS-7.

The Simple Check QC is featured with the function that allows automatic calculation of the prescribed image for calculation of the evaluation value, display of the judgment/image evaluation histories.

Images used for calculation varies depending on devices as follows:

AeroDR Detector: Flat Field, Phantom, NON-EXPOSE, Dark

REGIUS: Phantom, Flat Field, Erased, Dark

REGIUS Plate: Flat Field

The Simple Check QC is intended for the DR system "AeroDR SYSTEM" and the CR system, "REGIUS".

For REGIUS, you can conduct the Simple Check QC on both REGIUS main unit and REGIUS Plate.

"Basic Quality Control", "Detail Quality Control" and "Acceptance Test" are available as methods of analysis for each device.

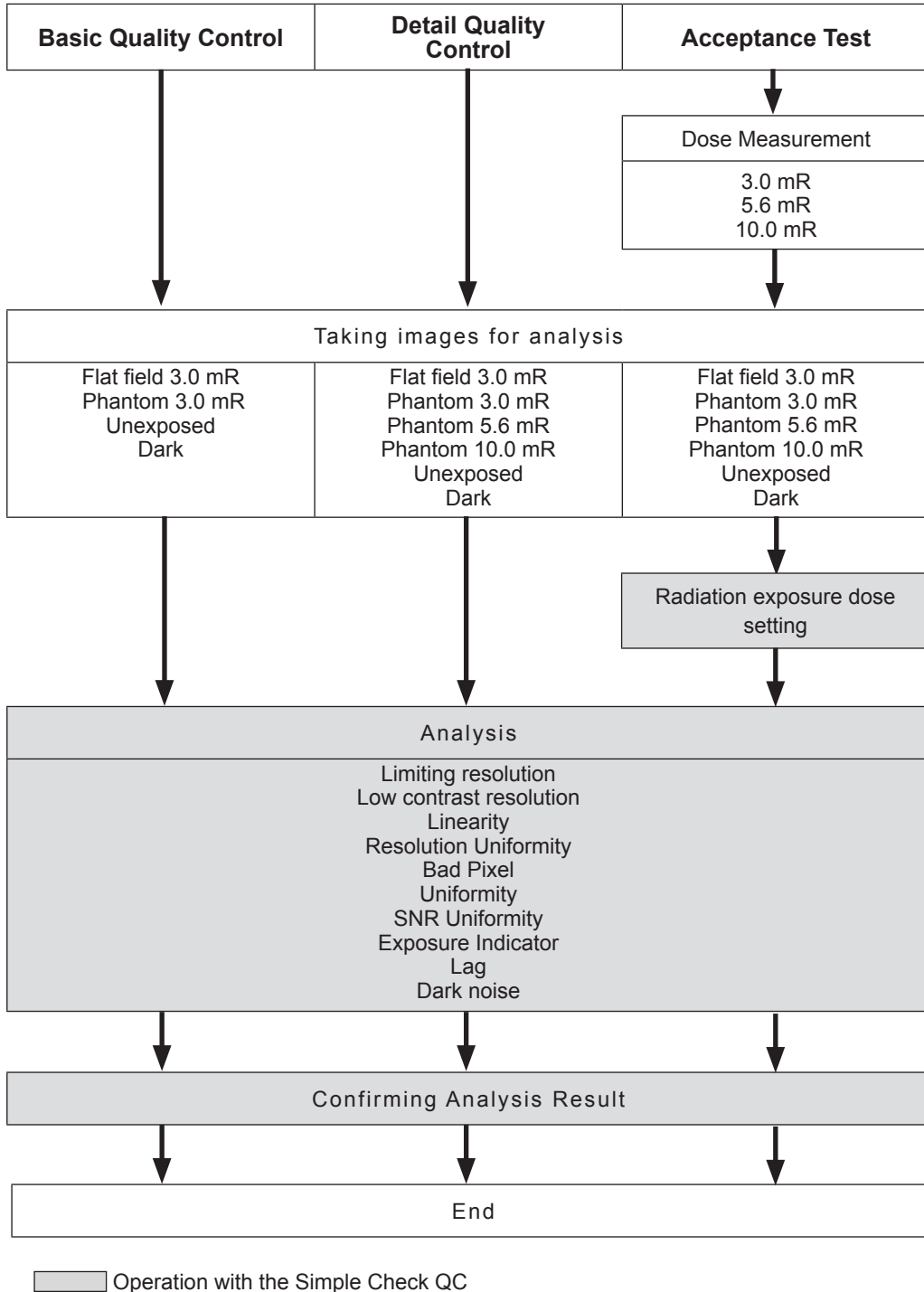
### CAUTION

- It is required to complete in advance the exposure and detecting of the prescribed Phantom image on Examination screen using the Exam Tag key exclusive to QA/QC to effect an automatic calculation.
- Handle the Phantom with care by referring to manual of "Simple Check QC Phantom".
- The judgment result should be referred to only as a guide to implement the quality control of the AeroDR Detector, REGIUS and REGIUS Plate of the CR System, and should not be understood as the warrantee of the quality.
- The user in daily operation is requested to verify the image by her/himself whether the image is suitable to diagnosis before using the image for diagnosis.
- The user is requested to take necessary actions against the judgment by her/himself referring to "[Chapter 4 Details of Test Items for CR SYSTEM](#)" to "[Chapter 6 Analytic Theory for CR SYSTEM](#)" described in this manual. If the action conducted by the user cannot solve the problem, please contact your technical representative.
- When performing exposure with the AeroDR Detector in Aero Sync mode, unexposed images cannot be collected. Therefore, Simple Check QC analysis cannot be performed.
- Use CS-7 version 1.20 or later for analysis of Phantom Images captured with AeroDR 1012HQ.
- QC test shall be implemented at least once every month.



**Work flow**

● **AeroDR Detector**

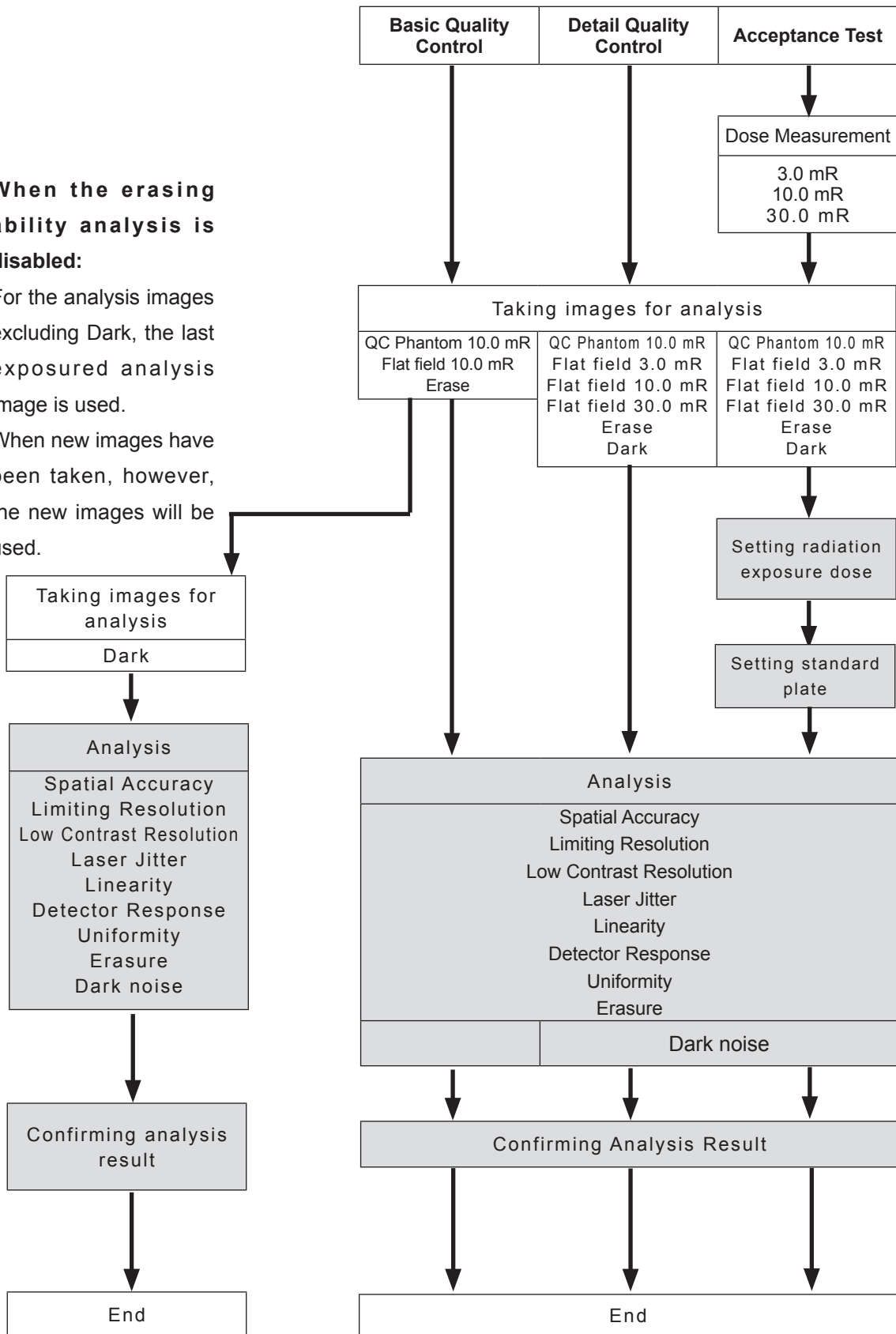


● REGIUS

**When the erasing ability analysis is disabled:**

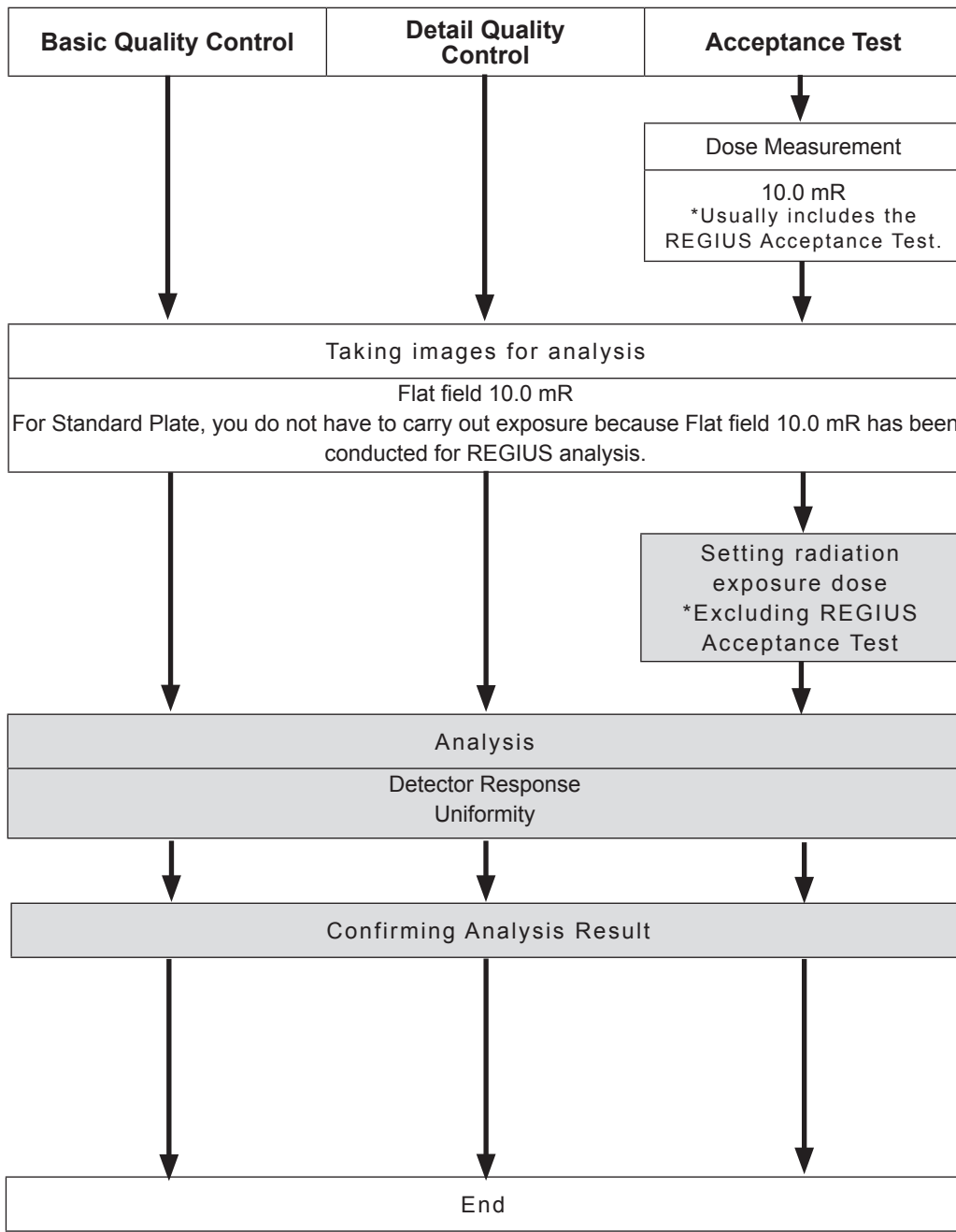
For the analysis images excluding Dark, the last exposed analysis image is used.

When new images have been taken, however, the new images will be used.



■ Operation with the Simple Check QC

● REGIUS Plate



Operation with the Simple Check QC

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# Chapter 2

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## **Exposure/Detecting & Analysis Procedure**

This chapter describes procedures for exposing, detecting and analyzing images with the device.

## 2.1 • Recommended Exposure Condition

### AeroDR Detector

#### • Basic Quality Control

Exam. Tag Key	Exposure Condition
Flat Field 3.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 4.3 mS (150 cm), 4.9 mS (160 cm), 5.5 mS (170 cm), 6.0 mS (180 cm), 6.8 mS (190 cm), 7.5 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 3.0 mR Other conditions: Without filter & grid
Phantom 3.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 4.3 mS (150 cm), 4.9 mS (160 cm), 5.5 mS (170 cm), 6.0 mS (180 cm), 6.8 mS (190 cm), 7.5 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 3.0 mR Other conditions: Without filter & grid
NON-EXPOSE	Obtains unexposed image 60 seconds after obtaining the Phantom 3.0 mR.
Dark	Obtains unexposed image 60 seconds after obtaining the NON-EXPOSE.

● **Detail Quality Control/Acceptance Test**

Exam. Tag Key	Exposure Condition
Flat Field 3.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 4.3 mS (150 cm), 4.9 mS (160 cm), 5.5 mS (170 cm), 6.0 mS (180 cm), 6.8 mS (190 cm), 7.5 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 3.0 mR Other conditions: Without filter & grid
Phantom 3.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 4.3 mS (150 cm), 4.9 mS (160 cm), 5.5 mS (170 cm), 6.0 mS (180 cm), 6.8 mS (190 cm), 7.5 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 3.0 mR Other conditions: Without filter & grid
Phantom 5.6 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 8.0 mS (150 cm), 9.1 mS (160 cm), 10.0 mS (170 cm), 11.2 mS (180 cm), 12.7 mS (190 cm), 14.0 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 5.6 mR Other conditions: Without filter & grid
Phantom 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 14.3 mS (150 cm), 16.9 mS (160 cm)18.5 mS (170 cm), 20.0 mS (180 cm) 22.6 mS (190 cm), 25.0 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid
NON-EXPOSE	Obtains unexposed image 60 seconds after obtaining the Phantom 10.0 mR.
Dark	Obtains unexposed image 60 seconds after obtaining the NON-EXPOSE.

## 2.1 Recommended Exposure Condition

### REGIUS



**HINT**

- Three plates can be set as the standard plate, but only one plate is used for the control of a REGIUS and for analysis.

#### ● Basic Quality Control

Exam. Tag Key	Exposure Condition
Phantom 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 15.9 mS (150 cm), 18.1 mS (160 cm), 20.4 mS (170 cm), 22.9 mS (180 cm), 25.5 mS (190 cm), 28.3 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid
Flat Field 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 15.9 mS (150 cm), 18.1 mS (160 cm), 20.4 mS (170 cm), 22.9 mS (180 cm), 25.5 mS (190 cm), 28.3 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid
Erased	Read the plate used for Flat Field 10.0 mR without exposure.
Dark	The Dark Noise Test can be omitted for the Basic Quality Control. If the Erasure failed, conduct the Dark Test only. After obtaining the Erased, the Slow erasure is conducted with REGIUS and image is obtained.

\* When the erasing ability is failed, the Dark noise is tested for troubleshooting.

#### ● Detail Quality Control/Acceptance Test

Exam. Tag Key	Exposure Condition
Phantom 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 15.9 mS (150 cm), 18.1 mS (160 cm), 20.4 mS (170 cm), 22.9 mS (180 cm), 25.5 mS (190 cm), 28.3 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid
Flat Field 3.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 4.7 mS (150 cm), 5.3 mS (160 cm), 6.0 mS (170 cm), 6.8 mS (180 cm), 7.5 mS (190 cm), 8.4 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 3.0 mR Other conditions: Without filter & grid
Flat Field 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 15.9 mS (150 cm), 18.1 mS (160 cm), 20.4 mS (170 cm), 22.9 mS (180 cm), 25.5 mS (190 cm), 28.3 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid
Flat Field 30.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 47.6 mS (150 cm), 54.2 mS (160 cm), 61.1 mS (170 cm), 68.5 mS (180 cm), 76.4 mS (190 cm), 84.6 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 30.0 mR Other conditions: Without filter & grid
Erased	Read the plate used for Flat Field 30.0 mR without exposure.
Dark	After obtaining the Erased, the Slow erasure is conducted with REGIUS and image is obtained.



**REGIUS Plate**● **Basic Quality Control**

Exam. Tag Key	Exposure Condition
Flat Field 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 15.9 mS (150 cm), 18.1 mS (160 cm), 20.4 mS (170 cm), 22.9 mS (180 cm), 25.5 mS (190 cm), 28.3 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid

● **Detail Quality Control/Acceptance Test**

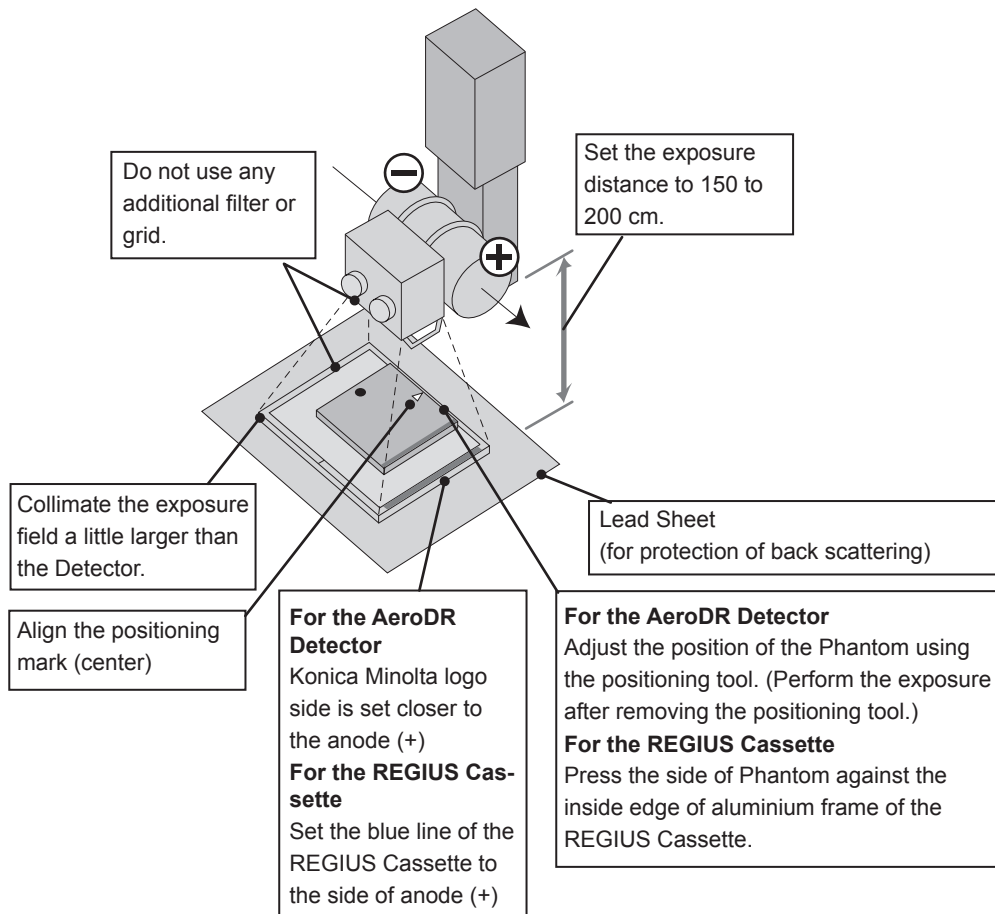
Exam. Tag Key	Exposure Condition
Flat Field 10.0 mR	Tube Voltage: 80 kV Tube Current: 200 mA Exposure Time: 15.9 mS (150 cm), 18.1 mS (160 cm), 20.4 mS (170 cm), 22.9 mS (180 cm), 25.5 mS (190 cm), 28.3 mS (200 cm) Exposure Distance: 150 cm to 200 cm Dose: 10.0 mR Other conditions: Without filter & grid

**Use equipments**

Equipments		Condition
Simple Check QC Phantom		
AeroDR SYSTEM	AeroDR Detector	
CR system	REGIUS Cassette/Plate	14 x 17 inch or 14 x 14 inch (for Phantom Image Test) Plates of all sizes are subject to the Acceptance Test and Quality Control. The standard plate, which will be used for control of REGIUS, is limited to that of 14 x 17 inch or 14 x 14 inch.
	REGIUS	
AeroDR SYSTEM / REGIUS Console		CS-7
Lead Sheet		Larger than the REGIUS Cassette
Dosimeter		Measurement of exposure dose, Calibrated
Time measure device		Stopwatch etc.

## 2.2 • Measure the exposure dose

### 1 Set the X-ray device and a detector.



#### About the setting

- Place the anti-scatter lead sheet, and place the detector on this sheet.
- Place the detector with its center aligned to the center of the exposure field, and adjust the size of the exposure field to fit to the detector size or to the size slightly larger (up to approx.3cm larger) than the detector.
- The AeroDR Detector and REGIUS Cassette have different Marks for arrangement.
  - For the AeroDR Detector**
    - Make sure that Konica Minolta logo side is set closer to the anode (+) of the tube.
  - For the REGIUS Cassette**
    - Make sure that the blue line of the REGIUS Cassette is set closer to the anode (+) of the tube.

#### IMPORTANT

- If it is difficult to set the Detector with its blue line or Konica Minolta logo side oriented to the anode side of the X-ray tube due to the reason of X-ray generator's positioning, it is also accepted that the Detector is positioned at 180 degrees rotated from the recommended position (as the result, the blue line or Konica Minolta logo side is oriented to the cathode side of the X-ray tube). However, please remember that once the Detector is positioned in this way, it has to be kept so through all test procedures.

**2 Measure the exposure dose with a dosimeter and adjust as follows;**

- Measure the exposure dose for taking images for each analysis.
  - Adjust exposure time so that the exposure dose is within the target amount  $\pm 0.5$  mR.
  - For the exposure condition and procedures, refer to "2.1 Recommended Exposure Condition".
  - Calculate the average dose after repeating the exposure five times with the above condition.
  - Record the decided exposure condition on "A Note on Exposure condition" at the back of this manual and store it. Make a photocopy of the note if needed.
- 
- Setting of the dosimeter: Remove the detector temporarily, place the receptor of the dosimeter at the center of exposure field.

**IMPORTANT** .....

- When implementing the Simple Check QC without using a dosimeter, make a note of the exposure condition (X-ray generator, tube voltage, tube current, exposure time, interval before detecting) for the 1st trial, and use these records for 2nd trial onward.
- The format for the above note is provided at the end of the manual. Make a photocopy of the format if needed.

.....

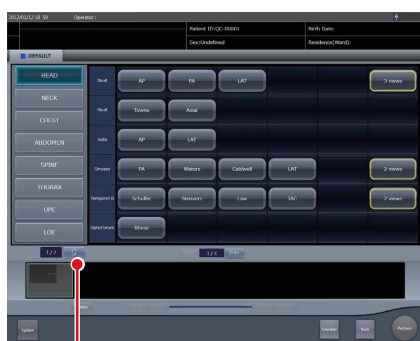
## 2.3 • Detect images for analysis

Enroll a patient in X-ray radiography on the Patient registration screen of the CS-7 and specify analysis method (Set key selection) on the Body part selection screen. Detect the exposed detector on the Exposure screen.

**1 Enroll a patient in X-ray radiography on the Patient registration screen.**

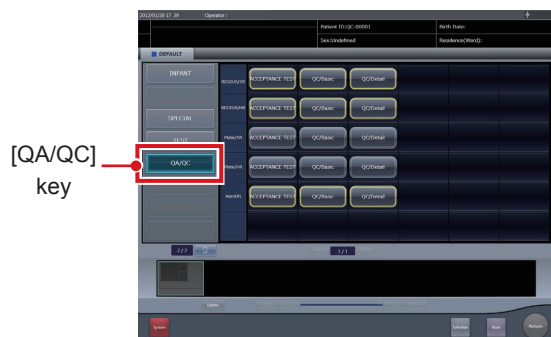
**2 Display the Body part selection screen.**

- Click the [Switching] button to display the second page of the Button display screen.

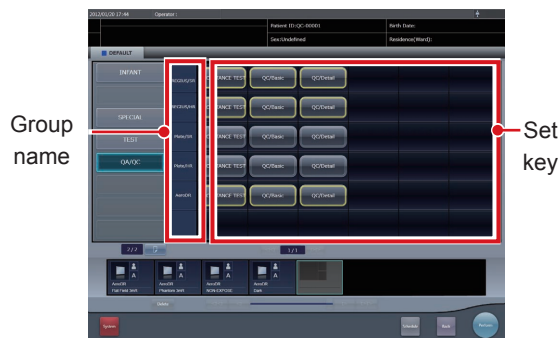


[Switching] button

**3 Click the [QA/QC] key.**



**4 Select the Set key.**



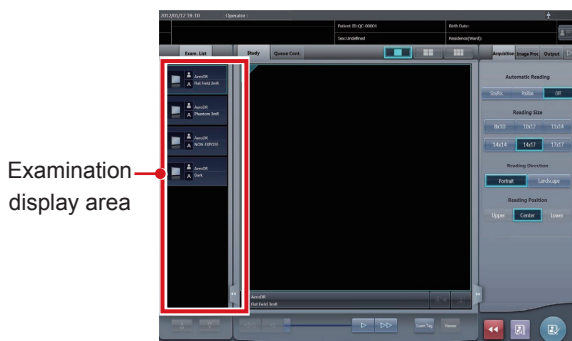
- Select a key from the following Set keys according to the system, and methods of analysis.

System	Analysis method	Group name	Set key
AeroDR SYSTEM	Acceptance Test	AeroDR	ACCEP-TANCE TEST
	Basic Quality Control		QC/Basic
	Detail Quality Control		QC/Detail
REGIUS	Acceptance Test (Standard resolution)	REGIUS/SR	ACCEP-TANCE TEST
	Acceptance Test (High resolution)	REGIUS/HR	ACCEP-TANCE TEST
	Basic Quality Control (Standard resolution)	REGIUS/SR	QC/Basic
	Basic Quality Control (High resolution)	REGIUS/HR	QC/Basic
	Detail Quality Control (Standard resolution)	REGIUS/SR	QC/Detail
	Detail Quality Control (High resolution)	REGIUS/HR	QC/Detail
REGIUS Plate	Acceptance Test (Standard resolution)	Plate/SR	ACCEP-TANCE TEST
	Acceptance Test (High resolution)	Plate/HR	ACCEP-TANCE TEST
	Basic Quality Control (Standard resolution)	Plate/SR	QC/Basic
	Basic Quality Control (High resolution)	Plate/HR	QC/Basic
	Detail Quality Control (Standard resolution)	Plate/SR	QC/Detail
	Detail Quality Control (High resolution)	Plate/HR	QC/Detail

**5 Click the [Perform] button.**



**6 Detect the exposed detector on the Exposure screen.**



- **For AeroDR Detector**
  - Expose and detect images in the exposure order displayed on the Examination display area.
  - For the exposure condition and procedures, refer to "2.1 Recommended Exposure Condition".
  - Check images each time you detect images.
- **For REGIUS Cassette**
  - Erase the image data produced by the last examination from the REGIUS Cassette that is used for the test.
  - Take images in the exposure order displayed on the Examination display area and then read the exposed Cassette with the REGIUS.
  - For the exposure condition and procedures, refer to "2.1 Recommended Exposure Condition".
  - Check images each time you detect images.

For information on how to take images for analysis, see the following pages.

- Phantom Image: "2.4 Exposure Procedure of Phantom Image"
- Flat Field Image: "2.5 Exposure Procedure of Flat Field Image"
- Erased Image: "2.6 Reading Procedure of Erased Image (REGIUS Cassette only)"
- Dark Noise Image: "2.7 Detecting Procedure of NON-EXPOSE Image (AeroDR Detector only)"
- NON-EXPOSE: "2.8 Detecting Procedure of Dark Noise Image"

**7 Click the [Examination completion] button to exit.**

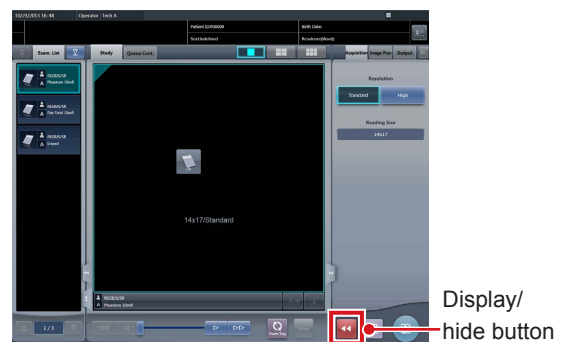
**Necessary Procedure when Exposing QAQC Analysis Images with REGIUS SIGMA/REGIUS SIGMA2**

The REGIUS SIGMA/REGIUS SIGMA2 cannot detect plates that have performed image reading. Therefore, if exposing QAQC analysis images with the REGIUS SIGMA/REGIUS SIGMA2, it is necessary to input the plate ID from the image supplemental information editing function of the exposure screen.

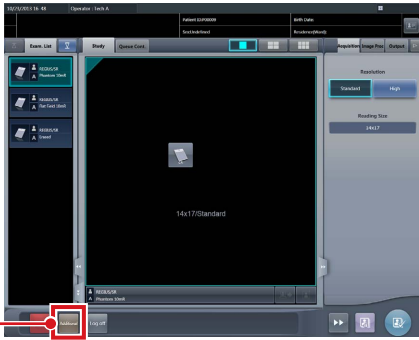
**IMPORTANT**

- Assign a unique ID to the REGIUS SIGMA/REGIUS SIGMA2 plate in advance.

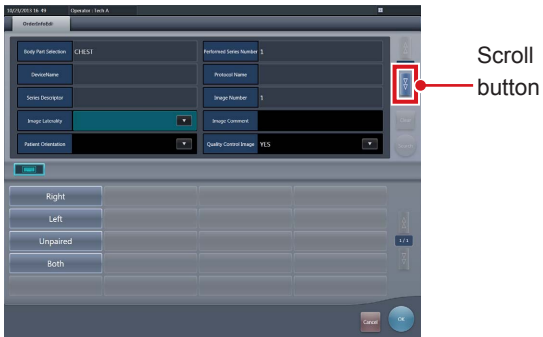
**1 Open the tool bar of the exposure screen.**



**2 Press [Additional].**

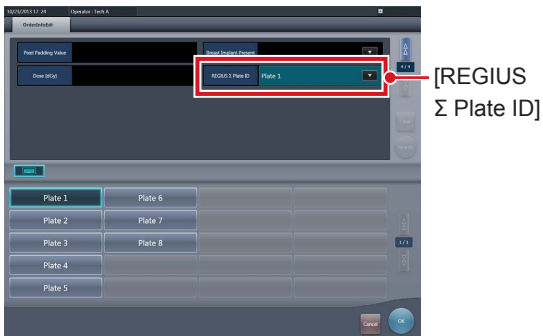


**3 Scroll until the page with the [REGIUS  $\Sigma$  Plate ID] entry appears.**



**4 Input the [REGIUS  $\Sigma$  Plate ID].**

- Enter the assigned ID of the REGIUS  $\Sigma$  Plate to be used to expose images for QAQC analysis in [REGIUS  $\Sigma$  Plate ID].



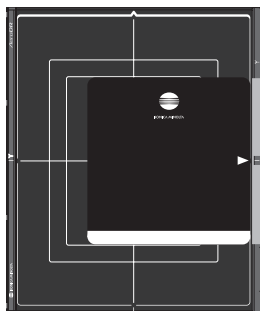
## 2.4 • Exposure Procedure of Phantom Image

### 1 Set the Simple Check QC Phantom on the Detector.

- For the layout of a X-ray device, refer to "2.2 Measure the exposure dose".
- The way of setting Simple Check QC Phantom is different for AeroDR Detector and REGIUS Cassette.

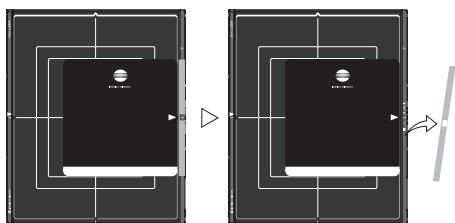
#### ● AeroDR Detector

Set the Simple Check QC Phantom on the Detector as shown below.



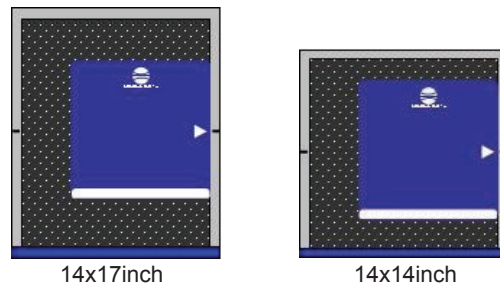
#### HINT

- Set the Phantom so that the white line of the Phantom is aligned with the Konica Minolta logo side of AeroDR Detector.
- Align the positioning mark on the Phantom with the center mark on the vertical side of the detector.
- Adjust the position of the Phantom using the positioning tool. (Perform the exposure after removing the positioning tool.)



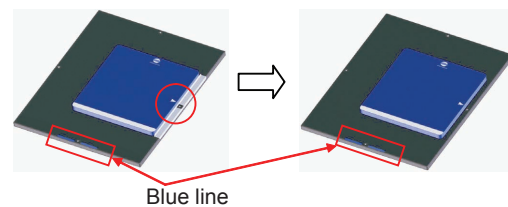
#### ● REGIUS Cassette

Set the Simple Check QC Phantom on the image-erased cassette as shown below



#### HINT

- Set the Phantom so that the white line of the Phantom is aligned with the blue line of the REGIUS Cassette in the same direction.
- Align the positioning mark on the Phantom with the center mark on the vertical side of the REGIUS Cassette.
- Set the Phantom by pressing it's side to the inside edge of aluminum frame of the REGIUS Cassette. Make sure that the Phantom is not set at angle.



### 2 Make sure that the center of the exposure field is aligned to the center of the detector.

### 3 Follow the instruction below for other setting conditions.

- Do not use any additional filter or grid.

### 4 Take images.

#### HINT

- When making the exposure with three different patterns, make sure that the interval before detecting is kept same for each of three.

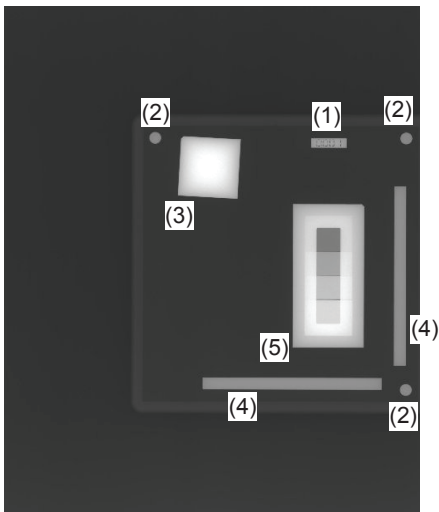
**5 Check that the image is that of Phantom on the Exposure screen.**

**Checks to be made on the monitor**

- Confirm that the number of metal pieces in the Phantom image are correct.

	<b>Metal pieces</b>	<b>No. of pcs</b>
(1)	Metal piece for Serial No.	1pc
(2)	Metal disc	3pcs
(3)	Square metal piece at the angle of 3-degree	1pc
(4)	Metal plates set to main/sub scan directions	2pcs
(5)	Metal step wedge	1pc

- No imaging of foreign material.



Phantom Image  
(After adjustment the contrast and the density)



## 2.5 • Exposure Procedure of Flat Field Image

### 1 Take images.

 **HINT** .....

- When making the exposure with three different patterns, make sure that the interval before detecting is kept same for each of three

### 2 Check that the image is that of Flat Field Image on the Exposure screen.

#### Checks to be made on the monitor

- No imaging of foreign material.



## 2.6 • Reading Procedure of Erased Image (REGIUS Cassette only)

Read the plate used for Flat Field 10.0 mR for Basic Quality Control and the plate used for Flat Field 30.0 mR for Detail Quality Control/Acceptance Test without exposure.

- 1 Read with the REGIUS the REGIUS Cassette that has been erased after the exposure and reading.**
- 2 Check that the image is that of Erased Image on the Exposure screen.**

### **Checks to be made on the monitor**

- No imaging of foreign material.

## 2.7 • Detecting Procedure of NON-EXPOSE Image (AeroDR Detector only)

After shooting the Phantom 3.0 mR in Basic Quality Control or after shooting the Phantom 10.0 mR in Detail Quality Control/Acceptance Test, at 60 seconds to get the non-exposed image.

### 1 Unexposed image is obtain.

- Be careful not to expose the AeroDR Detector to X-ray. Take the AeroDR Detector outside the exposure room, then obtain an image after exposure.

### 2 Check that the image is that of NON-EXPOSE Image on the Exposure screen.

#### Checks to be made on the monitor

- No imaging of foreign material.

## 2.8 • Detecting Procedure of Dark Noise Image

### ● For the AeroDR Detector

Obtain unexposed image 60 seconds after obtaining NON-EXPOSE image.

#### 1 Unexposed image is obtain.

- Be careful not to expose the AeroDR Detector to X-ray. Take the AeroDR Detector outside the exposure room, then obtain an image after exposure.

#### 2 Check that the image is that of Dark Noise Image on the Exposure screen.

##### Checks to be made on the monitor

- No imaging of foreign material.

### ● For the REGIUS Cassette

Read the plate used for Erasure without exposure.

#### 1 Erase the REGIUS Cassette with REGIUS in Slow mode.

#### 2 Read the REGIUS Cassette with the REGIUS without an X-ray exposure.

#### IMPORTANT .....

- Case of REGIUS Basic Quality Control  
This test should be implemented when the test item "Erasure" in the Erased Image test turned out to be "FAIL". Set the REGIUS to the Slow mode erasure, and erase the image in the REGIUS Cassette that should be tested.

.....

#### 3 Check that the image is that of Dark Noise Image on the Exposure screen.

##### Checks to be made on the monitor

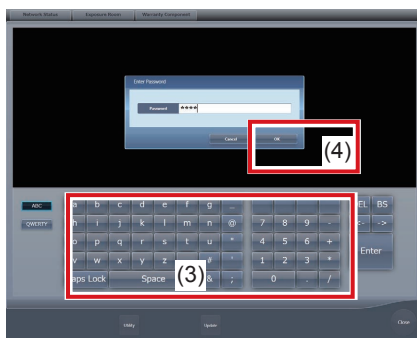
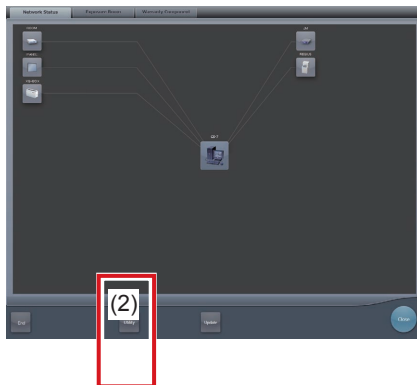
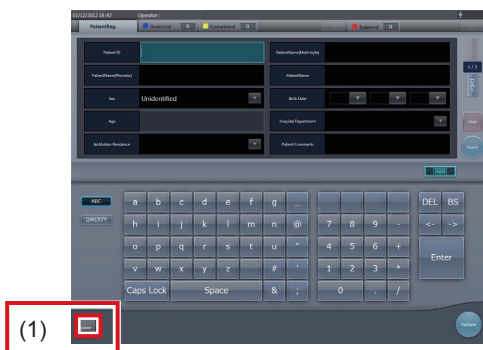
- No imaging of foreign material.

## 2.9 • Analysis Procedure

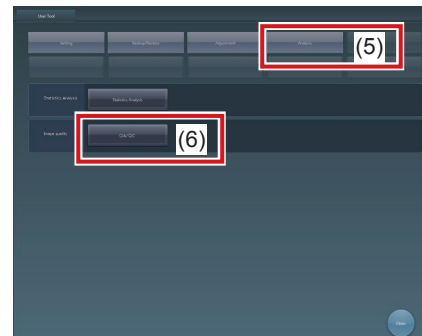
Following the procedure below, implement calculation for the captured image using Simple Check QC program, and verify and judge the result.

### 2.9.1 Starting Up Simple Check QC

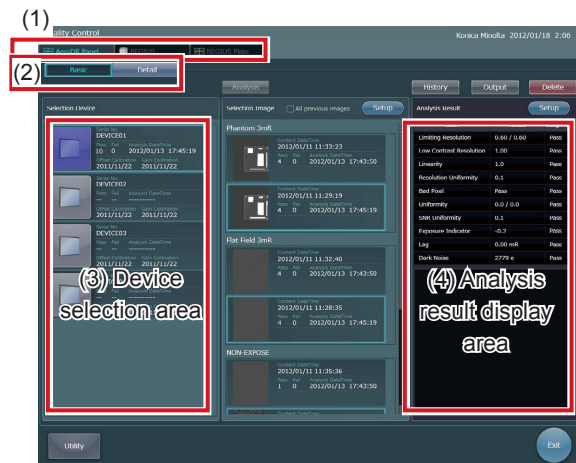
- 1 Click [System] button - [Utility] - [Input Password] - [OK] - [Analysis] - [QA/QC] in sequence to start up the Simple Check QC program.



The Password screen will not be displayed when using login control.



### 2.9.2 Calculation/Display of Judgment using < Basic Quality Control >/< Detail Quality Control > Simple Check QC



- 1 Press a Selection Device tab to select a device (AeroDR Panel, REGIUS or REGIUS Plate) to be tested.
  - Only connected devices are displayed.
- 2 Press the [Basic] or [Detail] radio button to select the analysis method.
  - The [Basic] is selected by default.

#### HINT

- Analyzed images cannot be analyzed again even when combined with unanalyzed images.
- If you want to analyze the image again, first delete analysis result by pressing [Delete] button.

**3 Select a device (AeroDR Panel, REGIUS, REGIUS Plate) be tested on the device selection area.**

- Images are selected automatically according to the analysis method and the most recent analysis date and time is compared against the dates and times that the images were captured.
- If all images were captured at new dates and times, the images are automatically tested and the results are displayed.
- If all images were captured at old dates and times, the test data with the most recent analysis date is displayed.
- If some of the images are old the test data is not displayed.

**4 The Analysis Result is displayed on the Analysis Result display area.**

- Refer to "Chapter 4 Details of Test Items for CR SYSTEM" onward for the details of calculated result and judgment for each test item.

**IMPORTANT** .....

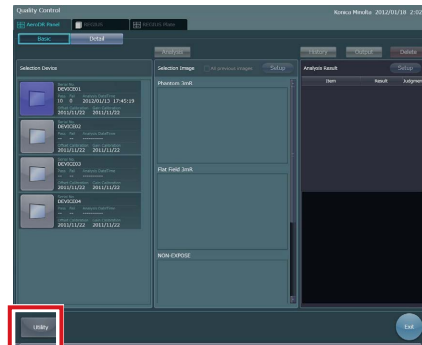
- With the REGIUS Basic Quality Control, if the Erasing ability is failed and the Dark Noise Image has not been tested yet, the Dark Noise Image will be performed additionally.
- .....

**Reference** .....

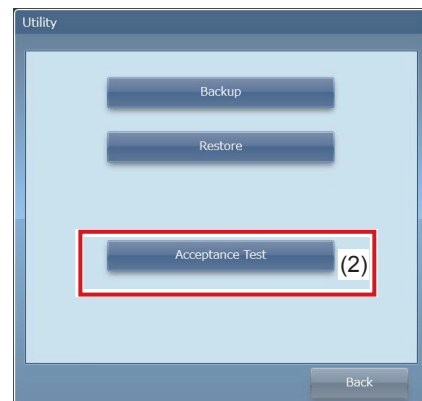
- Set the exposure dose and standard plate (Regius only) for the Acceptance Test. Refer to "2.9.3 Calculation/Display of Judgment using < Acceptance Test > Simple Check QC".
  - For details for changing the radiation exposure dose and control range (QC only), setting of the operation controls and checking the time graph of each device, refer to "Chapter 6 Analytic Theory for CR SYSTEM".
- .....

**2.9.3 Calculation/Display of Judgment using < Acceptance Test > Simple Check QC**

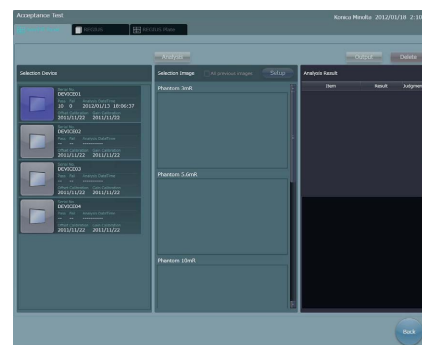
**1 Click [Utility] - [ACCEPTANCE TEST] in sequence to enter "ACCEPTANCE TEST" screen.**

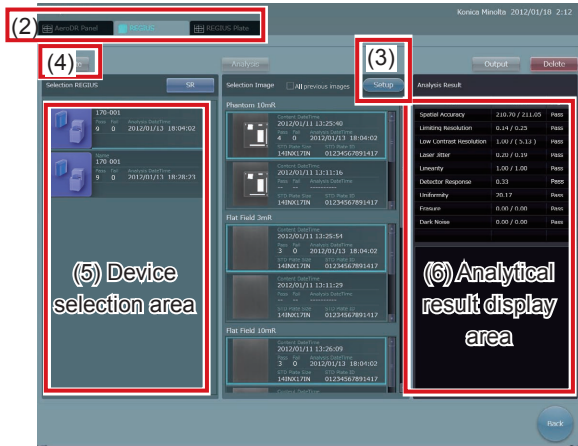


(1)



The [Acceptance Test] button may not be displayed depending on settings made by service engineers.

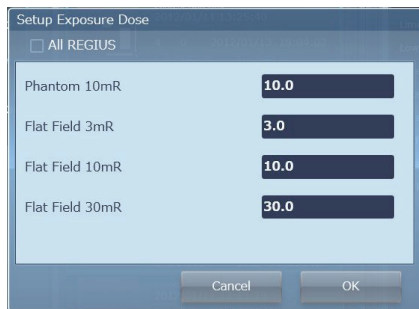




**2 Press a Selection Device tab to select a device (AeroDR Panel, REGIUS or REGIUS Plate) to be tested.**

- Only connected devices are displayed.

**3 Press the selection image [Setup] button and set the exposure dose to obtain analyzed images.**



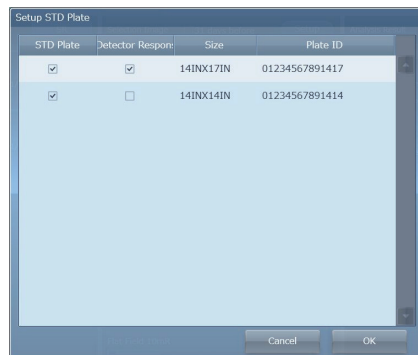
- Input exposure dose for each images.
- After inputting the exposure does, click the [OK] button.
- With the REGIUS Plate, you do not need to enter radiation exposure dose. The radiation exposure dose of REGIUS that reads REGIUS Plate will be used.

**IMPORTANT** .....

- Input measured exposure dose for analytical calculation.

.....

**4 With the REGIUS, click the [STD Plate] button and set the Standard Plate on the Setup STD Plate screen.**



- The REGIUS plate list is displayed.
- Select plates to set the Standard Plate (one to three plates depending on settings made by service engineers) and place a checkmark in the STD Plate checkbox.
- Select a plate for the system sensitivity reference of the REGIUS Plate from the selected plates and place a checkmark in the Detector Responsive checkbox.
- After specifying the plate, click the [OK] button.

**IMPORTANT** .....

- Analysis for REGIUS can be performed only after setting Standard Plate.

.....

**5 Select a device (AeroDR Panel, REGIUS or REGIUS Plate) to be tested on the device selection area.**

- Images are selected automatically according to the analysis method, the analysis is performed and the Analysis Result is displayed. From the second time, the most recent analysis date and time is compared against the dates and time that the images were captured.
- If all images were captured at new dates and times, the images are automatically tested and the results are displayed.
- If all images were captured are old, the test data with the most recent analysis date is displayed.
- If some of the images were captured at old dates and times, the test data is not displayed.

**6 The Analysis Result is displayed on the Analysis Result area.**

- Refer to "[Chapter 4 Details of Test Items for CR SYSTEM](#)" onward for the details of calculated result and judgment for each test item.

**7 After the acceptance test is performed, the quality control reference is set.**

 Reference .....

- For the details on the operation control settings and the Plate Chart, refer to "[Chapter 6 Analytic Theory for CR SYSTEM](#)".

.....



# Chapter 3

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## Details of Test Items for AeroDR SYSTEM

This chapter describes the details of test items for the AeroDR SYSTEM.

## 3.1 • Limiting Resolution

### 3.1.1 Description of resulted values displayed

Limiting Resolution value represents the following.

- **QC**

The edge method MTF using the tungsten edge of the QC Phantom  
MTF@1 cycle/mm

- **Acceptance Test**

The edge method MTF using the tungsten edge of the QC Phantom  
MTF@1 cycle/mm

### 3.1.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

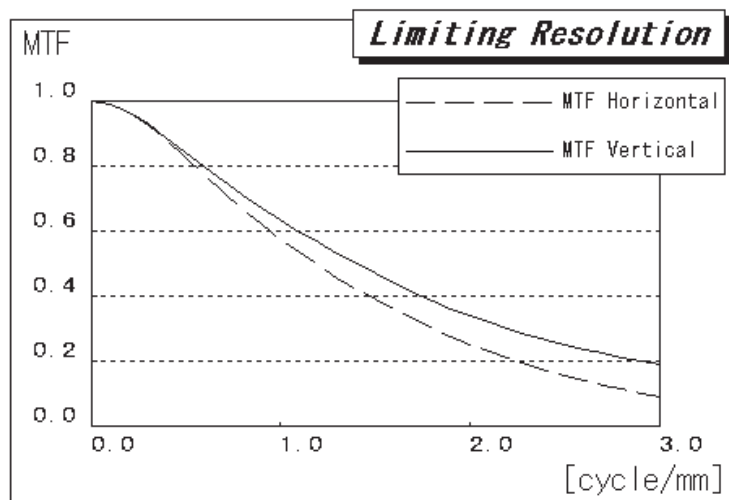
MTF@1 cycle/mm  $\geq$  0.47

- **Acceptance Test**

MTF@1 cycle/mm  $\geq$  0.47

### 3.1.3 Verification of the report

Result of the Limiting Resolution test in the QC/Acceptance Test will be displayed as the chart in the report. X-axis of the chart represents the "Frequency(cycle/mm)", while Y-axis represents "MTF". Visually check the calculated MTF.



### 3.1.4 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

- Check that the Tube Voltage is set to 80 kV +/-5 kV.
- Check that the dose is measured as 3.0 mR.
- Check that the exposure distance is set to 150-200 cm.
- Check that the exposure is made without additional filter or grid.
- Check that the X-ray radiation center is aligned to the center of the panel.
- Check that the exposure field is expanded to fit to the panel size.
- Check that any foreign material or dust is not attached on the panel.
- Check that the Phantom is properly set on the panel. (Check that the rotation and the back-to-front of the Phantom is correct.)

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on Limiting Resolution test.

- Implement the gain calibration of panel and repeat the examination.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.2 • Low Contrast Resolution

### 3.2.1 Description of resulted values displayed

Low Contrast Resolution value represents the following.

- **QC**

Correlation coefficient between the standard variation of conversion dose after transmitting the 3 step edges of the Phantom image of 3.0 mR and the theoretical dose.

Correlation coefficient between the log of conversion dose after transmitting the 5 step edges of the Phantom image of 3.0 mR and the log of the standard variation of pixel value. (R2 value is calculated using 3 edges between 0.0, 1.0 and 2.0 mm.)

- **Acceptance Test**

Correlation coefficient between the standard variation of conversion dose after transmitting the step edges of the Phantom images of 3.0, 5.6, 10.0 mR and the theoretical dose.

Correlation coefficient between the log of conversion dose after transmitting the step edges of the Phantom images of 3.0, 5.6, 10.0 mR and the log of the standard variation of pixel value.

### 3.2.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Correlation coefficient  $\geq 0.95$

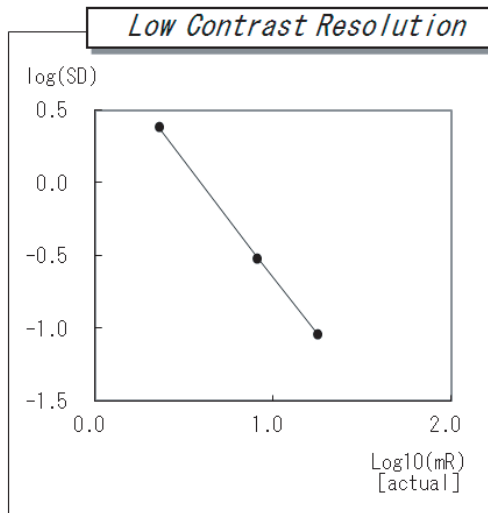
- **Acceptance Test**

Correlation coefficient  $\geq 0.95$

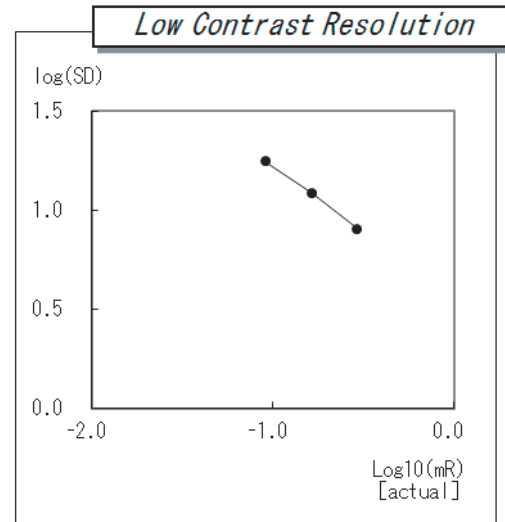
### 3.2.3 Verification of the report

Result of the Low Contrast Resolution test in the QC/Acceptance Test will be displayed as the chart in the report. X-axis of the chart represents "Transit Dose (log<sub>10</sub>(mR))", while Y-axis represents "Standard Deviation (log<sub>10</sub>(PVSD))". Visually check the calculated dose and linearity of the noise value.

- QC



- Acceptance Test



### 3.2.4 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

- Confirm the exposure condition in the same manner as shown in "3.1.4 Troubleshooting".

However, for the following confirmation, each value varies with the Basic Quality Control and Acceptance Test or Detail Quality Control.

- Check that the dose is measured as 3.0 mR. (Basic Quality Control)
- Check that the dose is measured as 3.0 mR or 5.6 mR or 10.0 mR. (Acceptance Test or Detail Quality Control)

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on Low Contrast Resolution test.

- If the result of Uniformity/Artifact or Bad Pixel test is "FAIL", implement the each troubleshooting first.
- If "FAIL" cannot be cleared even after the above troubleshooting is implemented, please check the exposure dose using dosimeter.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.3 • Linearity

### 3.3.1 Description of resulted values displayed

Linearity value represents the following.

- **QC**

Correlation coefficient between the theoretical dose of conversion dose after transmitting the 3 step edges of the Phantom image of 3.0 mR and the theoretical dose.

Correlation coefficient between the pixel value after transmitting the 5 step edges of the Phantom image of 3.0 mR and the converted value of pixel value. (R2 value is calculated using 3 edges between 0.0, 1.0 and 2.0 mm.)

- **Acceptance Test**

Correlation coefficient between the conversion dose after transmitting the step edges of the Phantom images of 3.0, 5.6, 10.0 mR and the theoretical dose.

Correlation coefficient between the pixel value after transmitting the step edges of the Phantom images of 3.0, 5.6, 10.0 mR and the converted value of pixel value.

### 3.3.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Correlation coefficient  $\geq 0.95$

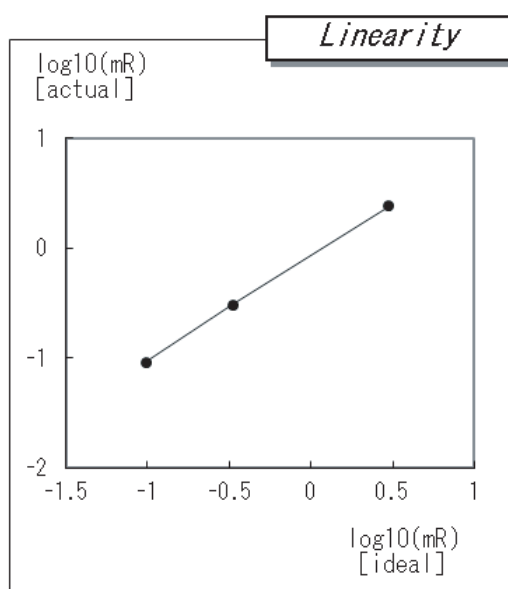
- **Acceptance Test**

Correlation coefficient  $\geq 0.95$

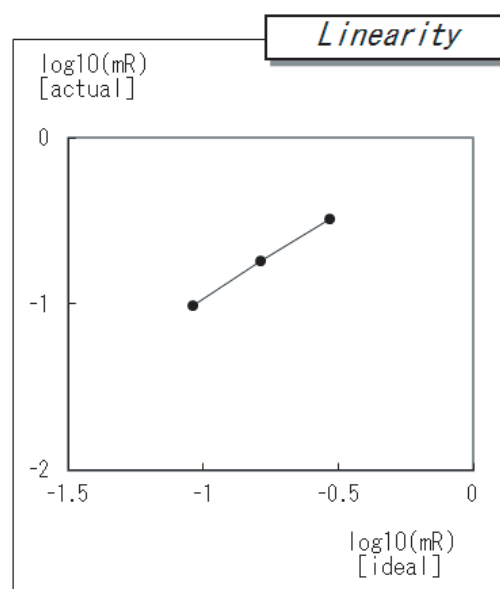
### 3.3.3 Verification of the report

Result of the Linearity test in the QC/Acceptance Test will be displayed as the chart in the report. X-axis of the chart represents "theoretical transparent dose (QC)" and "exposed dose measured by dosimeter (Acceptance Test)" as ideal dose, while Y-axis represents "dose indicated as AeroDR SYSTEM response (QC/Acceptance Test)" as actual dose.

#### ● QC



#### ● Acceptance Test



### 3.3.4 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

Confirm the exposure condition in the same manner as shown in "3.1.4 Troubleshooting".

However, for the following confirmation, each value varies with the Basic Quality Control and Acceptance Test or Detail Quality Control.

- Check that the dose is measured as 3.0 mR. (Basic Quality Control)
- Check that the dose is measured as 3.0 mR or 5.6 mR or 10.0 mR. (Acceptance Test or Detail Quality Control)

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on Linearity test.

- If the result of Uniformity/Artifact test is also "FAIL", please implement the troubleshooting of Uniformity first.
- If "FAIL" cannot be cleared even after the above troubleshooting is implemented, please check the exposure dose using dosimeter.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.4 • Resolution Uniformity

### 3.4.1 Description of resulted values displayed

Resolution Uniformity value represents the following.

- **QC**

Max. error in value at MTF of 1 cycle/mm calculated from the 3 copper discs.

- **Acceptance Test**

Max. error in value at MTF of 1 cycle/mm calculated from the 3 copper discs.

### 3.4.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Error  $\leq$  30%

- **Acceptance Test**

Error  $\leq$  30%

### 3.4.3 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

Confirm the exposure condition in the same manner as shown in ["3.1.4 Troubleshooting"](#).

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on Limiting Resolution test.

- Implement the gain calibration of panel and repeat the examination.

##### 2 Action to be taken when "FAIL" occurs on Resolution Uniformity test.

- Implement the gain calibration of panel and repeat the examination.
- Check the Limiting Resolution test result under the condition of rotating the panel by 180 degrees.
  - If the error of Limiting Resolution value between 0 degree and 180 degrees is under 30%, the Phantom may be faulty. Please Contact your technical representative.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.



## 3.5 • Bad Pixel

### 3.5.1 Description of resulted values displayed

Bad Pixel values represents the following.

- **QC**

When a solid image is taken with 3.0 mR and the difference between each pixel value and average value in the ROI (for example, periphery is 5x5) is 20 times or more of the standard deviation  $\sigma$  in the ROI, it is defined as Bad Pixel.

- **Acceptance Test**

When a solid image is taken with 3.0 mR and the difference between each pixel value and average value in the ROI (for example, periphery is 5x5) is 20 times or more of the standard deviation  $\sigma$  in the ROI, it is defined as Bad Pixel.

### 3.5.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Difference between each pixel value and average value in the ROI  $\geq$  Standard deviation  $\sigma$  in the ROI  $\times$  20

- **Acceptance Test**

Difference between each pixel value and average value in the ROI  $\geq$  Standard deviation  $\sigma$  in the ROI  $\times$  20

### 3.5.3 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

#### 1 Confirm the exposure condition.

- Check that the Tube Voltage is set to 80 kV +/-5 kV.
- Check that the dose is measured as 3.0 mR.
- Check that the exposure distance is set to 150-200 cm.
- Check that the exposure is made without additional filter or grid.
- Check that the X-ray radiation center is aligned to the center of the panel.
- Check that the exposure field is expanded to fit to the panel size.
- Check that any foreign material or dust is not attached on the panel.

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

#### 1 Action to be taken when "FAIL" occurs on Bad Pixel test.

- Implement the gain calibration of panel and repeat the examination.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.6 • Uniformity

### 3.6.1 Description of resulted values displayed

Uniformity values represents the following.

- **QC**

global (3.0 mR) :

GSNU calculated by dividing the difference between the maximum and minimum values of the ROI average signal values by the mean value.

local (3.0 mR) :

The maximum value (LSNU) calculated by dividing the difference between the ROI average signal value and the contiguous ROI average signal value by the ROI mean value.

- **Acceptance Test**

global (3.0 mR) :

GSNU calculated by dividing the difference between the maximum and minimum values of the ROI average signal values by the mean value.

local (3.0 mR) :

The maximum value (LSNU) calculated by dividing the difference between the ROI average signal value and the contiguous ROI average signal value by the ROI mean value.

### 3.6.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

global (3.0 mR) :  $GSNU \leq 30\%$

local (3.0 mR) :  $LSNU \leq 30\%$

- **Acceptance Test**

global (3.0 mR) :  $GSNU \leq 30\%$

local (3.0 mR) :  $LSNU \leq 30\%$

### 3.6.3 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

Confirm the exposure condition in the same manner as shown in "3.5.3 Troubleshooting".

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on Uniformity test.

- If the topical unevenness is located on the exposure image that is displayed by the visual check, Rotate the panel by 180 degrees, re-expose, and repeat the examination. (except the case of the unevenness is occurs by the heel effect.)

→ If the position of topical unevenness is different between 0 degree and 180 degrees image, the X-ray generator device may be faulty.

If the position of topical unevenness is same, then proceed to next step.

- If the topical unevenness is located or the position of topical unevenness is held, then implement the gain calibration of panel and repeat the examination.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.7 • SNR Uniformity

### 3.7.1 Description of resulted values displayed

SNR Uniformity value represents the following.

- **QC**

SNR distribution (Gain calibration dose, without filter, ROI 90 x 90)

- **Acceptance Test**

SNR distribution (Gain calibration dose, without filter, ROI 90 x 90)

### 3.7.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

SNR distribution  $\leq 40\%$

- **Acceptance Test**

SNR distribution  $\leq 40\%$

### 3.7.3 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

Confirm the exposure condition in the same manner as shown in ["3.5.3 Troubleshooting"](#).

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on SNR Uniformity test.

- If the topical unevenness is located on the exposure image that is displayed by the visual check, Rotate the panel by 180 degrees, re-expose, and repeat the examination. (except the case of the unevenness is occurs by the heel effect.)

→ If the position of topical unevenness is different between 0 degree and 180 degrees image, the X-ray generator device may be faulty.

If the position of topical unevenness is same, then proceed to next step.

- If the topical unevenness is located or the position of topical unevenness is held, then implement the gain calibration of panel and repeat the examination.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.8 • Exposure Indicator

### 3.8.1 Description of resulted values displayed

Exposure Indicator value represents the following.

- **QC**

The deviation(%) between the average theoretical values and the average actual measurements of the solid image of 3.0mR

- **Acceptance Test**

The deviation(%) between the average theoretical values and the average actual measurements of the solid image of 3.0mR

### 3.8.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Theoretical value - 20% ≤ Average signal value ≤ Theoretical value + 20%

- **Acceptance Test**

Theoretical value - 20% ≤ Average signal value ≤ Theoretical value + 20%

### 3.8.3 Troubleshooting

Action to be taken when "FAIL" occurs.

#### STEP 1

##### 1 Confirm the exposure condition.

Confirm the exposure condition in the same manner as shown in ["3.5.3 Troubleshooting"](#).

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Action to be taken when "FAIL" occurs on Exposure Indicator test.

- If the result of Uniformity test is also "FAIL", then implement the troubleshooting of Uniformity first.
- If "FAIL" cannot be cleared even after the above troubleshooting is implemented, please check the exposure dose using dosimeter.

If "FAIL" cannot be cleared despite of implementing the STEP 2, please contact your technical representative.

## 3.9 • Lag

### 3.9.1 Description of resulted values displayed

Lag value represents the following.

- **QC**

The afterimage component in the image obtained 60 seconds after taking the QC Phantom image

- **Acceptance Test**

The afterimage component in the image obtained 60 seconds after taking the QC Phantom image

### 3.9.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Afterimage component  $\leq 0.02$  mR (It is the same as the product standard)

- **Acceptance Test**

Afterimage component  $\leq 0.02$  mR (It is the same as the product standard)

### 3.9.3 Troubleshooting

Action to be taken when "FAIL" occurs on Lag test.

#### STEP 1

#### 1 Confirm the exposure condition.

- Check that the interval time from previous exposure is "60 sec".
- Check that the image is unexposed image.

If "FAIL" cannot be cleared despite of implementing the above, please contact your technical representative.

## 3.10 • Dark Noise

### 3.10.1 Description of resulted values displayed

Dark Noise value represents the following.

- **QC**

RMS value

- **Acceptance Test**

RMS value

### 3.10.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

RMS value  $\leq$  Specified value

- **Acceptance Test**

RMS value  $\leq$  Specified value

### 3.10.3 Troubleshooting

Action to be taken when "FAIL" occurs on Dark Noise test.

#### STEP 1

##### 1 Check the panel connection conditions.

- Check that the power supply is on-specification. Connect the panel directly to the electrical outlet without using power strip.
- Check the connection of wired cable and the panel. (Case of wired mode)

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

##### 1 Confirm the exposure condition.

- Check that the interval time from previous exposure is "60 sec".
- Check that the image is unexposed image.

If "FAIL" cannot be cleared despite of implementing the above, please contact your technical representative.

## 3.11 • Action to be taken when "ERROR" occurs

### 3.11.1 PHANTOM IMAGE TEST

If "ERROR" occurs in the Limiting Resolution, Low Contrast Resolution, Linearity or Resolution Uniformity, check the following items.

#### STEP 1

- Check that the "QC Phantom Image" is displayed correctly.
- Check that the correct Exam Tag key is selected.

If no problem is found by the procedure in "STEP 1", proceed to "STEP 2".

#### STEP 2

- Check that the foreign material is not located.
- Check that the number of the parts in the phantom and Check the parts are allocated to the correct position. (visually Check the displacement or slant of the part)
- Check the Phantom is properly set on the panel. (Check the rotation and the back-to-front of the Phantom is correct.)
- If no problem is found by the above procedure, repeat the examination according to the correct procedure.

If "ERROR" cannot be solved despite of implementing the remedies through to STEP 2, contact your technical representative.

### 3.11.2 FLAT FIELD IMAGE TEST

If "ERROR" occurs in the Bad Pixel, Uniformity, SNR Uniformity or Exposure Indicator, check the following items.

#### STEP 1

- Check that the "Flat Filed Image" is displayed correctly.
- Check that the correct Exam Tag key is selected.

If no problem is found by the procedure in "STEP 1", then proceed to "STEP 2".

#### STEP 2

- Check that the foreign material is not located.
- If there is no foreign material is located, then repeat the examination according to the procedure described in the manual.

If "ERROR" cannot be solved despite of implementing the remedies through to STEP 2, please contact your technical representative.



# Chapter 4

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## Details of Test Items for CR SYSTEM

This chapter describes the details of test items for the CR System.

## 4.1 • Spatial Accuracy

### 4.1.1 Description of resulted values displayed

Spatial Accuracy value represents the following.

- **QC**

Proportion[%] between the actually measured distance in main-scan direction and criterion / proportion[%] between the actually measured distance in sub-scan direction and criterion.

- **Acceptance Test**

Actually measured distance [mm] in main-scan direction / actually measured distance [mm] in sub-scan direction.

### 4.1.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Error between the actually measured distance ( $d_{\text{measured}}$ ) in main/sub-scan directions and the criterion ( $d_0$ ).

$$|d_{\text{measured}} - d_0| / d_0 < 2\%$$

- **Acceptance Test**

Error between the actually measured distance ( $d_{\text{measured}}$ ) in main/sub-scan directions and the theoretical distance ( $d_0$ ).

$$|d_{\text{measured}} - d_0| / d_0 < 2\%$$

### 4.1.3 Troubleshooting

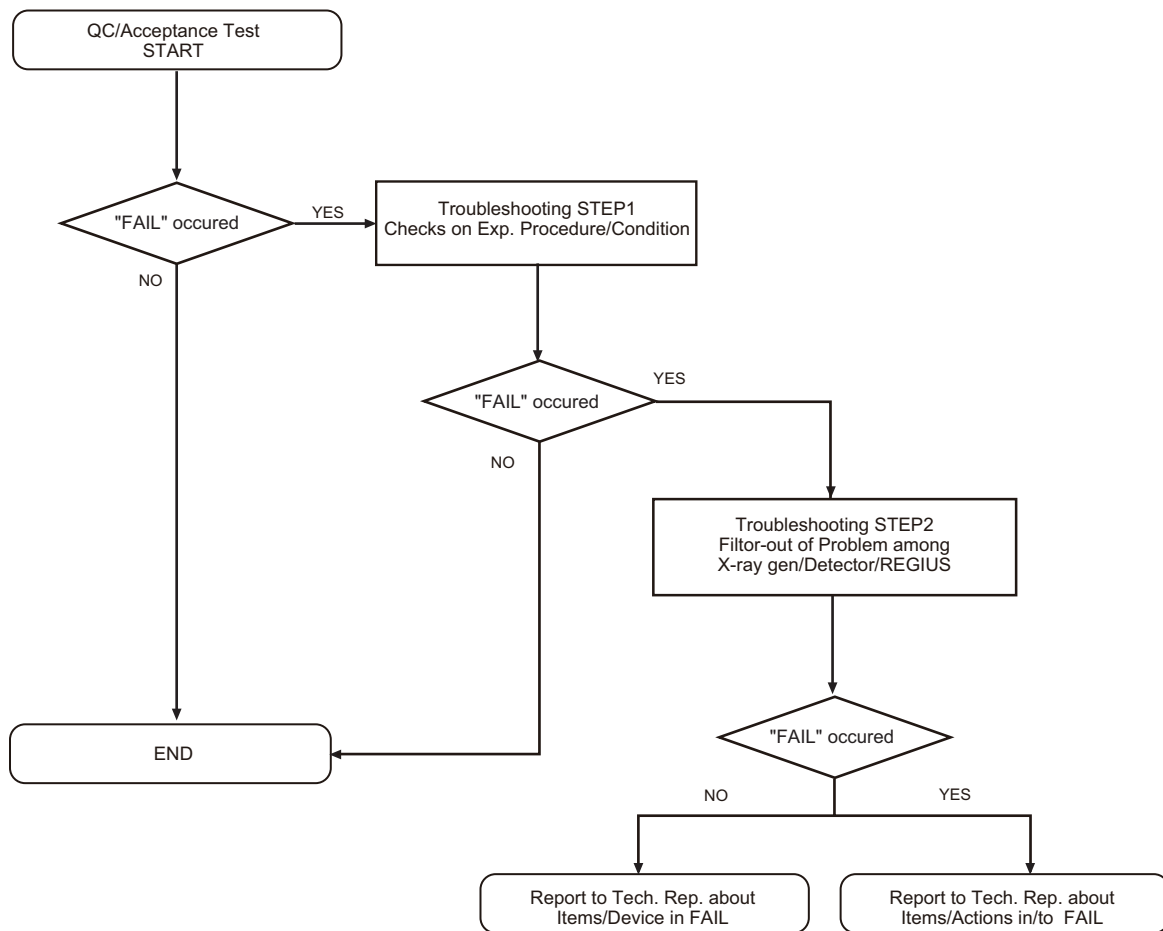
"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Spatial Accuracy test correlates with each system component as shown in the table below.

	X-ray Gen.	REGIUS	REGIUS Cassette	Others
Spatial Accuracy	×	○	×	Exposure Distance

○: Highly possible      △: Possible      ×: Scarcely possible

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



### ● QC

**STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.**

#### 1 Confirm the exposure condition.

- Confirm that the exposure condition (tube voltage, tube current, exposure time, exposure distance, and time before it is detected) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette satisfies the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

## 4.1 Spatial Accuracy

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### STEP 2: Investigate the following points as to the item that resulted in FAIL.

- Confirm that the exposure distance is set to the same as that of the 1st Simple Check QC test.  
→ If "FAIL" repeats despite of the exposure distance identical to the 1st trial, the REGIUS may be faulty. Proceed to the next step to investigate the failure of the REGIUS.
- Implement the Acceptance Test (Phantom Image Test), and check the test result.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

#### ● Acceptance Test

### STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.

#### 1 Confirm the exposure condition.

- Confirm that the exposure distance is set to 150 cm to 200 cm.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the Tube Voltage is set to  $80 \text{ kV} \pm 5 \text{ kV}$ .
- Confirm that the dose is measured as  $10.0 \text{ mR} \pm 0.5 \text{ mR}$ .  
→ Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used for the Phantom Image test is the one from which the image has been erased prior to the exposure.
- Confirm that the setting of the Phantom is made in accordance with the instruction.  
→ Special attention must be paid to the angle and position of the Phantom.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

### STEP 2: Check the following as to the item that is judged "FAIL".

- If the site has several REGIUS, repeat the examination by changing the REGIUS only.  
→ If "PASS" is resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

## 4.2 • Limiting Resolution

### 4.2.1 Description of resulted values displayed

Limiting Resolution value represents the following.

- **QC**

MTF in main-scan direction / MTF in sub-scan direction (each describes MTF calculated by 90% of Nyquist frequency of standard resolution)

- **Acceptance Test**

MTF in main-scan direction / MTF in sub-scan direction (each describes MTF calculated by 90% of Nyquist frequency of standard resolution)

### 4.2.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

MTF values( $MTF_{main}$ ,  $MTF_{sub}$ ) at 90% of Nyquist frequency with standard resolution (175 [ $\mu\text{m}/\text{pixel}$ ]).

$0.1 < MTF_{main} < 0.6$        $0.1 < MTF_{sub} < 0.6$

- **Acceptance Test**

MTF values( $MTF_{main}$ ,  $MTF_{sub}$ ) at 90% of Nyquist frequency with standard resolution (175 [ $\mu\text{m}/\text{pixel}$ ]).

$0.1 < MTF_{main} < 0.6$        $0.1 < MTF_{sub} < 0.6$

**IMPORTANT** .....

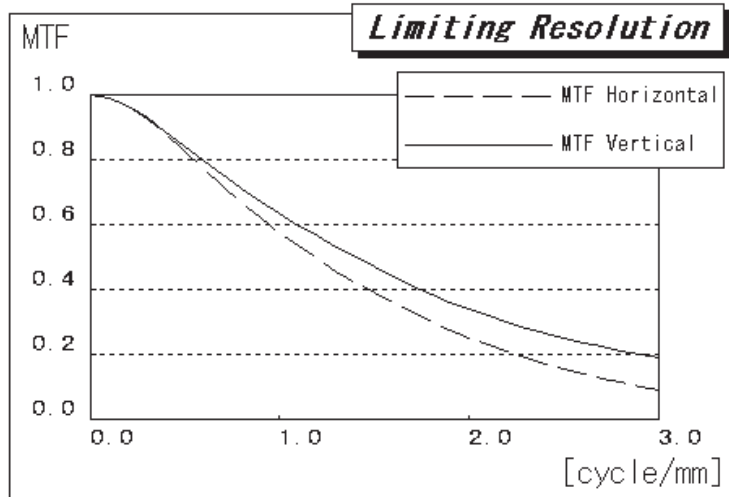
- Even when the image was read by High Resolution (87.5 [ $\mu\text{m}/\text{pixel}$ ]), displayed value and the judgment is also applied at the 90% of Nyquist frequency of Standard Resolution (175 [ $\mu\text{m}/\text{pixel}$ ]).

Because of the shape of pre-sampled MTF until Nyquist frequency is the same with High Resolution and Standard Resolution under the condition of same cassette and same REGIUS.

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### 4.2.3 Verification of the report

Result of the Limiting Resolution test in the QC/Acceptance Test will be displayed as the chart in the report. X-axis of the chart represents the "Frequency(cycle/mm)", while Y-axis represents "MTF. Visually check the calculated MTF.



### 4.2.4 Troubleshooting

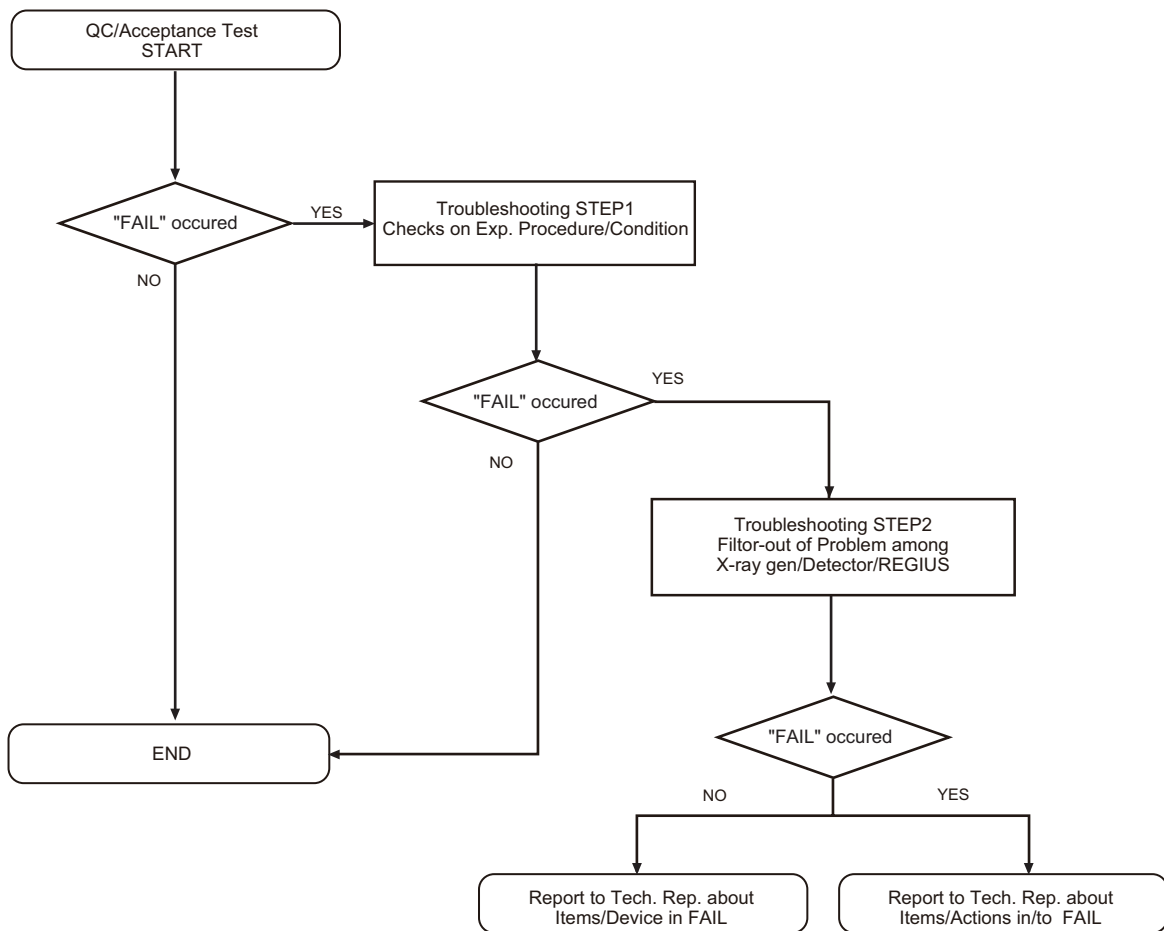
"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Limiting Resolution test correlates with each system component as shown in the table below.

	X-ray Gen.	REGIUS	REGIUS Cassette	Others
Limiting Resolution	△	△	○	

○: Highly possible      △: Possible      ×: Scarcely possible

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



### ● QC

#### STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.

#### 1 Confirm the exposure condition.

- Confirm that the exposure condition (tube voltage, tube current, exposure time, exposure distance, and time before it is read) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

## 4.2 Limiting Resolution

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### STEP 2: Investigate the following points as to the item that resulted in FAIL.

- Implement the QC test using a different Cassette.
  - If "PASS" resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several X-ray generator devices, repeat the examination by changing the X-ray generator device only.
  - If "PASS" resulted, the X-ray generator device may be faulty.
  - If "FAIL" resulted, the REGIUS may be faulty.
- If the site has several REGIUS, repeat the examination with the same Cassette by changing the REGIUS, and check the result of QC test.
  - If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

### ● Acceptance Test

### STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.

#### 1 Confirm the exposure condition.

- Confirm that the Tube Voltage is set to  $80 \text{ kV} \pm 5 \text{ kV}$ .
- Confirm that the dose is measured as  $10.0 \text{ mR} \pm 0.5 \text{ mR}$ .
  - Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure distance is set to 150 cm to 200 cm.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used for the Phantom Image test is the one from which the image has been erased prior to the exposure.
- Confirm that the setting of the Phantom is made in accordance with the instruction.
  - Special attention must be paid to the angle and position of the Phantom.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

### STEP 2: Check the following as to the item that is judged "FAIL" .

- Repeat the examination by changing the REGIUS Cassette only.
  - If "PASS" is resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, the REGIUS may be faulty.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" resulted, the REGIUS may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several X-ray generator devices, repeat the examination by changing the X-ray generator device only.
  - If "PASS" resulted, the X-ray generator device may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.



## 4.3 • Low Contrast Resolution

### 4.3.1 Description of resulted values displayed

Low Contrast Resolution value represents the following.

- **QC**

Proportion [%] between the correlation coefficient of linear least square fit of  $\log_{10}(mR)$  vs  $\log_{10}(PVSD)$  and the criteria / PVSD at 1.0 mR calculated from the linear least square fit.

- **Acceptance Test**

Correlation coefficient of least-squares approximate straight line of (  $\log_{10}(mR)$  vs  $\log_{10}(PVSD)$  ) (CC) / PVSD at 1.0 mR calculated from the linear least square fit.

### 4.3.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Error between the Correlation Coefficient(CC<sub>0</sub>) of the linear least square fit ( $\log_{10}(PVSD)$  vs  $\log_{10}(E_{\text{measured}})$  ) calculated from actually measured transit dose( $E_{\text{measured}}$ ) and the standard deviation of the pixel value(PVSD) obtained for each step of the metal step wedge plate and the criterion.

$$CC_{\text{measured}} / CC_0 = 1 \pm 20\%$$

- **Acceptance Test**

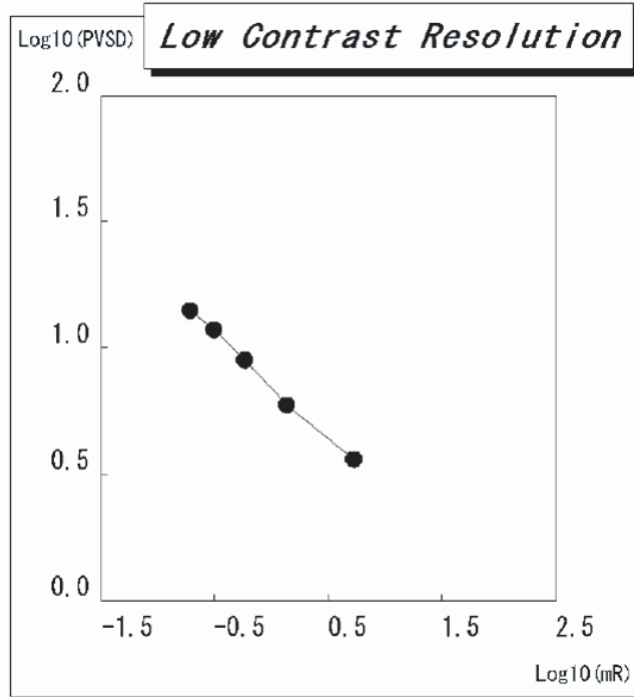
Correlation coefficient(CC) between the linear least square fit ( $\log_{10}(PVSD)$  vs  $\log_{10}(E_{\text{measured}})$  ) calculated from actually measured transit dose( $E_{\text{measured}}$ ) and the standard deviation of the pixel value(PVSD) obtained for each step of the metal step wedge plate.

CC > 0.95 (CC: actually measured correlation coefficient)

### 4.3 Low Contrast Resolution

#### 4.3.3 Verification of the report

Result of the Low Contrast Resolution test in the QC/Acceptance Test will be displayed as the chart in the report. X-axis of the chart represents "Transit Dose ( $\log_{10}(\text{mR})$ )", while Y-axis represents "Standard Deviation ( $\log_{10}(\text{PVSD})$ )". Visually check the calculated dose and linearity of the noise value.



#### 4.3.4 Troubleshooting

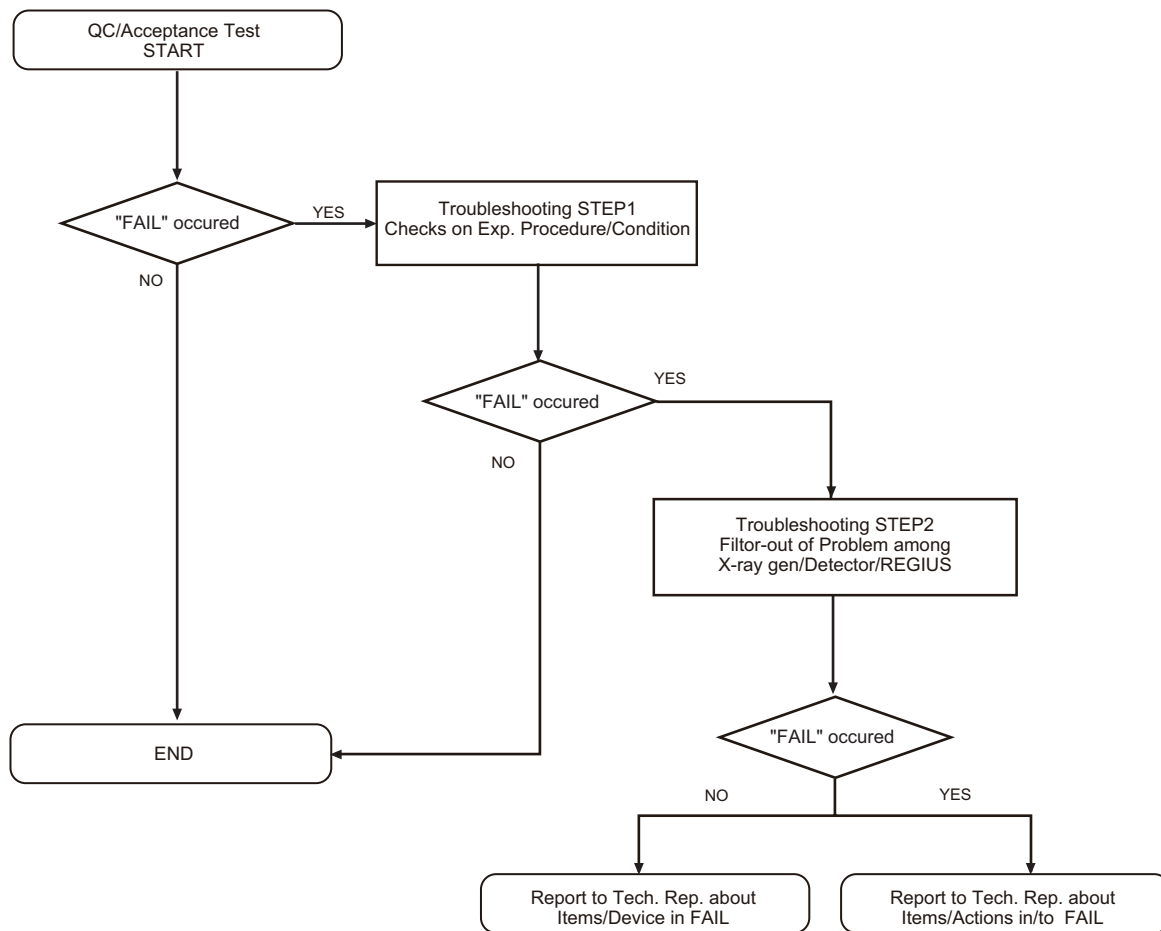
"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Low Contrast Resolution test correlates with each system component as shown in the table below.

	X-ray Gen.	REGIUS	REGIUS Cassette	Others
Low Contrast Resolution	△	△	△	

○: Highly possible    △: Possible    ×: Scarcely possible

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



### ● QC

#### STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.

#### 1 Confirm the exposure condition.

- Confirm that the exposure condition (tube voltage, tube current, exposure time, exposure distance, and time before it is read) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the exposure made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

## 4.3 Low Contrast Resolution

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### STEP 2: Investigate the following points as to the item that resulted in FAIL.

- Measure the dose for the exposure condition identical to that of the 1st QC test to check if the exposure is made with the same dose.
  - If the measured dose is not same, X-ray generator device may faulty.
  - If it is same, proceed to the next step.
- Implement the Acceptance Test (Phantom Image Test), and check the result.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

#### ● Acceptance Test

### STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.

#### 1 Confirm the exposure condition.

- Confirm that the Tube Voltage is set to  $80 \text{ kV} \pm 5 \text{ kV}$ .
- Confirm that the dose is measured as  $10.0 \text{ mR} \pm 0.5 \text{ mR}$ 
  - Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure distance is set to 150 cm to 200 cm.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used for the Phantom test is the one from which the image has been erased prior to the exposure.
- Confirm that the setting of the Phantom is made in accordance with the instruction.
  - Special attention must be paid to the angle and position of the Phantom.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2"

### STEP 2: Check the following as to the item that is judged "FAIL".

- Measure the dose with the dosimeter to check if the exposure was made with the appropriate dose.
  - If the dose is judged to be correct, proceed to the next step.
- Repeat the examination by changing the REGIUS Cassette only.
  - If "PASS" resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

## 4.4 • Laser Jitter

### 4.4.1 Description of resulted values displayed

Laser Jitter value represents the following.

- **QC**

Maximum pixel deviation in main-scan direction [pixel] / maximum pixel deviation in sub-scan direction [pixel]

- **Acceptance Test**

Maximum pixel deviation in main-scan direction [pixel] / maximum pixel deviation in sub-scan direction [pixel]

### 4.4.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Maximum pixel deviation in main/sub-scan direction( $J_{main}$  [pixel],  $J_{sub}$  [pixel])

$J_{main} < 1.0$   $J_{sub} < 1.0$

- **Acceptance Test**

Maximum pixel deviation in main/sub-scan direction( $J_{main}$  [pixel],  $J_{sub}$  [pixel])

$J_{main} < 1.0$   $J_{sub} < 1.0$

### 4.4.3 Troubleshooting

"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Laser Jitter test correlates with each system component as shown in the table below.

	<b>X-ray Gen.</b>	<b>REGIUS</b>	<b>REGIUS Cassette</b>	<b>Others</b>
Laser Jitter	×	○	△	Phantom

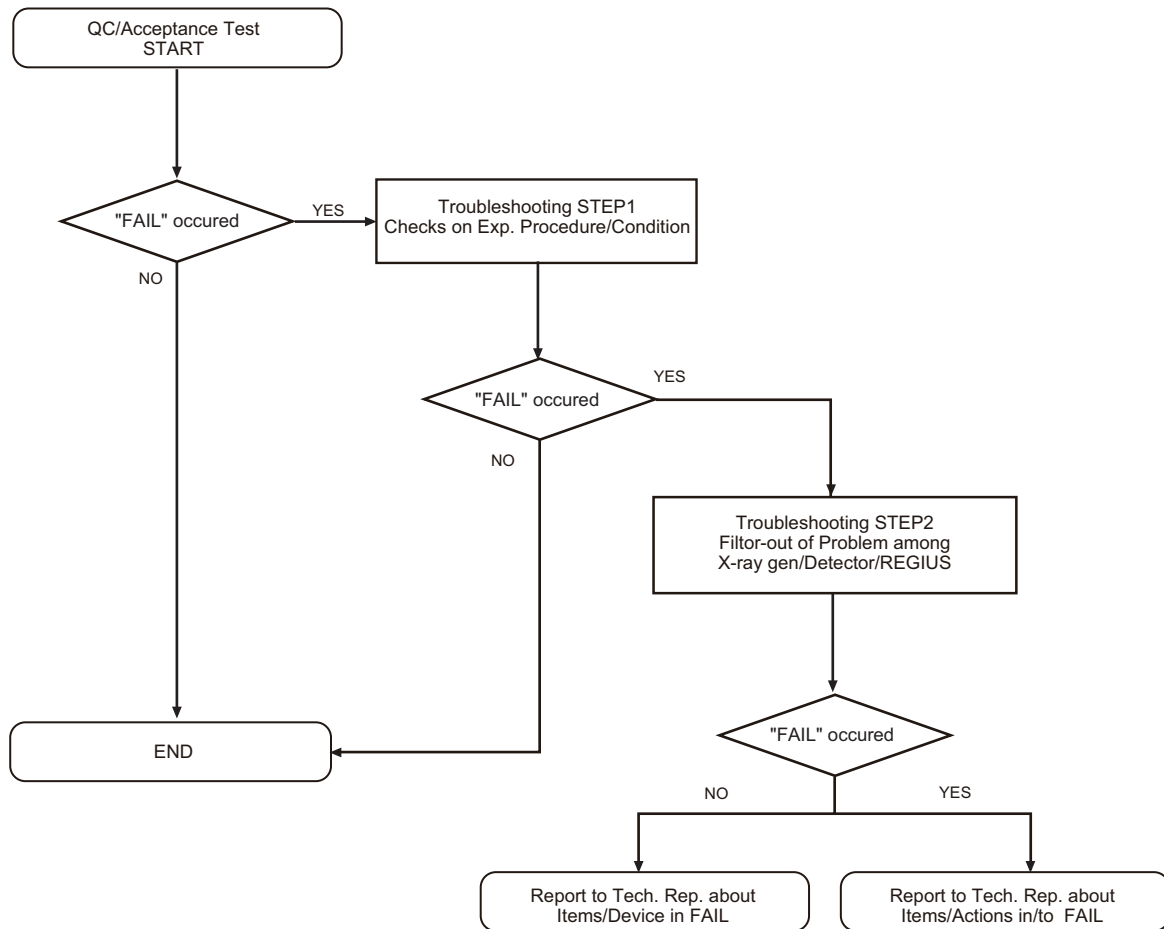
○: Highly possible

△: Possible

×: Scarcely possible

Filter out the problems to locate the cause following the procedure below.

**Flowchart of Troubleshooting**



● QC

**STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.**

**1 Confirm the exposure condition.**

- Confirm that the exposure condition (Tube Voltage, tube current, exposure time, exposure distance, time before it is read) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

**2 Check the exposure procedure.**

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

**STEP 2: Investigate the following points as to the item that resulted in FAIL.**

- Repeat the examination by changing the REGIUS Cassette only.
  - If "PASS" resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, the REGIUS may be faulty. Proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

### ● Acceptance Test

**STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.**

#### 1 Confirm the exposure condition.

- Confirm that the Tube Voltage is set to  $80\text{kV} \pm 5\text{kV}$ .
- Confirm that the exposure distance is set to 150cm to 200cm.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the dose is measured as  $10.0\text{ mR} \pm 0.5\text{ mR}$ .
  - Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used for the Phantom test is the one from which the image has been erased prior to the exposure.
- Confirm that the setting of the Phantom is made in accordance with the instruction.
  - Special attention must be paid to the angle and position of the Phantom.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

**STEP 2: Check the following as to the item that is judged "FAIL".**

- Repeat the examination by changing the REGIUS Cassette only.
  - If "PASS" resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

## 4.5 • Linearity

### 4.5.1 Description of resulted values displayed

Linearity Values represents the following meaning.

- **QC**

Proportion[%] between the slope of linear least square fit of  $\log_{10}$ (theoretical transit dose) vs  $\log_{10}$ (actually measured transit dose) and the criterion proportion ( $\text{Slope}_{\text{measured}} / \text{Slope}_0$  [%]) / proportion between the correlation coefficient and the criterion ( $\text{CC}_{\text{measured}} / \text{CC}_0$  [%]).

- **Acceptance Test**

Converting the average Pixel Value the dose ( $E_{\text{measured}}$ ) indicated as CR system response when exposure is made with three different exposure doses ( $E_{\text{real}} : 3.0 \text{ mR}, 10.0 \text{ mR}, 30.0 \text{ mR}$ ), obtain the slope of the linear least square fit ( $\log_{10}(E_{\text{real}})$  vs.  $\log_{10}(E_{\text{measured}})$ ) and correlation coefficient(CC).

### 4.5.2 Judgment Procedure and Criteria

Judgment of PASS/FAIL in the QC/Acceptance Test will be made referring to the allowance / criteria shown below;

- **QC**

Error between the linear least square fit ( $\log_{10}(E_{\text{real}})$ ) calculated from the actually measured transit dose ( $E_{\text{measured}}$ ) obtained for each step of the metal step wedge plate and theoretical transit dose vs the slope ( $\text{Slope}_{\text{measured}}$ ) obtained from  $\log_{10}(E_{\text{measured}})$  and Correlation Coefficient( $\text{CC}_{\text{measured}}$ ) and the criteria ( $\text{Slope}_0, \text{CC}_0$ ).

$\text{Slope}_{\text{measured}} / \text{Slope}_0 = 1 \pm 10\%$      $\text{CC}_{\text{measured}} / \text{CC}_0 = 1 \pm 10\%$

- **Acceptance Test**

Converting the average Pixel Value into the dose indicated as CR system response ( $M_{\text{measured}}$ ) when exposure is made with three different exposure doses ( $E_{\text{real}} : 3.0 \text{ mR}, 10.0 \text{ mR}, 30.0 \text{ mR}$ ), obtain the slope of the linear least square fit ( $\log_{10}(E_{\text{real}})$  vs.  $\log_{10}(E_{\text{measured}})$ ) and correlation coefficient(CC).

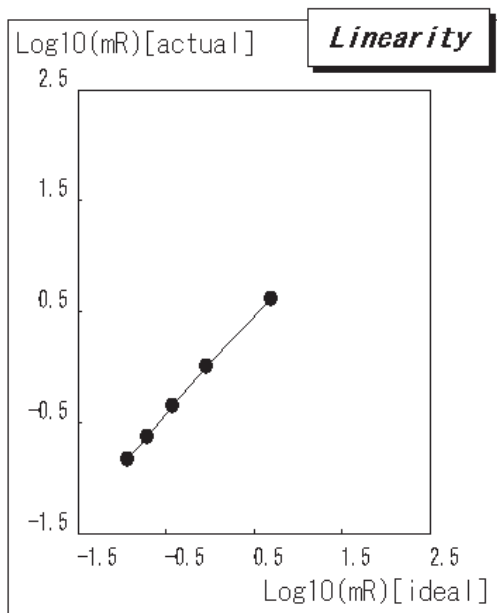
$\text{Slope} = 1 \pm 10\%$      $\text{CC} > 0.95$



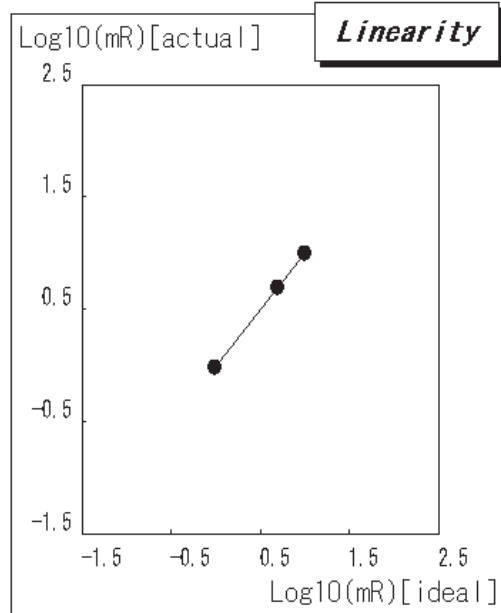
### 4.5.3 Verification of the report

Result of the Linearity test in the QC/Acceptance Test will be displayed as the chart in the report. X-axis of the chart represents "theoretical transparent dose (QC)" and "exposed dose measured by dosimeter (Acceptance Test)" as ideal dose, while Y-axis represents "dose indicated as CR system response (QC/Acceptance Test)" as actual dose.

● QC



● Acceptance Test



### 4.5.4 Troubleshooting

"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Linearity test correlates with each system component as shown in the table below.

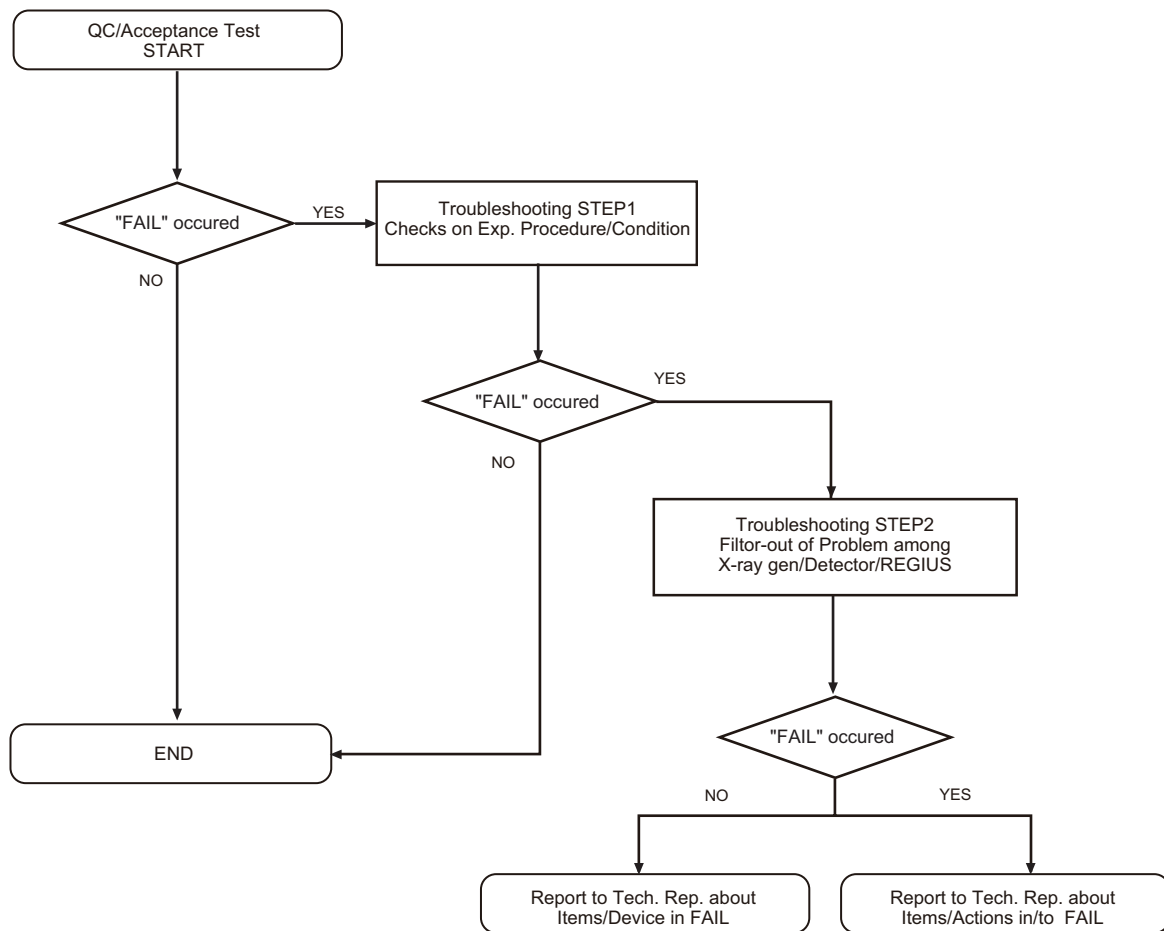
	X-ray Gen.	REGIUS	REGIUS Cassette	Others
Linearity (QC)	○	○	×	
Linearity (Acceptance Test)	×	○	×	Interval before reading

○: Highly possible    △: Possible    ×: Scarcely possible

## 4.5 Linearity

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



### ● QC

**STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.**

#### 1 Confirm the exposure condition.

- Confirm that the exposure condition (Tube Voltage, tube current, exposure time, exposure distance, time before it is read) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

**STEP 2: Investigate the following points as to the item that resulted in FAIL.**

- Confirm that the Tube Voltage is set to the same as that of the 1st Simple Check QC test.  
→ If "FAIL" repeats despite of the Tube Voltage identical to the 1st trial, the X-ray generator device may be faulty. Proceed to the next step to investigate the failure of the X-ray generator device.
- If the site has several X-ray generator devices, repeat the examination by changing the X-ray generator device only.  
→ If "PASS" is resulted, the X-ray generator device may be faulty.  
If "FAIL" is resulted, the REGIUS may be faulty. Proceed to the next step below.
- Implement the Acceptance Test (3 Flat Field Images Test), and check the test result.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

### ● Acceptance Test

**STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.**

#### 1 Confirm the exposure condition.

- Confirm that the Tube Voltage is set to  $80 \text{ kV} \pm 5 \text{ kV}$ .
- Confirm that the dose is measured as 3.0 mR, 10.0 mR, and 30.0 mR.  
→ Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure distance is set to 150 cm to 200 cm.
- Confirm that the exposure interval times for all three exposures are the same in case of 3 Flat Field Images test.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used for the test is the one from which the image has been erased prior to the exposure.
- Confirm that the positional relation between the X-ray tube and the blue line of the REGIUS Cassette are kept as instructed.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

**STEP 2: Check the following.**

#### 1 Linearity is judged as "FAIL".

- If the site has several REGIUS, repeat the examination by changing the REGIUS only.  
→ If "PASS" is resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

## 4.6 • Detector Response

### 4.6.1 Description of resulted values displayed

Detector Response value represents the following.

- **QC**

Proportion [%] between the average pixel value in 80% center image area and the criteria.

- **Acceptance Test**

Proportion [%] of the exposure dose calculated from the average Pixel Value in the 80% center area of the image to prescribed dose.

### 4.6.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Converting the average Pixel Value in 80% center image area into the dose ( $E_{\text{measured}}$ ) indicated as CR system response when exposed at the same dose as in the 1<sup>st</sup> Simple Check QC, obtain the error between the exposed dose and the criteria ( $E_0$ ).

$$E_{\text{measured}}/E_0 = 1 \pm 10\%$$

- **Acceptance Test**

Converting the average Pixel Value in 80% center image area to obtain the dose indicated as CR system response ( $E_{\text{measured}}$ ) when exposed at 10.0 mR ( $E_{\text{real}}$ ), obtain the proportion ( $E_{\text{measured}}/E_{\text{real}}$ ) between the exposed dose and indicated dose.

$$E_{\text{measured}}/E_{\text{real}} = 1 \pm 10\%$$

### 4.6.3 Troubleshooting

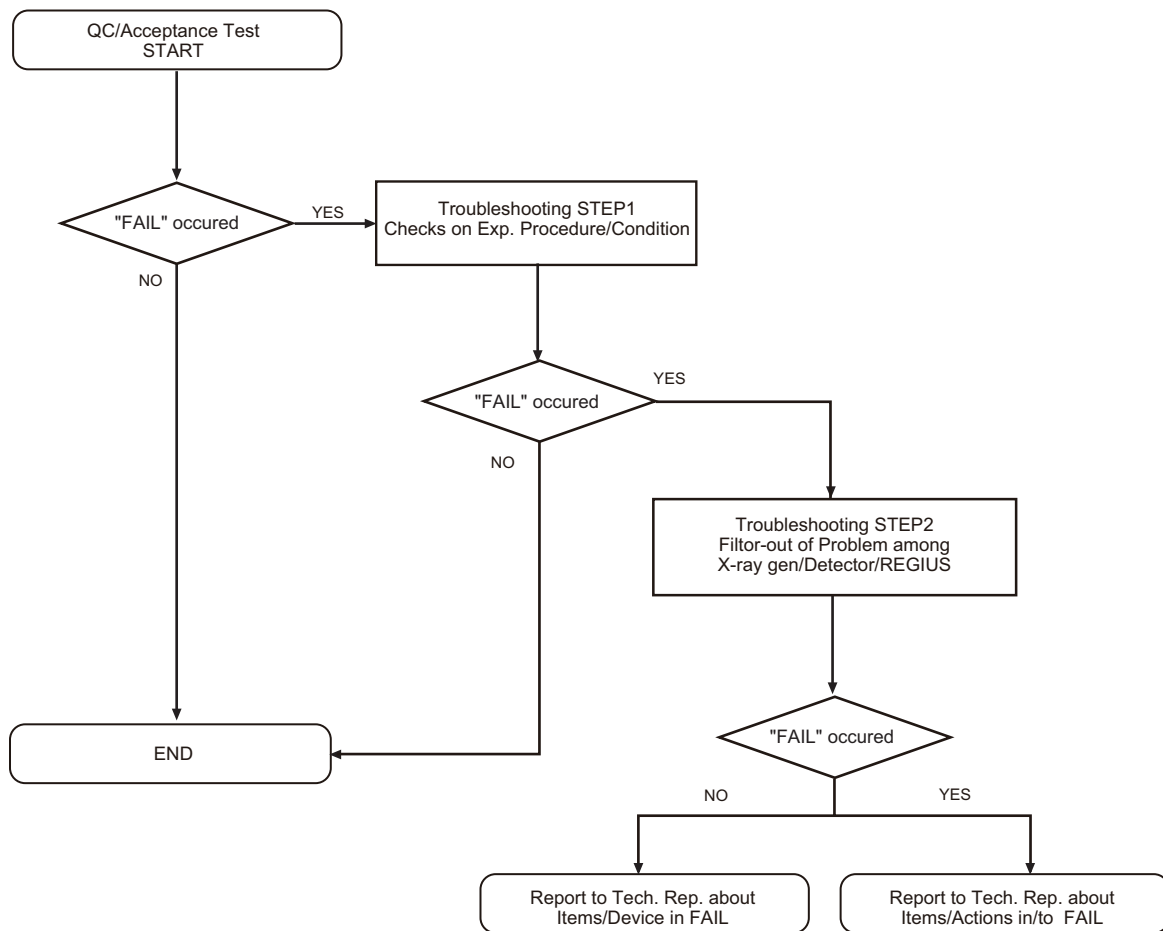
"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Detector Response test correlates with each system component as shown in the table below.

	X-ray Gen.	REGIUS	REGIUS Cassette	Others
Detector Response	○	○	○	

○: Highly possible      △: Possible      ×: Scarcely possible

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



### ● QC

**STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.**

#### 1 Confirm the exposure condition.

- Confirm that the exposure condition (tube voltage, tube current, exposure time, exposure distance, time before it is read, cassette orientation) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- If it is possible to measure the dose, check the dose. If the measured dose is different from what is intended, the X-ray generator device may be faulty.

### 3 Check the exposure procedure.

- If it is possible to measure the dose, check the dose. If the measured dose is different from what is intended, the X-ray generator device may be faulty.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

#### STEP 2: Investigate the following points as to the item that resulted in FAIL.

- If the site has several X-ray generator devices, repeat the examination by changing the X-ray generator device only.
  - If "PASS" resulted, the X-ray generator device may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- Implement the Acceptance Test (1 Flat Field Image Test), and check the result.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

#### ● Acceptance Test

#### STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.

### 1 Confirm the exposure condition.

- Confirm that the Tube Voltage is set to 80 kV  $\pm$  5 kV.
- Confirm that the dose is measured as 10.0 mR  $\pm$  0.5 mR.
  - Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure distance is set to 150 cm to 200 cm.
- Confirm the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used for the test is the one from which the image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".

#### STEP 2: Check the following items.

When the re-examination is implemented, implement the 1 Shot Flat Field Image Test.

- Repeat the examination by changing the REGIUS Cassette only.
  - If "PASS" resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several X-ray generator devices, repeat the examination by changing the X-ray generator device only.
  - If "PASS" resulted, the X-ray generator device may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, sensitivity correction may be necessary to be implemented by the technical representative. Please contact your technical representative.

## 4.7 • Uniformity

### 4.7.1 Description of resulted values displayed

Uniformity value represents the following.

- **QC**

Proportion[%] between the standard deviation of pixel value in 80% center image area and the criteria.

- **Acceptance Test**

Standard deviation of Pixel Value in the 80% center area of the image.

### 4.7.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Error between the standard deviation of pixel value(PVSD<sub>measured</sub>) in 80% center image area and the criterion(PVSD<sub>0</sub>).  
 $PVSD_{measured} / PVSD_0 = 1 \pm 10\%$

- **Acceptance Test**

Error between the standard deviation of pixel value (PVSD<sub>measured</sub>) in 80% center image area.  
 $PVSD < 30.0$

### 4.7.3 Troubleshooting

"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of X-ray generator device, REGIUS, cassette or exposure procedure may be faulty. It is highly possible that "FAIL" for the Uniformity test correlates with each system component as shown in the table below.

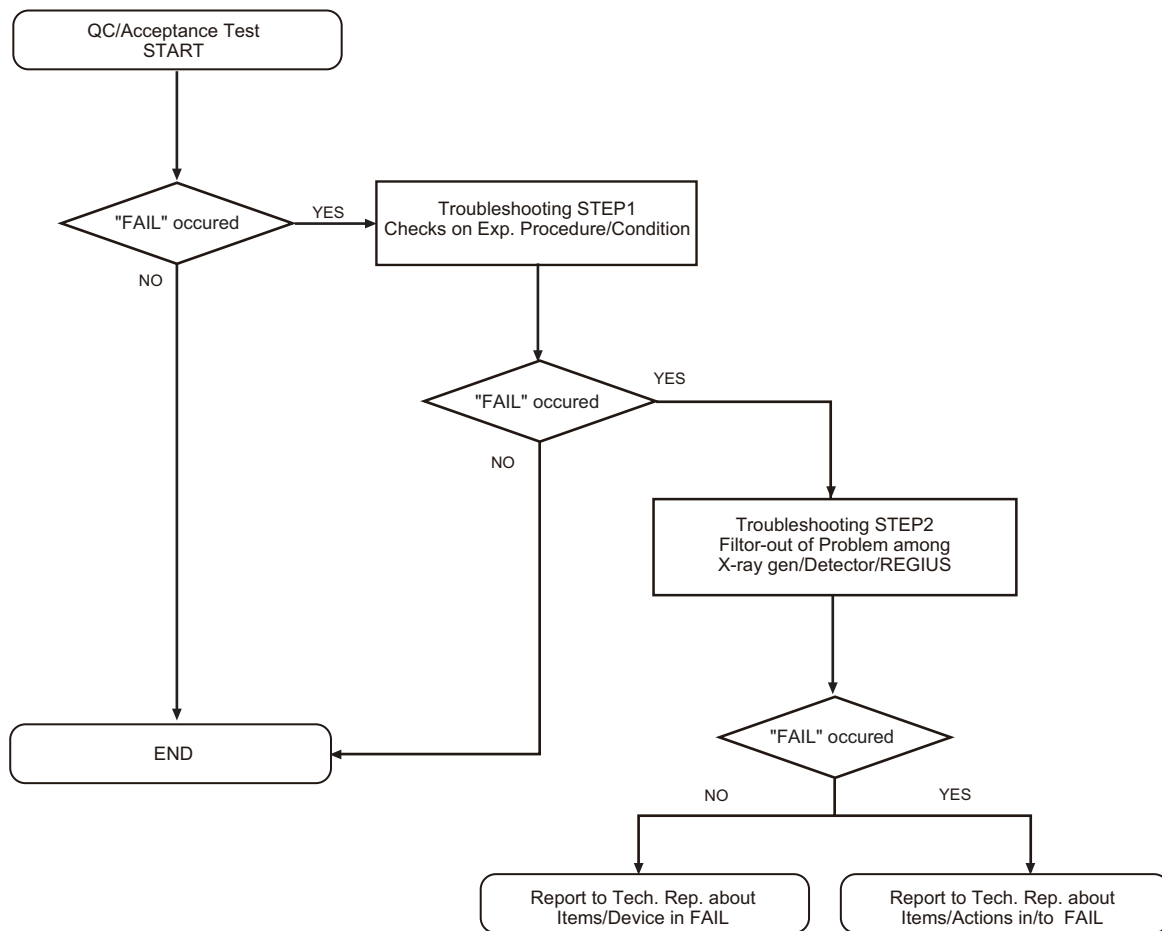
	X-ray Gen.	REGIUS	REGIUS Cassette	Others
Uniformity	○	○	○	

○: Highly possible    △ Possible    ×: Scarcely possible

## 4.7 Uniformity

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



### ● QC

**STEP 1: Check if the exposure procedure and exposure condition are in accordance with the manual.**

#### 1 Confirm the exposure condition.

- Confirm that the exposure condition (tube voltage, tube current, exposure time, exposure distance, time before it is read, cassette orientation) is set to the same as that of the 1st Simple Check QC test.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

#### 2 Check the exposure procedure.

- Confirm that the REGIUS Cassette used is the one from which the previously exposed image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in the above. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2".



**STEP 2: Investigate the following points.**

- If the site has several X-ray generator devices, repeat the examination by changing the X-ray generator device only.
  - If "PASS" resulted, the X-ray generator device may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- Implement the Acceptance Test (1 Flat Field Image Test), and check the result.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

### ● Acceptance Test

**STEP 1: Check if the exposure procedure using the Phantom is in accordance with the procedure described in the manual.****1 Confirm the exposure condition.**

- Confirm that the Tube Voltage is set to  $80 \text{ kV} \pm 5 \text{ kV}$ .
- Confirm that the dose is measured as  $10.0 \text{ mR} \pm 0.5 \text{ mR}$ .
  - Check the exposure dose using dosimeter as necessary.
- Confirm that the exposure distance is set to 150 cm to 200 cm.
- Confirm that the exposure is made without additional filter or grid.
- Confirm that the X-ray tube is positioned so that the X-ray radiation center is aligned to the center of the REGIUS Cassette.
- Confirm that the exposure field is expanded to fit to the REGIUS Cassette size.

**2 Check the exposure procedure.**

- Confirm that the REGIUS Cassette used for the test is the one from which the image has been erased prior to the exposure.
- Confirm that the relative positioning of the X-ray tube and the blue line of the REGIUS Cassette meet the specified method.

Proceed to "STEP 2" if no faulty is found through the checks in 1 and 2. Repeat the exposure if a faulty is found in the procedure in "STEP 1". If the problem cannot be solved despite of re-examination, proceed to "STEP 2"

**STEP 2: Check the following items.**

When the re-examination is implemented, implement the 1 Shot Flat Field Image Test.

- Expose the REGIUS Cassette with 1/2 of the prescribed dose (10.0 mR only). Then rotate the REGIUS Cassette by 180 degrees, and re-expose the REGIUS Cassette with 1/2 of the prescribed dose. (Two serial exposures)
  - If "PASS" resulted, complete the examination.
  - If "FAIL" resulted, proceed to the next step.
- Repeat the examination by changing the REGIUS Cassette only.
  - If "PASS" resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" resulted, proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

## 4.8 • Erasure/Dark Noise

### 4.8.1 Description of resulted values displayed

Erasure/Dark Noise value represents the following.

- **QC**

Standard deviation between average Pixel Value /Pixel Value in the 80% center area of the image.

- **Acceptance Test**

Standard deviation between average Pixel Value /Pixel Value in the 80% center area of the image.

### 4.8.2 Judgment Procedure and Criteria

"PASS/FAIL" judgment in the QC/Acceptance Test will be made referring to the allowance/criterion as shown below.

- **QC**

Standard deviation(PVSD) of average pixel value ( $PV_{average}$ ) in 80% center image area and pixel value.

$PV_{average} < 10.0$     $PVSD < 1.0$

- **Acceptance Test**

Standard deviation(PVSD) of average pixel value ( $PV_{average}$ ) in 80% center image area and pixel value.

$PV_{average} < 10.0$     $PVSD < 1.0$

### 4.8.3 Troubleshooting

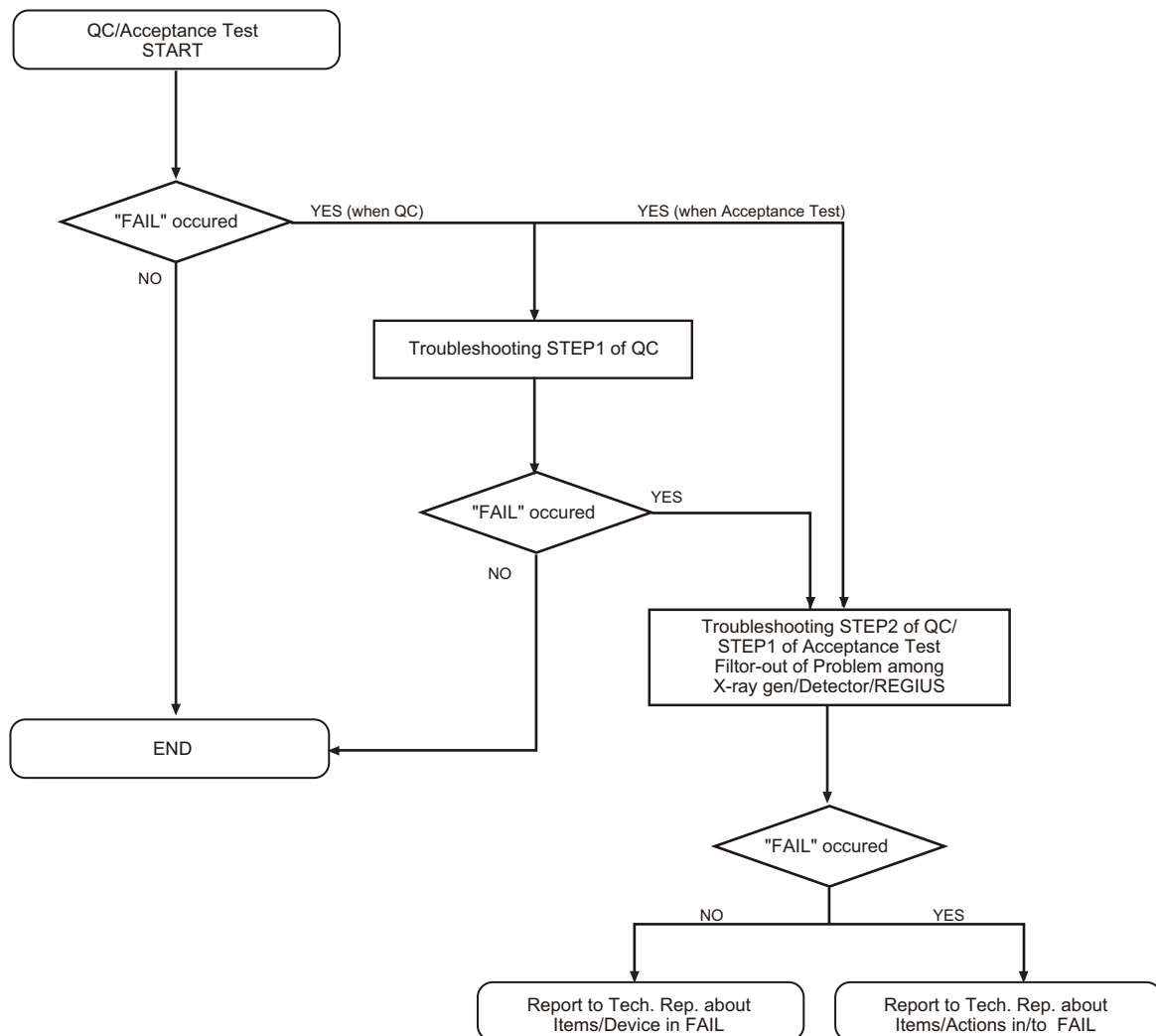
"FAIL" will be displayed when the calculated result for the evaluation item does not satisfy the allowance/criterion value defined in the QC/Acceptance Test. If "FAIL" is displayed, any of REGIUS or cassette may be faulty. It is highly possible that "FAIL" for the Erasure test correlates with each system component as shown in the table below.

	<b>X-ray Gen.</b>	<b>REGIUS</b>	<b>REGIUS Cassette</b>	<b>Others</b>
Erasure	×	○	○	
Dark Noise	×	○	○	

○: Highly possible   △: Possible   ×: Scarcely possible

Filter out the problems to locate the cause following the procedure below.

### Flowchart of Troubleshooting



#### ● QC

##### STEP 1: Check the following items.

- Repeat erasure of the plate (compulsory), and implement the Dark Noise Test with the plate after erasure.  
→ Even if the Dark Noise Test resulted in "PASS", the REGIUS or Cassette may be faulty. Proceed to "STEP 2".

##### STEP 2: Investigate the following points.

- Foreign image appears on the image.  
→ The REGIUS Cassette may be faulty.
- Implement the QC test by changing the REGIUS Cassette.  
→ If "PASS" resulted, the REGIUS Cassette may be faulty.  
If "FAIL" resulted, proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.  
→ If "PASS" resulted, the REGIUS may be faulty.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

### ● Acceptance Test

#### **STEP 1: Check the following points.**

- Foreign image appears on the image.
  - The REGIUS Cassette may be faulty.
- Implement re-examination by changing the REGIUS Cassette only.
  - If "PASS" is resulted, the REGIUS Cassette may be faulty.
  - If "FAIL" is resulted, proceed to the next step.
- If the site has several REGIUS, repeat the examination by changing the REGIUS only.
  - If "PASS" is resulted, the REGIUS may be faulty.
  - If "FAIL" is resulted, proceed to the next step.

If "FAIL" cannot be cleared even after the above troubleshooting is implemented, contact your technical representative.

## 4.9 • Action to be taken when "ERROR" occurs

### 4.9.1 PHANTOM IMAGE TEST

ERROR may be displayed for all evaluation items of Phantom image. This is in most of cases attributed to the improper exposure procedure, and it is seldom that the ERRORS are displayed when the REGIUS, cassette or X-ray generator device is in abnormal state. If the above is displayed in your window, follow the procedure below to solve the problem.

**STEP 1: Check if the Phantom image displayed on the QC/Acceptance Test screen is the correct one as prescribed.**

If the displayed image is not the correct Phantom image, confirm the following:

- Wrong Exam Tag key may have been selected. Select the Phantom image in the Select Image screen.
- If there is no Phantom image, it means the Phantom exposure has not been made yet. Expose the Phantom according to the prescribed exposure procedure.

If no problem is found by the procedure in "STEP 1", proceed to "STEP 2".

**STEP 2: Check on the X-rayed image if the parts that should be in the Phantom are correctly allocated. Refer to [Items to be checked on the Monitor] for checks of parts that should be in the Phantom.**

- Check if any foreign material is exposed over the regular image field.  
→ If the foreign material is located, remove the causative material and repeat the exposure.
- Confirm that the number of the parts imaged in the field is identical to the number referred in [Items to be checked on the Monitor]. At the same time, check if the parts are allocated to the correct position. (visually check the displacement or slant of the part)  
→ If abnormality is found, the Phantom may be faulty. Contact your technical representative.

If no problem is found by the procedure in "STEP 2", proceed to "STEP 3".

**STEP 3: Check if there is any mistake in exposure procedure/condition of the Phantom.**

- Check if the exposure condition is set according to the description in the manual. Also check if the Phantom is properly set on the REGIUS Cassette.  
→ Care should be taken because failure in Phantom setting such as rotation or back-to-front on the REGIUS Cassette may also lead to ERROR.  
If abnormality is found, repeat the examination according to the prescribed exposure procedure.

If no problem is found by the procedure in "STEP 3", proceed to "STEP 4".

**STEP 4: Repeat the Phantom exposure according to the description in the manual, and implement the automatic calculation again. In this procedure, pay attention to the slant of the Phantom when it is set.**

If "ERROR" cannot be solved despite of implementing the remedies through to STEP 4, contact your technical representative.

### 4.9.2 FLAT FIELD IMAGE TEST

ERROR may be displayed for all evaluation items of the uniform image (Detector Response and Uniformity in the Flat Field Image Test of the Acceptance Test). This is in most of cases attributed to the faulty image targeted for automatic calculation, and it is seldom that the ERRORS are displayed when the REGIUS, cassette or X-ray generator device is in abnormal state. If the above is displayed in your window, follow the procedure below to solve the problem.

#### **STEP 1: Check if the uniform image displayed on the QC/Acceptance Test screen is the correct one as prescribed.**

If the displayed image is not the uniformly exposed one, confirm the following:

- Wrong Exam Tag key may have been selected. Select the uniform image in the Select Image screen.
- If there is no uniform image, it means the uniform exposure has not been made yet. Expose the uniform image according to the prescribed exposure procedure.

If no problem is found by the procedure in "STEP 1", proceed to "STEP 2".

#### **STEP 2: Check if any foreign material is exposed over the regular image field.**

- If the foreign material is located, remove the causative material and repeat the examination according to the procedure described in the manual.
- If no foreign material is located, repeat the examination according to the procedure described in the manual.

If "ERROR" cannot be solved despite of implementing the remedies through to STEP 2, contact your technical representative.

### 4.9.3 ERASED IMAGE TEST

ERROR may be displayed for all evaluation items of erased image. This is in most of cases attributed to the faulty image targeted for automatic calculation, and it is seldom that the ERRORS are displayed when the REGIUS, cassette or X-ray generator device is in abnormal state. If the above is displayed in your window, follow the procedure below to solve the problem.

#### **STEP 1: Check if the erased image displayed on the Erased Image or Dark Noise Image of the QC/Acceptance Test screen is the correct one as prescribed.**

If the displayed image is not the erased image, check the following points;

- Wrong Exam Tag key may have been selected. Select the erased image in the Select Image screen.
- If there is no erased image, it means the examination of erased image has not been made yet. Implement the examination of the erased image according to the prescribed exposure procedure.

If no problem is found by the procedure in "STEP 1", proceed to "STEP 2".

#### **STEP 2: Check if any foreign material is exposed over the regular image field.**

- If the foreign material is located, remove the causative material and repeat the examination according to the procedure described in the manual.
- If no foreign material is located, repeat the exposure according to the procedure described in the manual.

If "ERROR" cannot be solved despite of implementing the remedies through to STEP 2, contact your technical representative.

# Chapter 5

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## Analytic Theory for AeroDR SYSTEM

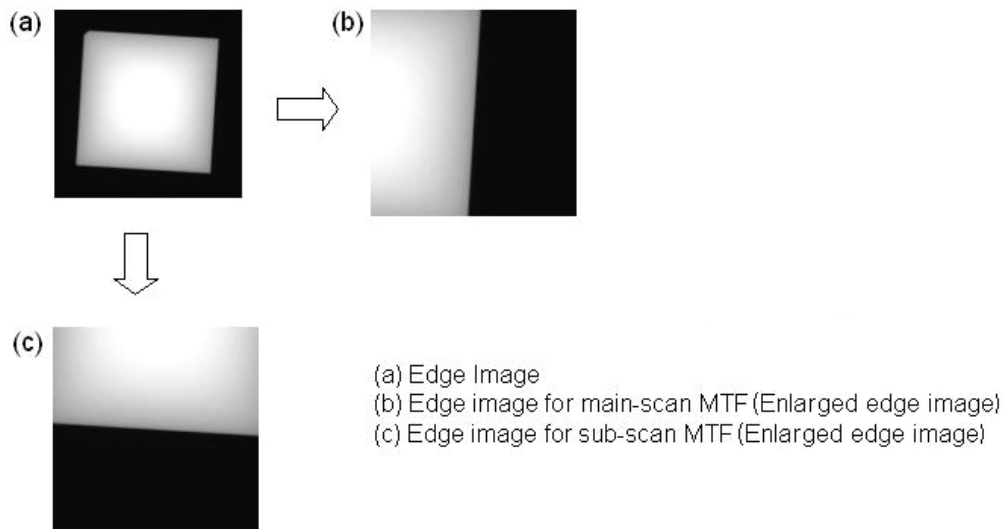
This chapter describes the analytic theory of the test items for the  
AeroDR SYSTEM.



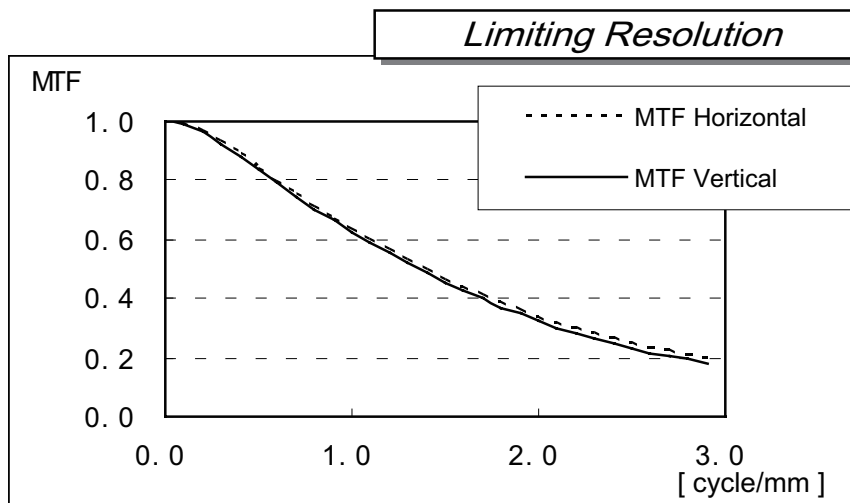
- .....
- The AeroDR Detector QR values are as follows.
    - AeroDR Detector (HQ type) : 2500
    - AeroDR Detector (S type) : 1500
- .....

## 5.1 • Limiting Resolution

Various factors (shape of exposure field, scattered radiation, characteristics of X-ray tube, characteristics of AeroDR SYSTEM) may influence the sharpness of the DR image. The edge method (MTF) is available for measuring the spatial resolution of the AeroDR SYSTEM. However, this method is not measuring the maximum resolution power of the system but is only the means to allow comparison with existing characteristics of the device.



Calculate the MTF in main/sub-scan directions from the 5x5cm tungsten edge allocated on the Phantom at the angle of 3 degrees. (method complying with IEC Standard) Calculate ESF (Edge Spread Function) from the edge image of (b), (c). Then calculate LSF (Line Spread Function) from the derivative of ESF. Fourier transformation of the resulted LSF will produce MTF.

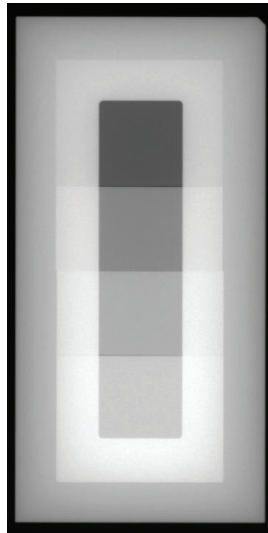




## 5.2 • Low Contrast Resolution

The low contrast resolution is essential for precise diagnosis. The noise of an image cannot be defined only by X-ray exposure but also influenced by MTF of the system noise in general. Evaluation of the noise is a key factor because it leads to deterioration of visibility of low contrast object or lesion.

- QC



**Metal Step Wedge**

Using the image obtained from the metal step wedge contained in the Phantom, measure the linearity between the transit dose and the noise value of each step.

Calculate the transit dose  $\log_{10}(mR)$  from the average Pixel Value of each step using the equation shown below.

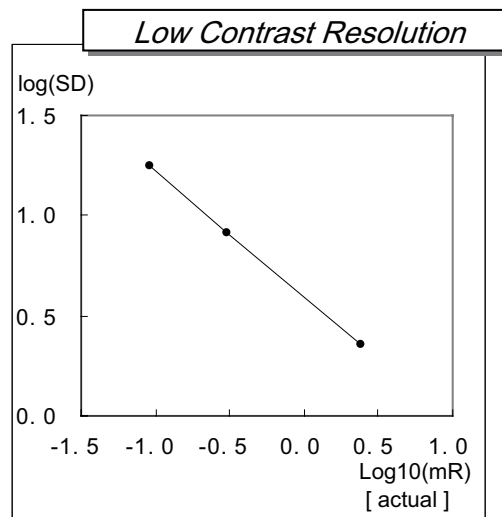
$$\log_{10}(mR) = \left\{ \frac{(Pixel\ Value - 1535)}{1024} \right\} - \log_{10}\left(\frac{QR}{200}\right)$$

In addition, calculate the standard deviation  $\log_{10}(PVSD)$  of the value of each step.

Calculating the linear least square fit from the transit dose  $\log_{10}(mR)$  and standard deviation  $\log_{10}(PVSD)$  obtained in the above will produce the correlation coefficient (CC).

( $\log_{10}(mR)$  vs  $\log_{10}(PVSD)$ ).

In addition, the standard deviation ( $PVSD_{1.0\ mR}$ ) when the X-ray of the dose 1.0 mR is exposed can be calculated from the linear least square fit obtained from the calculation.



- **Acceptance Test**

Use the Phantom images that are exposed with the prescribed, three different exposure doses (3.0 mR, 5.6 mR and 10.0 mR).

The dose  $\log_{10}(mR)$  from the average Pixel Value of each step using the equation shown below.

$$\log_{10}(mR) = \left\{ \frac{(Pixel\ Value - 1535)}{1024} \right\} - \log_{10}\left(\frac{QR}{200}\right)$$

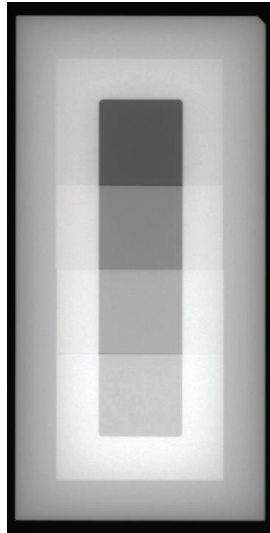
In addition, calculate the standard deviation  $\log_{10}(PVSD)$  of the value of each image.

Calculating the linear least square fit from the transit dose  $\log_{10}(mR)$  and standard deviation  $\log_{10}(PVSD)$  obtained in the above will produce the correlation coefficient (CC). ( $\log_{10}(mR)$  VS  $\log_{10}(PVSD)$ ).

## 5.3 • Linearity

AeroDR SYSTEM are calibrated so that they have a linear relation with the logarithm of X-ray dose. Linearity will be evaluated in this section.

- QC



**Metal Plate Step Wedge**

Measure the linearity between the theoretical transit dose and the dose indicated as AeroDR SYSTEM response by reading the step wedge value resulted from the metal step wedge plate affixed in the Phantom. The relation between the dose and Pixel Value is in accordance with the following equation.

$$\text{Pixel Value} = 1024 * \left\{ \log_{10}(mR) + \log_{10}\left(\frac{QR}{200}\right) \right\} + 1535$$

Calculate the dose indicated as AeroDR SYSTEM response from the average Pixel Value of each step using the equation in the above.

Then calculate the linear least square fit ( $\log_{10}(\text{theoretical transit dose})$  vs  $\log_{10}(\text{indicated dose})$ ) (The straight-line approximation is constructed using the log of actual pixel value and the log of pixel value converted from the theoretical dose.) from the theoretical transit dose and the calculated dose.

In theory, slope value = 1.0, correlation coefficient = 1.0 will be obtained.

● **Acceptance Test**

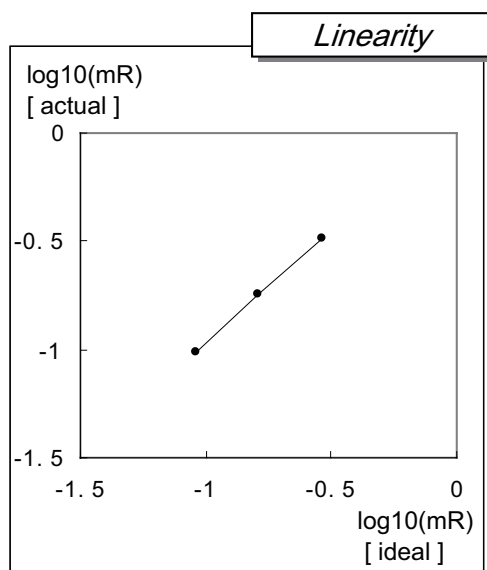
Use the Phantom images that are exposed with the prescribed, three different exposure doses (3.0 mR, 5.6 mR, 10.0 mR).

The dose and Pixel Value are in accordance with the equation shown below:

$$Pixel\ Value = 1024 * \left\{ \log_{10}(mR) + \log_{10}\left(\frac{QR}{200}\right) \right\} + 1535$$

Calculate the dose indicated as AeroDR SYSTEM response using the calculated average Pixel Value and QR value. Calculate the linear least square fit ( $\log_{10}(\text{theoretical transit dose})$  vs  $\log_{10}(\text{indicated dose})$ ) (The straight-line approximation is constructed using the log of actual pixel value and the log of pixel value converted from the theoretical dose.) using the theoretical dose and the dose indicated as AeroDR SYSTEM response and obtain the slope value and correlation coefficient.

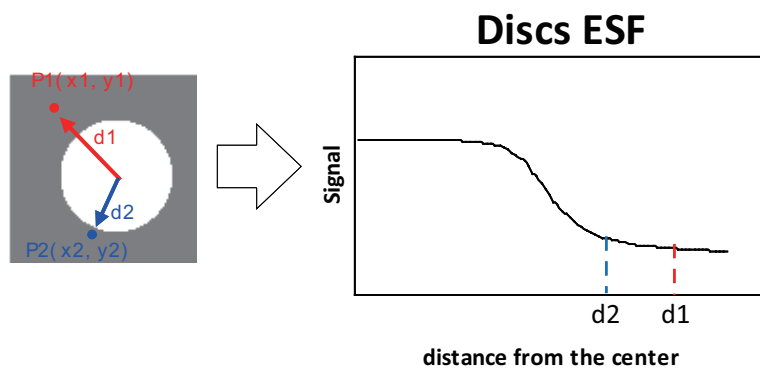
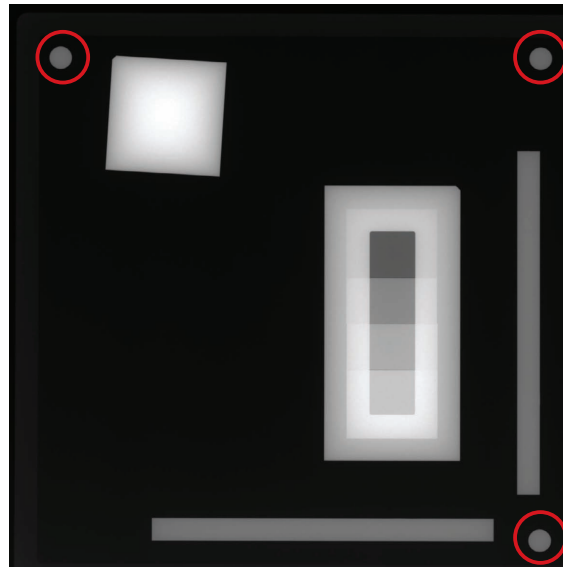
In theory, slope value = 1.0, correlation coefficient = 1.0 will be obtained.



## 5.4 • Resolution Uniformity

The Resolution Uniformity determines whether uniformity of sharpness is maintained, by calculating the MTF from 3 copper discs on the QC Phantom.

Measure the ESF radially, from the center of the 3 copper discs on the Phantom and use this value to calculate the edge method MTF.



Use the maximum and minimum values at MTF in 1 cycle/mm from the 3 measured areas to calculate the Resolution Uniformity from the formula below.

$$\text{Resolution Uniformity} = \frac{\text{MAX. Value} - \text{MIN. Value}}{\text{MAX. Value}}$$

---

## 5.5 • Bad Pixel

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Calibration is implemented in AeroDR SYSTEM to prevent any bad pixel from occurring. How to determine whether or not any bad pixel is present, is described in this section.



(a) 3.0 mR

Take a solid image with 3.0 mR, detect the difference between each pixel value and the average value of the ROI (for example, periphery of 5x5 pixels) and see if it is 20 times or more of the standard deviation to determine whether or not there is any bad pixel.

## 5.6 • Uniformity

Calibration is implemented in AeroDR SYSTEM to prevent any unevenness from occurring. How to determine the degree of image unevenness is described in this section.



(a) 3.0 mR

### • Global

Unevenness on a whole image is tested using the Global Uniformity method. Take a solid image with 3.0 mR, measure the max (ROI) and min (ROI) of the average signal value in each ROI (for example, 90x90 pixels) inside the whole image area and calculate the index value GSNU according to the formula below. The smaller the GSNU value is, the smaller the unevenness of the whole image will be.

$$GSNU = \frac{\max(\overline{ROI}_{i,j}) - \min(\overline{ROI}_{i,j})}{(\max(\overline{ROI}_{i,j}) + \min(\overline{ROI}_{i,j})) / 2}$$

### • Local

Local unevenness is tested using the Local Uniformity method. Measure the average signal value in each ROI (for example, 90x90 pixels) inside the whole image area and the maximum value of the average signal value in a periphery of 3x3 ROI and calculate the index value LSNU according to the formula below. The smaller the LSNU value is, the smaller the unevenness of the whole image will be.

$$LSNU = \max\left(\frac{\max(|\overline{ROI}_{i,j} - \overline{ROI}_{i\pm 1, j\pm 1}|)}{\overline{ROI}_{i,j}}\right)$$

## 5.7 • SNR Uniformity

AeroDR SYSTEM is designed so that the signal-to-noise ratio (SNR) in the image area becomes uniform. The SNR variation test is described in this section.



(a) 3.0 mR

Take a solid image with 3.0 mR, measure the max (ROI/ $\sigma$ ) and min (ROI/ $\sigma$ ) of the values which were determined by dividing the average signal value (ROI) in each ROI (for example, 90x90 pixels) inside the whole image area by the dispersed value ( $\sigma$ ), and calculate the index value GSNRNU, according to the formula below. The smaller the GSNRNU value is, the smaller the SNR variation will be.

$$\text{GSNRNU} = \frac{\max\left(\frac{\overline{\text{ROI}}_{i,j}}{\sigma(\text{ROI}_{i,j})}\right) - \min\left(\frac{\overline{\text{ROI}}_{i,j}}{\sigma(\text{ROI}_{i,j})}\right)}{\left(\max\left(\frac{\overline{\text{ROI}}_{i,j}}{\sigma(\text{ROI}_{i,j})}\right) + \min\left(\frac{\overline{\text{ROI}}_{i,j}}{\sigma(\text{ROI}_{i,j})}\right)\right) / 2}$$



## 5.8 • Exposure Indicator

AeroDR SYSTEM is designed so that a predetermined signal value is calculated according to the exposure dose. The deviation test between the signal value to the exposure dose and the theoretical value is described in this section.



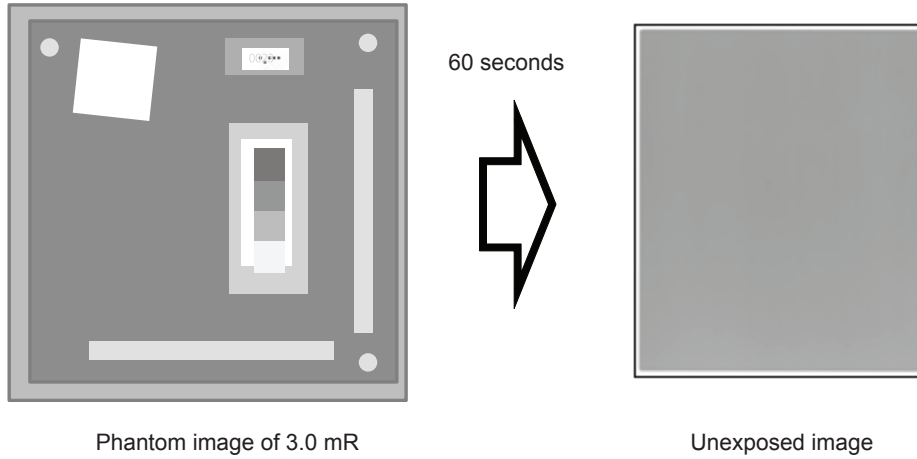
(a) 3.0 mR

Take a solid image with 3.0 mR and measure the deviation between the average signal value inside the whole image area and the theoretical signal value calculated from the exposure dose using the formula below.

$$\text{Pixel Value} = 1024 * \left\{ \log_{10}(mR) + \log_{10}\left(\frac{QR}{200}\right) \right\} + 1535$$

## 5.9 • Lag

AeroDR SYSTEM is designed so that the lag amount is less than a predetermined value. The lag test is described in this section.

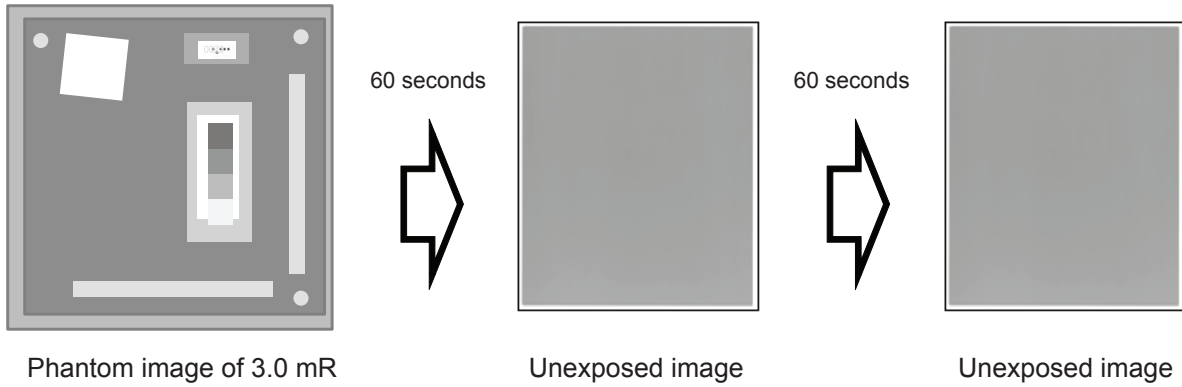


60 seconds after taking a Phantom image of 3.0 mR, take an unexposed (without exposure) image and calculate the lag (conversion dose) from the average signal value of the unexposed image according to the formula below.

$$(mR) = \left( \frac{200}{QR} \right) \times 10 \left\{ \frac{(Pixel\ Value - 1535)}{1024} \right\}$$

## 5.10 • Dark Noise

AeroDR SYSTEM is designed so that the noise when unexposed is less than a predetermined value. The noise test when unexposed is described in this section.



60 seconds after taking a Phantom image of 3.0 mR, take an unexposed image (image without exposure). Then, after more than 60 seconds, the unexposed image is obtained to calculate the electrical noise (conversion charge amount) from the standard deviate of the unexposed image.

## 5.11 • List of Test Items/Evaluation Method for AeroDR SYSTEM

### ● Basic Quality Control

Characteristics		Quantity of Interest
Limiting Resolution		The edge method MTF using the tungsten edge of the QC Phantom MTF: @1 cycle/mm $\geq 0.47$
Low Contrast Resolution		Correlation coefficient between the standard deviation of conversion dose and theoretical dose after transmitting the 3 Phantom image step edges of 3.0 mR. The correlation coefficient obtained between the value of the log of the conversion dose (after transmitting 5 step edges of the Phantom image of 3.0 mR) and the log of the standard deviation of the pixel value. (The R2 value is determined using 3 edges from 0.0, 1.0 and 2.0mm.) Correlation coefficient $\geq 0.95$
Linearity		Correlation coefficient between the theoretical dose of conversion dose and theoretical dose after transmitting the 3 Phantom image step edges of 3.0 mR. The correlation coefficient obtained between the pixel value after transmitting 5 step edges of the Phantom image of 3.0 mR and the pixel conversion value of the theoretical dose. (The R2 value is determined using 3 edges from 0.0, 1.0 and 2.0 mm.) Correlation coefficient $\geq 0.95$
Resolution Uniformity		Max. error at MTF of 1 cycle/mm calculated from the 3 copper discs. Error $\leq 30\%$
Bad Pixel		When a solid image is taken with 3.0 mR and the difference between the each pixel value and average value of the ROI (for example, periphery is 5x5) is 20 times or more of the standard deviation $\sigma$ , it is defined as Bad Pixel.
Image Uniformity	Uniformity	global (3.0 mR) : GSNU calculated by dividing the difference between the maximum and minimum values of the ROI average signal values by the mean value should be 30% or less. local (3.0 mR) : The maximum value (LSNU) calculated by dividing the difference between the ROI average signal value and the contiguous ROI average signal value by the ROI mean value should be 30% or less.
	SNR Uniformity	SNR distribution: 40% or less (Gain calibration dose, without filter, ROI90x90)
Exposure Indicator		The average signal value of the solid image of 3.0 mR should be within the theoretical value $\pm 20\%$ .
Lag		The afterimage component in the image obtained 60 seconds after taking the QC Phantom should be 0.02 mR or less. (It is the same as the product standard)
Dark Noise		RMS value $\leq$ Specified value

● Acceptance Test

Characteristics		Quantity of Interest
Limiting Resolution		The edge method MTF using the tungsten edge of the QC Phantom MTF: @1 cycle/mm $\geq 0.47$
Low Contrast Resolution		Correlation coefficient between the standard deviation of conversion dose and theoretical dose after transmitting the Phantom image step edges of 3.0, 5.6 and 10.0 mR. The correlation coefficient obtained between the log of conversion dose after transmitting the step edges of the Phantom images of 3.0, 5.6 and 10.0 mR, and the log of the standard deviate of the pixel value. Correlation coefficient $\geq 0.95$
Linearity		Correlation coefficient between the conversion dose and theoretical dose after transmitting the Phantom image step edges of 3.0, 5.6 and 10.0 mR. The correlation coefficient obtained between the pixel values after transmitting the step edges of the Phantom images of 3.0, 5.6 and 10.0 mR, and the pixel conversion values of the theoretical dose. Correlation coefficient $\geq 0.95$
Resolution Uniformity		Max. error at MTF of 1 cycle/mm calculated from the 3 copper discs. Error $\leq 30\%$
Bad Pixel		When a solid image is captured with 3.0 mR and the difference between the each pixel value and average value of the ROI (for example, periphery is 5x5) is 20 times or more of the standard deviation $\sigma$ , it is defined as Bad Pixel.
Image Uniformity	Uniformity	global (3.0 mR) : GSNU calculated by dividing the difference between the maximum and minimum values of the ROI average signal values by the mean value should be 30% or less. local (3.0 mR) : The maximum value (LSNU) calculated by dividing the difference between the ROI average signal value and the contiguous ROI average signal value by the ROI mean value should be 30% or less.
	SNR Uniformity	SNR distribution: 40% or less (Gain calibration dose, without filter, ROI90x90)
Exposure Indicator		The average signal value of the solid image of 3.0 mR should be within the theoretical value $\pm 20\%$ .
Lag		The afterimage component in the image obtained 60 seconds after taking the QC Phantom should be 0.02 mR or less. (It is the same as the product standard)
Dark Noise		RMS value $\leq$ Specified value

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# Chapter 6

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## Analytic Theory for CR SYSTEM

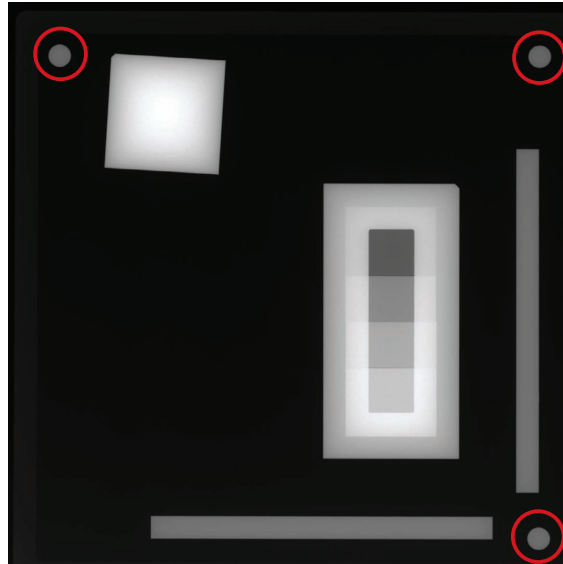
This chapter describes the analytic theory of the test items for the CR System.



- .....
- The QR value for the CR SYSTEM is 250.
- .....

## 6.1 • Spatial Accuracy

This is an index describing the geographical relations when reading the REGIUS Cassette on the REGIUS. It is important to know the magnification of the image displayed on the monitor after the image is read.



**Phantom Image**

Measure the distance from the circular parts allocated to the three corners of the Phantom in the main/sub-scan directions. Calculate the distance between the central coordinates in main/sub-scan direction from the central coordinate of each circular part  $(x_1, y_1)$ ,  $(x_2, y_2)$ ,  $(x_3, y_3)$ .

$$Interval\ Horizontal = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$Interval\ Vertical = \sqrt{(x_3 - x_2)^2 + (y_3 - y_2)^2}$$

Calculate the distance between the central coordinates using the reading resolution  $d$  [ $mm/pixel$ ] and the distance between the central coordinates obtained in the above.

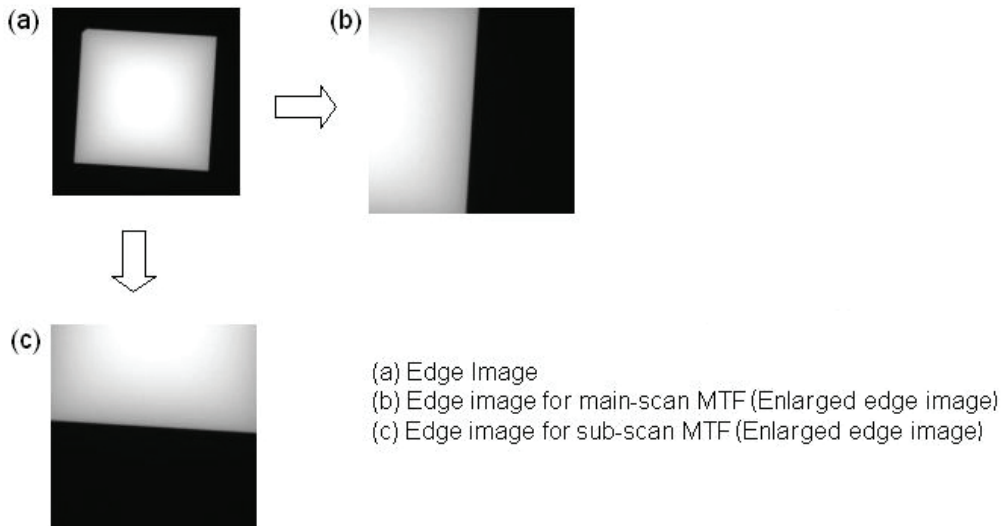
$Interval\ Horizontal \times d$  [ $mm$ ]

$Interval\ Vertical \times d$  [ $mm$ ]

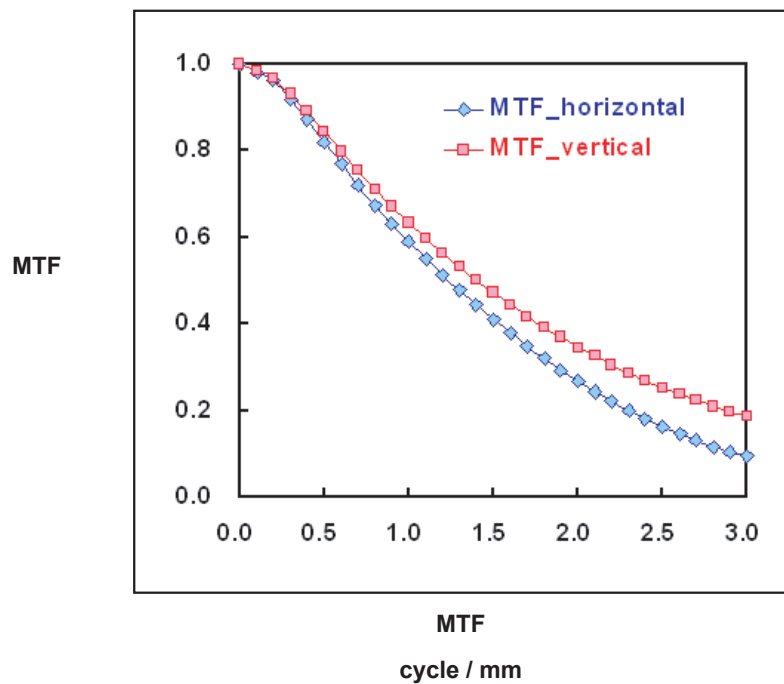


## 6.2 • Limiting Resolution

Various factors (shape of exposure field, scattered radiation, characteristics of X-ray tube, characteristics of CR system) may influence the sharpness of the CR image. The edge method (MTF) is available for measuring the spatial resolution of the CR system. However, this method is not measuring the maximum resolution power of the system but is only the means to allow comparison with existing characteristics of the device.

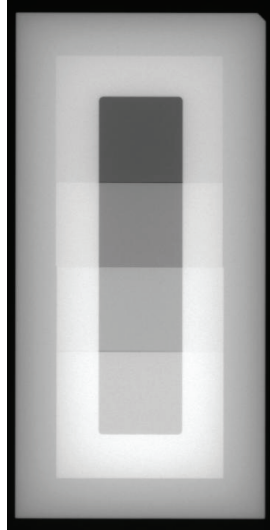


Calculate the MTF in main/sub-scan directions from the 5x5cm tungsten edge allocated on the Phantom at the angle of 3 degrees.(method complying with IEC Standard) Calculate ESF(Edge Spread Function) from the edge image of (b), (c). Then calculate LSF(Line Spread Function) from the derivative of ESF. Fourier transformation of the resulted LSF will produce MTF.



## 6.3 • Low Contrast Resolution

The low contrast resolution is essential for precise diagnosis. The noise of an image cannot be defined only by X-ray exposure but also influenced by MTF of the system noise in general. Evaluation of the noise is a key factor because it leads to deterioration of visibility of low contrast object or lesion.



**Metal Step Wedge**

Using the image obtained from the metal step wedge contained in the Phantom, measure the linearity between the transit dose and the noise value of each step.

Calculate the transit dose  $\log_{10}(mR)$  from the average Pixel Value of each step using the equation shown below.

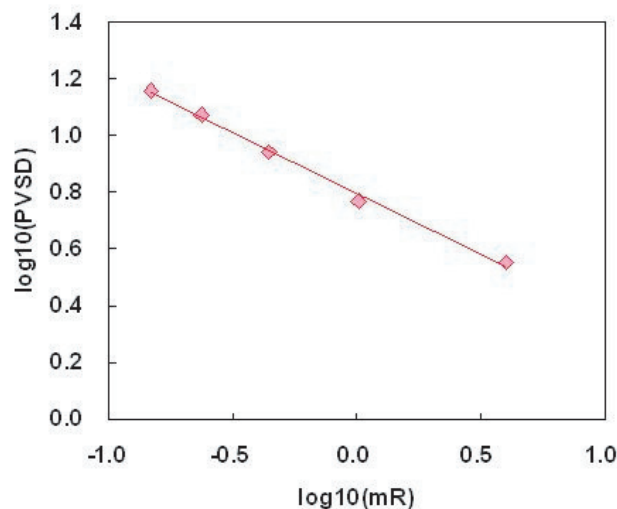
$$\log_{10}(mR) = \left\{ \frac{(Pixel\ Value - 1535)}{1024} \right\} - \log_{10}\left(\frac{QR}{200}\right)$$

In addition, calculate the standard deviation  $\log_{10}(PVSD)$  of the value of each step.

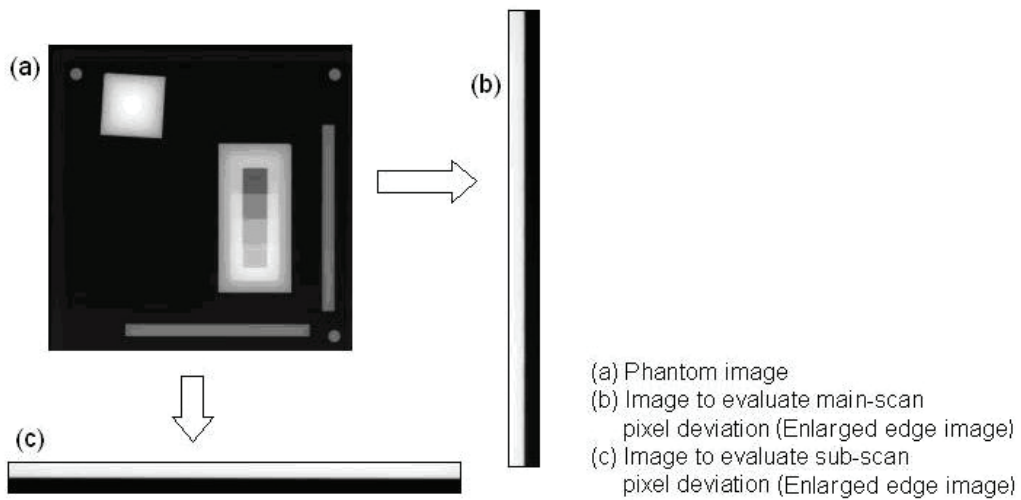
Calculating the linear least square fit from the transit dose  $\log_{10}(mR)$  and standard deviation  $\log_{10}(PVSD)$  obtained in the above will produce the correlation coefficient (CC).

( $\log_{10}(mR)$  vs  $\log_{10}(PVSD)$ ).

In addition, the standard deviation ( $PVSD_{1.0\ mR}$ ).when the X-ray of the dose 1.0 mR is exposed can be calculated from the linear least square fit obtained from the calculation.



## 6.4 • Laser Jitter



Measure the pixel deviation in main/sub-scan directions from the two long rectangular metal plates contained in the Phantom.

Precisely measure the edge lines on the edge images of the metal plates (b) & (c), and calculate the linear least square fit.

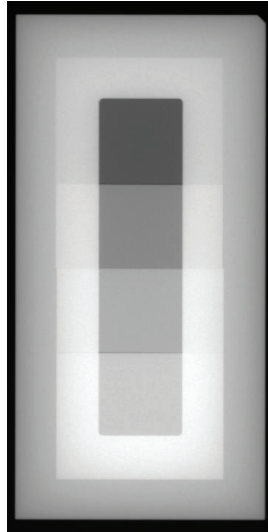
Calculate the error of the edge line from the linear least square fit as the theoretical value, and take the resulted value as the pixel deviation.

Calculate the maximum pixel deviation for each of main and sub-scan directions.

## 6.5 • Linearity

CR systems are calibrated so that they have a linear relation with the logarithm of X-ray dose. Linearity will be evaluated in this section.

- QC



**Metal Plate Step Wedge**

Measure the linearity between the theoretical transit dose and the dose indicated as CR system response by reading the step wedge value resulted from the metal step wedge plate affixed in the Phantom.

The relation between the dose and Pixel Value is in accordance with the following equation.

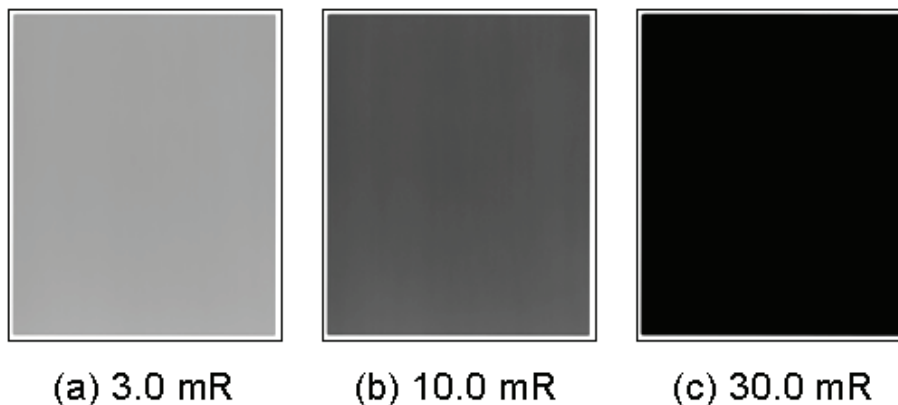
$$\text{Pixel Value} = 1024 * \left\{ \log_{10}(mR) + \log_{10}\left(\frac{QR}{200}\right) \right\} + 1535$$

Calculate the dose indicated as CR system response from the average Pixel Value of each step using the equation in the above.

Then calculate the linear least square fit ( $\log_{10}(\text{theoretical transit dose})$  vs  $\log_{10}(\text{indicated dose})$ ) from the theoretical transit dose and the calculated dose.

In theory, slope value = 1.0, correlation coefficient = 1.0 will be obtained.

● Acceptance Test



Use the uniform images that are exposed with the prescribed, three different exposure doses (3.0 mR, 10.0 mR, 30.0 mR).

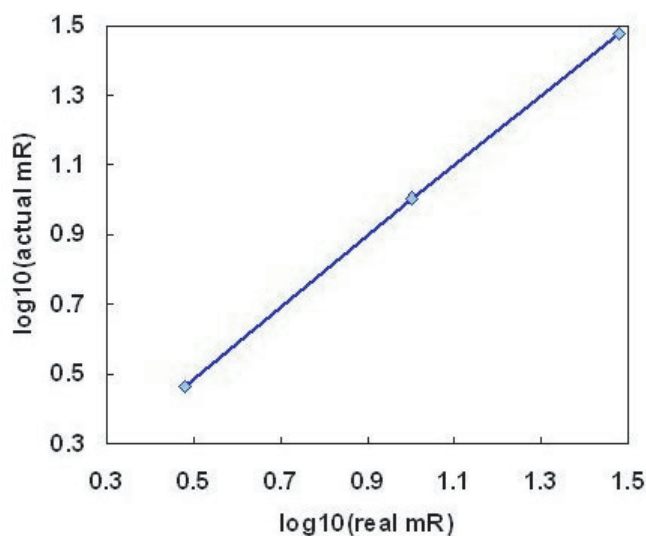
The dose and Pixel Value are in accordance with the equation shown below:

$$\text{Pixel Value} = 1024 * \left\{ \log_{10}(mR) + \log_{10}\left(\frac{QR}{200}\right) \right\} + 1535$$

Calculate the dose indicated as CR system response using the calculated average Pixel Value and QR value.

Calculate the linear least square fit ( $\log_{10}$  (theoretical dose) vs  $\log_{10}$  (indicated dose)) using the theoretical dose and the dose indicated as CR system response and obtain the slope value and correlation coefficient.

In theory, slope value = 1.0, correlation coefficient = 1.0 will be obtained.



## 6.6 • Detector Response

REGIUS have been calibrated to produce  $S = 200 / \text{exposure (mR)}$  for the dose delivered to the plate.



(b) 10.0 mR

"mR" should be measured from the average Pixel Value when the dose of 10.0 mR is delivered to the plate. The average Pixel Value calculated from the 80% center area of the image will be converted to "mR"

$$\log_{10}(mR) = \left\{ \frac{(\text{Pixel Value} - 1535)}{1024} \right\} - \log_{10}\left(\frac{QR}{200}\right)$$

## 6.7 • Uniformity

Uniformity test is implemented to secure the intensity of scanning laser for reading, and reading steps are consistent over the whole surface of the plate.



(b) 10.0 mR

Use the uniform image exposed with the exposure dose of 10.0 mR.  
Calculate the standard deviation of the Pixel Value in the 80% center area of the image.

---

## 6.8 • Erasure

---

Implement this procedure to ensure that the previously exposed image has been completely erased from the REGIUS Cassette and Plate so that it has no influence on the image exposed afterward.

After reading the plate on which Phantom image or uniform image was exposed, read the plate again without implementing X-ray exposure.

Calculate the standard deviation between the average Pixel Value and the Pixel Value obtained in the 80% center image by reading the erased plate.



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## 6.9 • Dark Noise

---

This test should be carried out if the test item "Erasure" resulted in "FAIL".

Calculate the standard deviation between the average Pixel Value and the Pixel Value obtained in the 80% center image by reading the Dark Noise image.

## 6.10 • List of Test Items/Evaluation Method for CR System

### ● Basic Quality Control

Characteristics	Quantity of Interest	Acceptable RANGE
Spatial Accuracy	Error between the actually measured distance ( $d_{\text{measured}}$ ) in main/sub-scan directions and the criterion ( $d_0$ ).	$ d_{\text{measured}} - d_0  / d_0 < 2\%$
Limiting Resolution	MTF values ( $MTF_{\text{main}}$ , $MTF_{\text{sub}}$ ) at 90% of Nyquist frequency with standard resolution (175 [ $\mu\text{m}/\text{pixel}$ ]).	$0.1 < MTF_{\text{main}} < 0.6$ $0.1 < MTF_{\text{sub}} < 0.6$
Low Contrast Resolution	Error between the Correlation Coefficient ( $CC_0$ ) of the linear least square fit ( $\log_{10}(\text{PVSD})$ vs $\log_{10}(E_{\text{measured}})$ ) calculated from actually measured transit dose ( $E_{\text{measured}}$ ) and the standard deviation of the pixel value (PVSD) obtained for each step of the metal step wedge plate and the criterion.	$CC_{\text{measured}} / CC_0 = 1 \pm 10\%$
Laser Jitter	Maximum pixel deviation in main/sub-scan direction ( $J_{\text{main}}$ [pixel], $J_{\text{sub}}$ [pixel])	$J_{\text{main}} < 1.0$ $J_{\text{sub}} < 1.0$
Linearity	Error between the Correlation Coefficient ( $CC_{\text{measured}}$ ) of the $\text{Slope}_{\text{measured}}$ obtained from the linear least square fit ( $\log_{10}(E_{\text{real}})$ vs $\log_{10}(E_{\text{measured}})$ ) calculated from actually measured transit dose ( $E_{\text{measured}}$ ) and the theoretical transit dose and the criterion ( $\text{Slope}_0$ , $CC_0$ ).	$\text{Slope}_{\text{measured}} / \text{Slope}_0 = 1 \pm 10\%$ $CC_{\text{measured}} / CC_0 = 1 \pm 10\%$
Detector Response	Converting the average Pixel Value in 80% center image area into the dose ( $E_{\text{measured}}$ ) indicated as CR system response when exposed at the same dose as in the 1st Simple Check QC, obtain the error between the exposed dose and the criteria ( $E_0$ ).	$E_{\text{measured}}/E_0 = 1 \pm 10\%$
Uniformity	Error between the standard deviation of pixel value ( $\text{PVSD}_{\text{measured}}$ ) in 80% center image area and the criterion ( $\text{PVSD}_0$ ).	$\text{PVSD}_{\text{measured}} / \text{PVSD}_0 = 1 \pm 10\%$
Erasure	The average of pixel value ( $\text{PV}_{\text{average}}$ ) and the standard deviation of pixel value (PVSD) in 80% center image area.	$\text{PV}_{\text{average}} < 10.0$ $\text{PVSD} < 1.0$
Dark Noise	The average of pixel value ( $\text{PV}_{\text{average}}$ ) and the standard deviation of pixel value (PVSD) in 80% center image area.	$\text{PV}_{\text{average}} < 10.0$ $\text{PVSD} < 1.0$

## ● Acceptance Test

Characteristics	Quantity of Interest	Acceptable RANGE
Spatial Accuracy	Error between the actually measured distance ( $d_{\text{measured}}$ ) in main/sub-scan directions and the theoretical distance ( $d_0$ ).	$ d_{\text{measured}} - d_0  / d_0 < 2\%$
Limiting Resolution	MTF values ( $MTF_{\text{main}}$ , $MTF_{\text{sub}}$ ) at 90% of Nyquist frequency with standard resolution (175 [ $\mu\text{m}/\text{pixel}$ ]).	$0.1 < MTF_{\text{main}} < 0.6$ $0.1 < MTF_{\text{sub}} < 0.6$
Low Contrast Resolution	Correlation coefficient (CC) between the linear least square fit ( $\log_{10}(\text{PVSD})$ vs $\log_{10}(E_{\text{measured}})$ ) calculated from actually measured transit dose ( $E_{\text{measured}}$ ) and the standard deviation of the pixel value (PVSD) obtained for each step of the metal step wedge plate.	$CC > 0.95$
Laser Jitter	Maximum pixel deviation in main/sub-scan direction ( $J_{\text{main}}$ [pixel], $J_{\text{sub}}$ [pixel])	$J_{\text{main}} < 1.0$ $J_{\text{sub}} < 1.0$
Linearity	Converting the average Pixel Value the dose ( $E_{\text{measured}}$ ) indicated as CR system response when exposure is made with three different exposure doses ( $E_{\text{real}}$ : 3.0 mR, 10.0 mR, 30.0 mR), obtain the slope of the linear least square fit ( $\log_{10}(E_{\text{real}})$ vs. $\log_{10}(E_{\text{measured}})$ ) and correlation coefficient(CC).	Slope = $1 \pm 10\%$ $CC > 0.95$
Detector Response	Converting the average Pixel Value in 80% center image area to obtain linear least square fit ( $E_{\text{measured}}$ ) when exposed at 10.0 mR ( $E_{\text{real}}$ ), obtain the proportion ( $E_{\text{measured}}/E_{\text{real}}$ ) between the exposed dose and indicated dose.	$E_{\text{measured}}/E_{\text{real}} = 1 \pm 10\%$
Uniformity	Standard deviation of pixel value (PVSD) in 80% center image area.	$PVSD < 30.0$
Erasure	The average of pixel value ( $PV_{\text{average}}$ ) and the standard deviation of pixel value (PVSD) in 80% center image area.	$PV_{\text{average}} < 10.0$ $PVSD < 1.0$
Dark Noise	The average of pixel value ( $PV_{\text{average}}$ ) and the standard deviation of pixel value (PVSD) in 80% center image area. The average of pixel value ( $PV_{\text{average}}$ ) and the standard deviation of pixel value (PVSD) in 80% center image area.	$PV_{\text{average}} < 10.0$ $PVSD < 1.0$

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# Chapter 7

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## Description of Screens

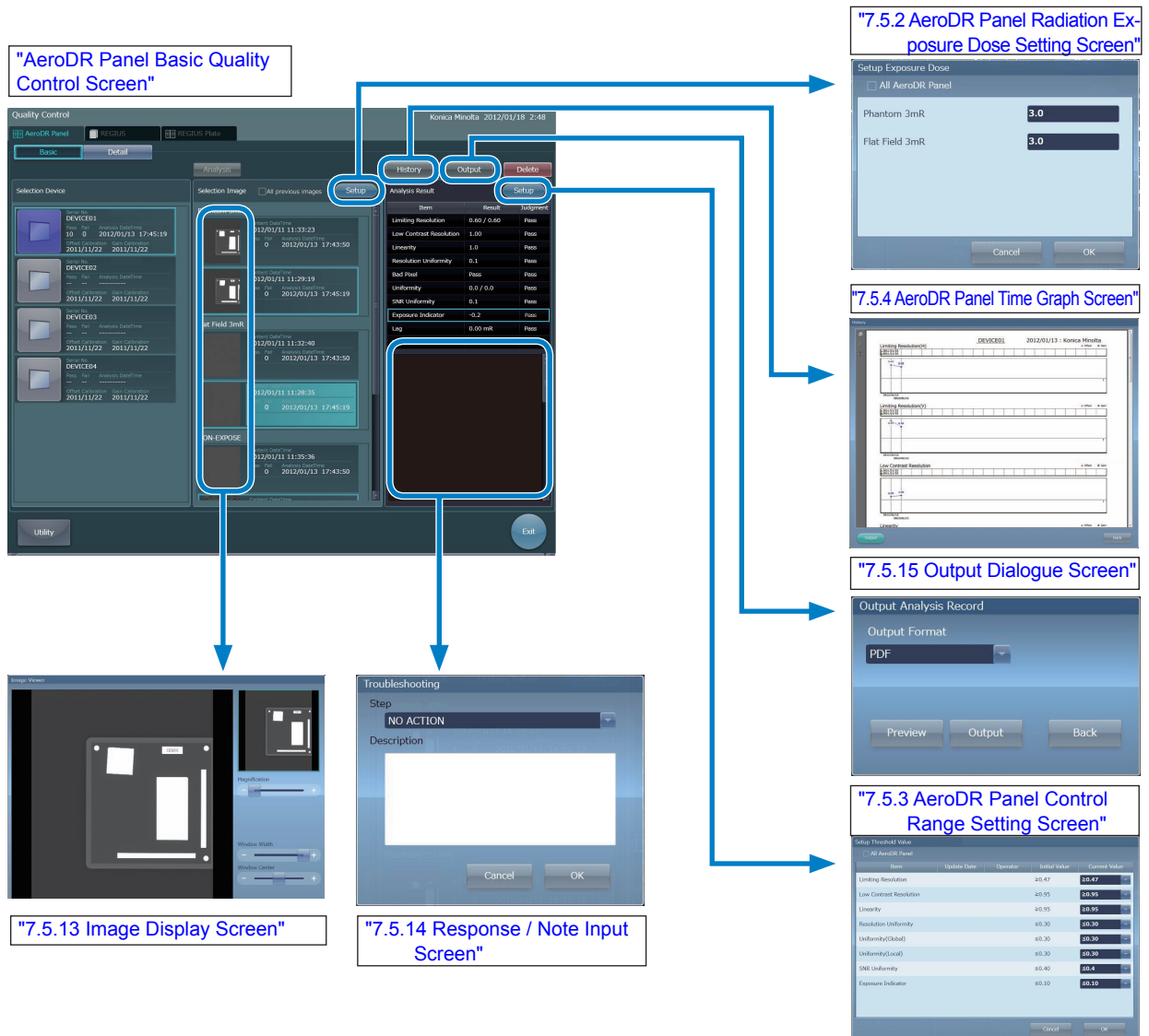
This chapter describes the screen structure of this software, and the function of each button on the screen, etc.

## 7.1 • Screen Flow-1



The [Acceptance Test] button may not be displayed depending on settings made by service engineers.

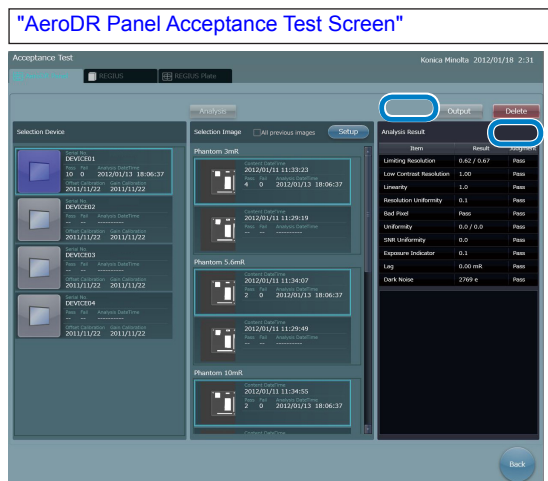
## 7.2 • Screen Flow-2



The Screen Flow of the AeroDR Panel Detail Quality Control screen and AeroDR Panel Acceptance Test screen is almost the same as that of the REGIUS Basic Quality Control screen, but the following buttons are different.

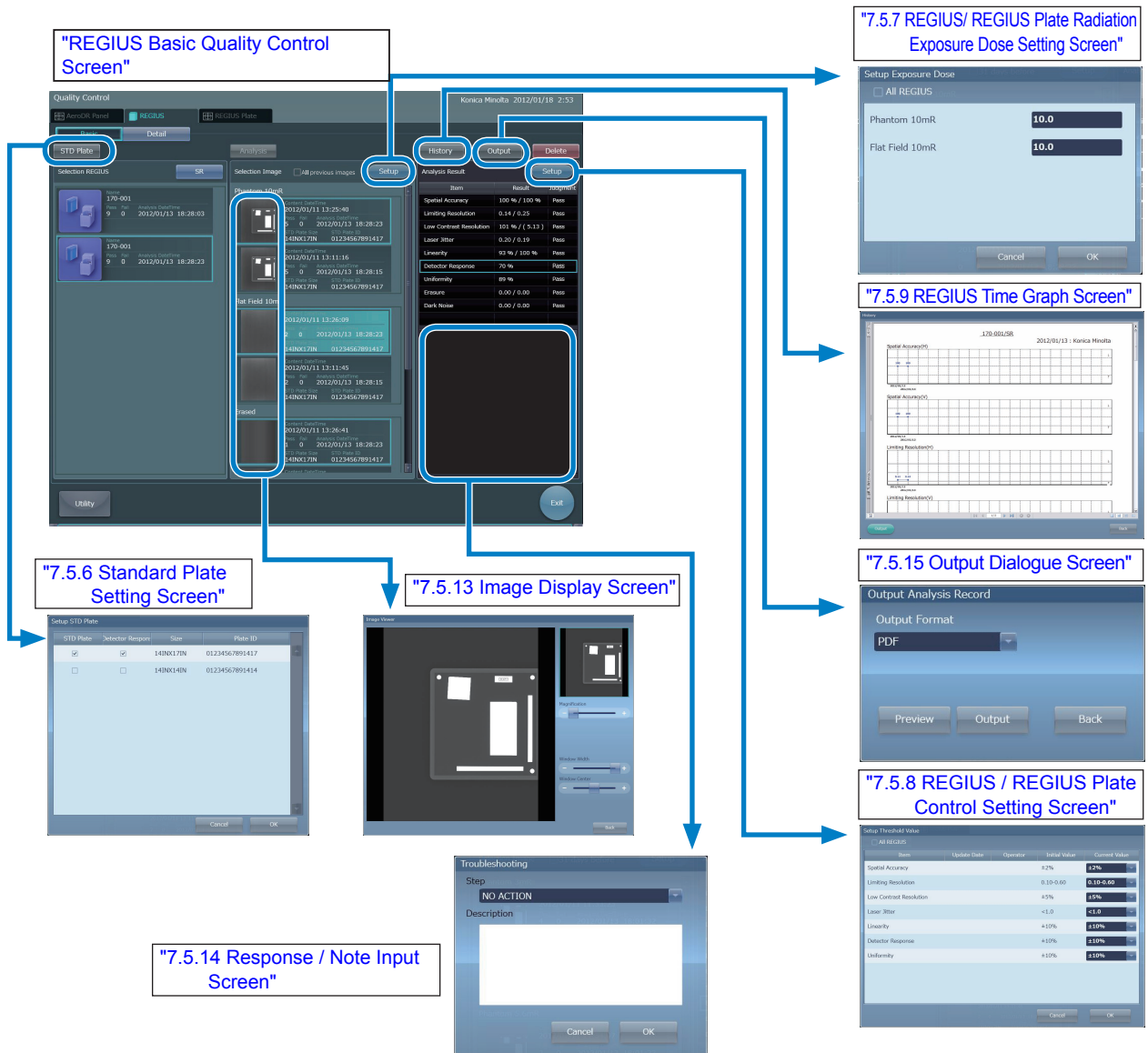


The Analysis Result [Setup] button is not provided.



The [History] button and Analysis Result [Setup] button are not provided.

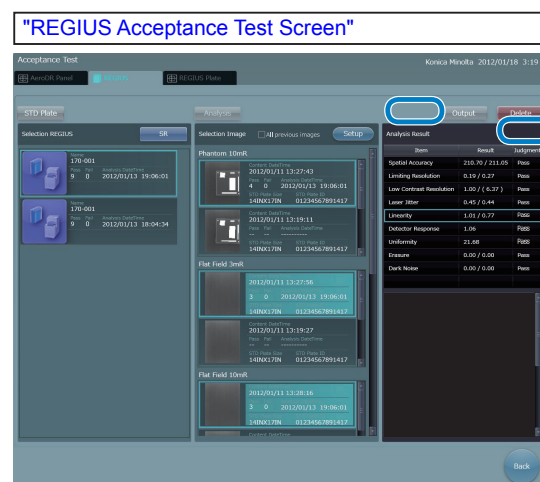
## 7.3 • Screen Flow-3



The Screen Flow of the REGIUS Detail Quality Control screen and REGIUS Acceptance Test screen is almost the same as that of the REGIUS Basic Quality Control screen, but the following buttons are different.



The Analysis Result [Setup] button is not provided.

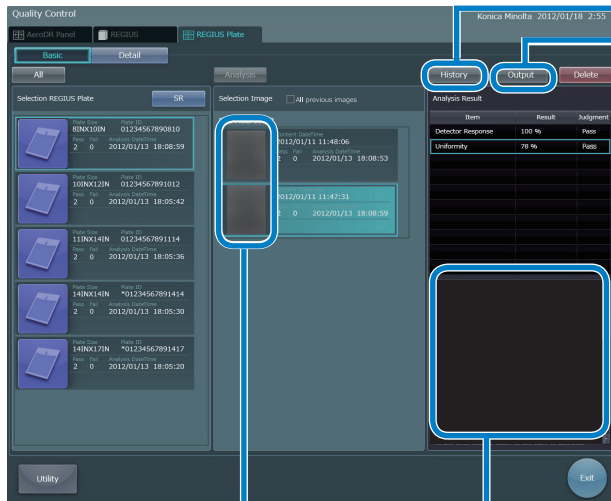


The [History] button and Analysis Result [Setup] button are not provided.

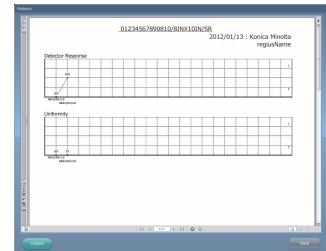


## 7.4 • Screen Flow-4

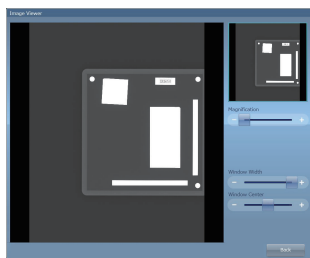
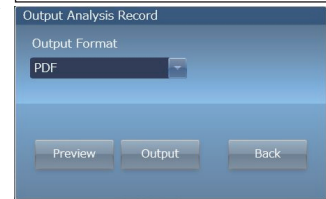
"REGIUS Plate Basic Quality Control Screen"



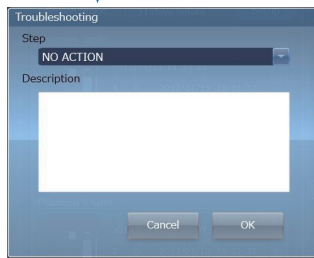
"7.5.11 REGIUS Plate Time Graph Screen"



"7.5.15 Output Dialogue Screen"

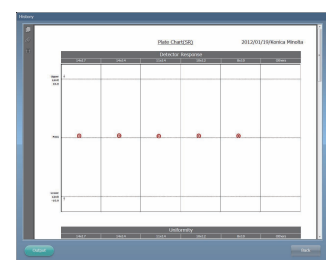


"7.5.13 Image Display Screen"



"7.5.14 Response / Note Input Screen"

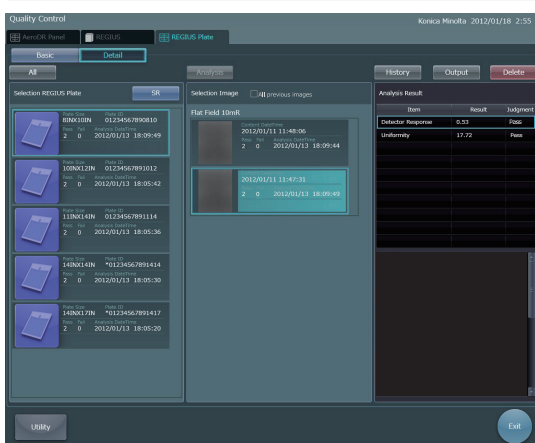
"7.5.12 REGIUS Plate Plate Chart Screen"



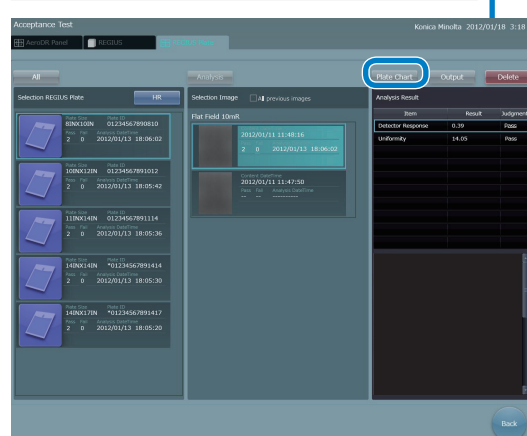
The REGIUS Plate Detail Quality Control screen is the same as the REGIUS Plate Basic Quality Control screen.

The Screen Flow of the REGIUS Plate Acceptance Test screen is almost the same as that of the REGIUS Plate Basic Quality Control screen, but the following button is different.

"REGIUS Plate Detail Quality Control Screen"



"REGIUS Plate Acceptance Test Screen"



The [History] button is not provided but the [Plate Chart] button is provided.

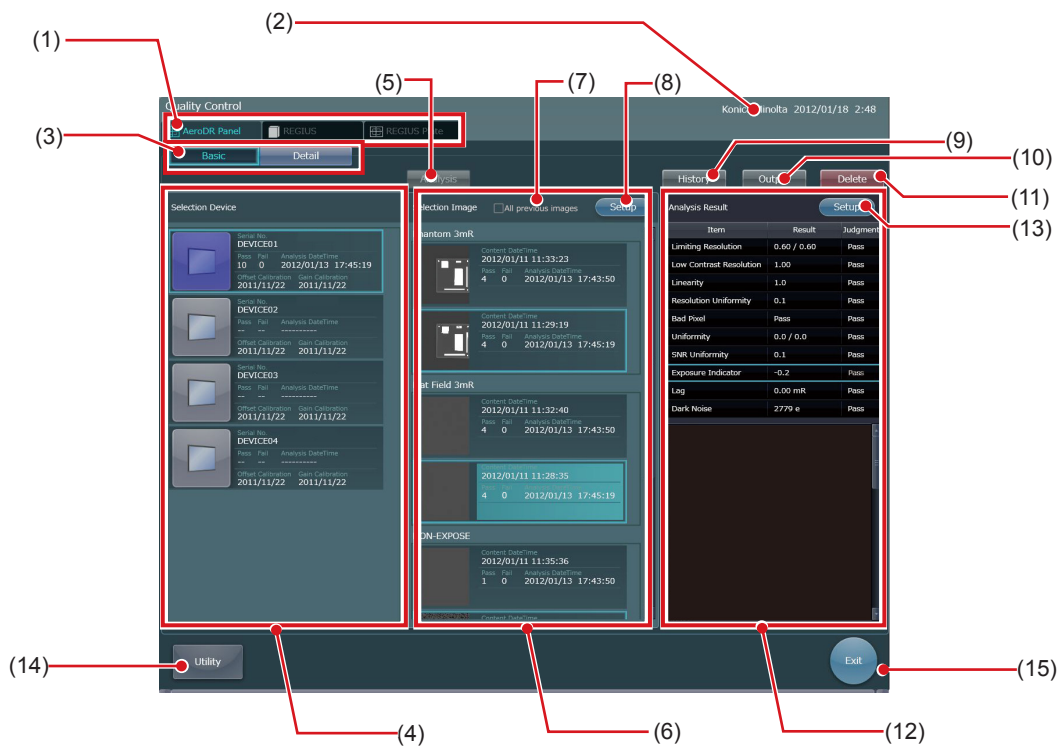
## 7.5 • Screen Details



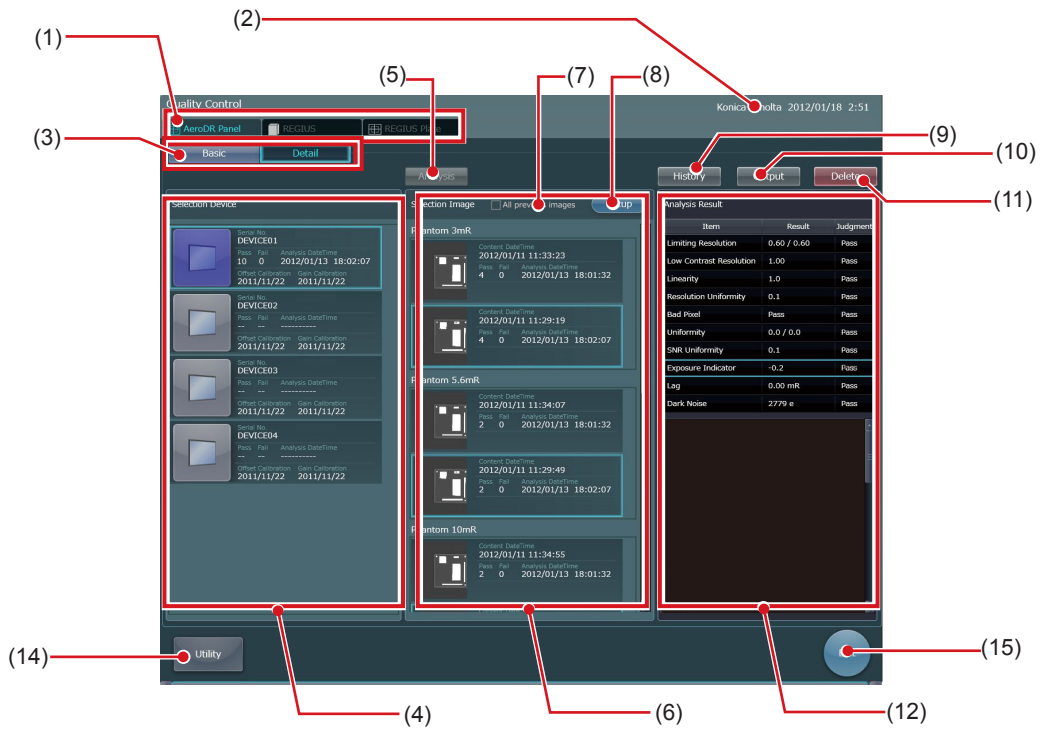
- To use this function, the image(s) to be carried out QC judgment or an acceptance test, such as Phantom Image or Flat Field Image, needs to be read into Simple Check QC.

### 7.5.1 AeroDR Panel Basic Quality Control/Detail Quality Control/Acceptance Test Screen

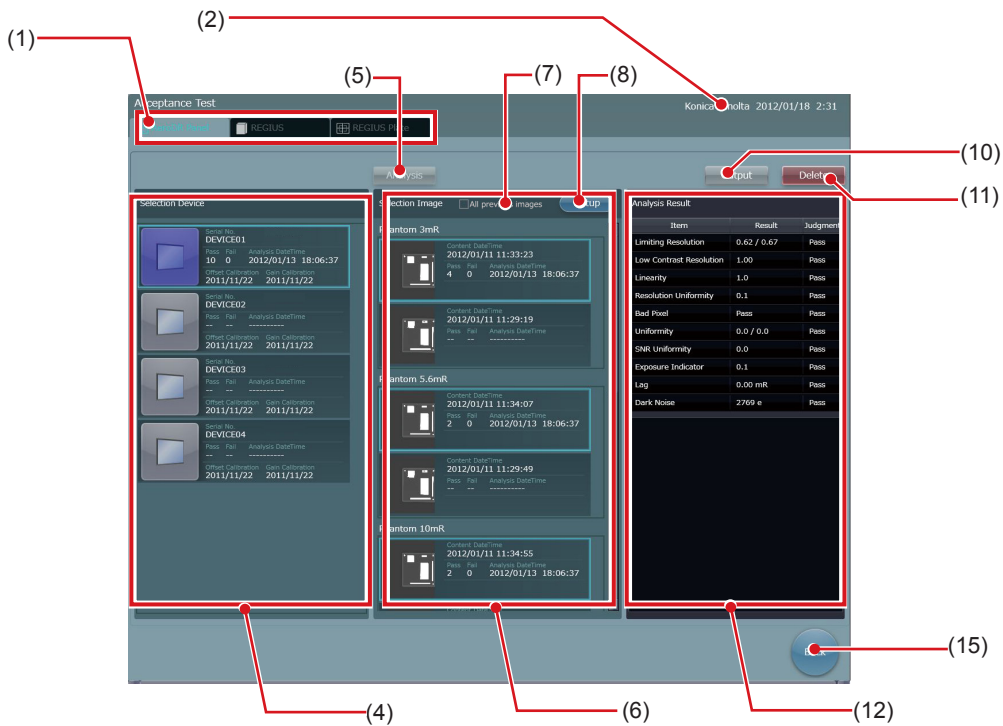
#### AeroDR Panel Basic Quality Control Screen































### AeroDR Panel Detail Quality Control Screen

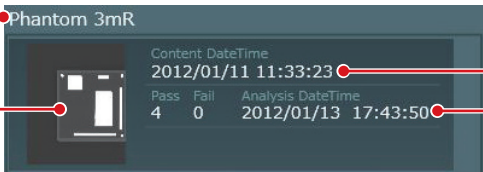


### AeroDR Panel Acceptance Test Screen




## 7.5 Screen Details

	Screen	Description																		
(1)	Selection Device tabs	Selects a device. Only connected devices are displayed. If both AeroDR SYSTEM and REGIUS are connected, you can switch screens.																		
(2)	Operator, date and time	Displays the name of the operator and the current date and time.																		
(3)	[Basic] and [Detail] radio buttons	<b>&lt;Only on the AeroDR Panel Basic Quality Control and AeroDR Panel Detail Quality Control screens&gt;</b> You can switch the AeroDR Panel Basic Quality Control screen and AeroDR Panel Detail Quality Control screen.																		
(4)	Selection Device area	<p>Displays all AeroDR Detectors in your facility. Select an AeroDR Detector that you wish to test. When an AeroDR Detector is selected, the latest image taken within the effective image days of the AeroDR Detector is extracted and the most recent analysis date and time and the date and time that the image was taken is compared.</p> <p>Images to be extracted vary according to the analysis methods.</p> <ul style="list-style-type: none"> <li>When the <b>AeroDR Panel Basic Quality Control</b> screen is displayed: QC Phantom (3.0 mR) Image, Flat Field (3.0 mR) Image, Dark Noise Image, Unexposed Image</li> <li>When the <b>AeroDR Panel Detail Quality Control</b> or <b>AeroDR Panel Acceptance Test</b> screen is displayed: QC Phantom (3.0 mR) Image, QC Phantom (5.6 mR) Image, QC Phantom (10.0 mR) Image, Flat Field (3.0 mR) Image, Dark Noise Image, Unexposed Image</li> </ul> <p>The following are displayed depending on the results of comparison.</p> <ul style="list-style-type: none"> <li><b>If all images were captured at new dates and times</b> The images are selected and automatically tested, and the results of those tests are displayed.</li> <li><b>If all images were captured at old dates and times</b> The images used for tests on the last test date are selected and the results of those tests are displayed.</li> <li><b>If some of the images were captured at new dates and times</b> The images are not selected and test data is not displayed.</li> </ul> <p>AeroDR Detector information is displayed in the detector key.</p> <div style="text-align: center;">  </div> <p>a) Colored icons indicate the statuses described below.</p> <p><b>On the AeroDR Panel Basic Quality Control or AeroDR Panel Detail Quality Control screen</b></p> <table border="1" data-bbox="523 1276 1396 1563"> <thead> <tr> <th></th> <th>Within quality control interval</th> <th>Beyond quality control interval</th> </tr> </thead> <tbody> <tr> <td>If quality control was not implemented</td> <td></td> <td></td> </tr> <tr> <td>If all test items of the last quality control test "passed"</td> <td></td> <td></td> </tr> <tr> <td>If any of the test items of the last quality control test "failed"</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>On the AeroDR Panel Acceptance Test screen</b></p> <table border="1" data-bbox="523 1624 1184 1850"> <tbody> <tr> <td>If an acceptance test was not performed</td> <td></td> </tr> <tr> <td>If all test items of the last acceptance test "passed"</td> <td></td> </tr> <tr> <td>If any of the test items of the last acceptance test "failed"</td> <td></td> </tr> </tbody> </table>		Within quality control interval	Beyond quality control interval	If quality control was not implemented			If all test items of the last quality control test "passed"			If any of the test items of the last quality control test "failed"			If an acceptance test was not performed		If all test items of the last acceptance test "passed"		If any of the test items of the last acceptance test "failed"	
	Within quality control interval	Beyond quality control interval																		
If quality control was not implemented																				
If all test items of the last quality control test "passed"																				
If any of the test items of the last quality control test "failed"																				
If an acceptance test was not performed																				
If all test items of the last acceptance test "passed"																				
If any of the test items of the last acceptance test "failed"																				

	Screen	Description
		b) AeroDR Detector serial No. and name of lab room c) Status and analysis date and time Information on the last test results is displayed on the respective screens. For the Status, the numbers of "Passed" items and "Failed" items for the analysis judgement are displayed. The number of "Error" items are included in that of "Failed" items. If testing was not performed even once, "-- --" is displayed. d) Last date the device was calibrated and date of gain calibration
(5)	[Analysis] button	When a device to be tested is selected, the result for the last image is displayed automatically. You can select an image for analysis. Click this button to start image analyses of the images selected in the Selection Image area and the results are displayed. If an image that was not analyzed within the effective image days set in the system is selected, an analysis starts. If an analyzed image is selected, analysis will not be performed.
(6)	Selection Image area	The list of quality control exposure condition keys of the AeroDR Detector selected in the Selection Device area are categorized and displayed by the following quality control exposure conditions. <ul style="list-style-type: none"> <li>• When the <b>AeroDR Panel Basic Quality Control</b> screen is displayed: QC Phantom (3.0 mR) Image, Flat Field (3.0 mR) Image, Dark Noise Image, Unexposed Image</li> <li>• When the <b>AeroDR Panel Detail Quality Control</b> or <b>AeroDR Panel Acceptance Test</b> screen is displayed: QC Phantom (3.0 mR) Image, QC Phantom (5.6 mR) Image, QC Phantom (10.0 mR) Image, Flat Field (3.0 mR) Image, Dark Noise Image, Unexposed Image</li> </ul> Select an image that you wish to test. If an image that was already analyzed is selected, all of the images used in those analyses are selected. Unanalyzed images beyond the effective image days set in the system are not displayed. To determine whether analyzed images are within the effective image days or not, the oldest image among all analyzed images is used as the criteria. To cancel the selection, press the Ctrl key and while holding it pressed down click the selected image.  Information on analyzed images is displayed in the quality control exposure condition key. <div style="text-align: center;">  </div> a) Quality control exposure condition b) Thumbnail of the analyzed images Click an image within the effective image days to display the Image display screen. (Refer to "7.5.13 Image Display Screen".) c) Exposure date and time d) Status and analysis date and time Analysis information is displayed on the respective screens. For the Status, the numbers of "Passed" items and "Failed" items for the analysis judgement are displayed. The number of "Error" items are included in that of "Failed" items. If testing was not performed even once, "-- --" is displayed.
(7)	Selection Image [All previous images] checkbox	When the box is un-checked, only analyzed images whose exposure date, dating back from the present date, is within the effective image days set in the system are displayed. When a checkmark is placed in the checkbox, all analyzed images are displayed.
(8)	Selection Image [Setup] button	Displays the AeroDR Detector radiation exposure dose setting screen. Set the exposure dose for capturing images for the AeroDR Panel Basic Quality Control, Detail Quality Control and Acceptance Test. (Refer to "7.5.2 AeroDR Panel Radiation Exposure Dose Setting Screen".) Only administrators or service engineers with authority can change the setting.

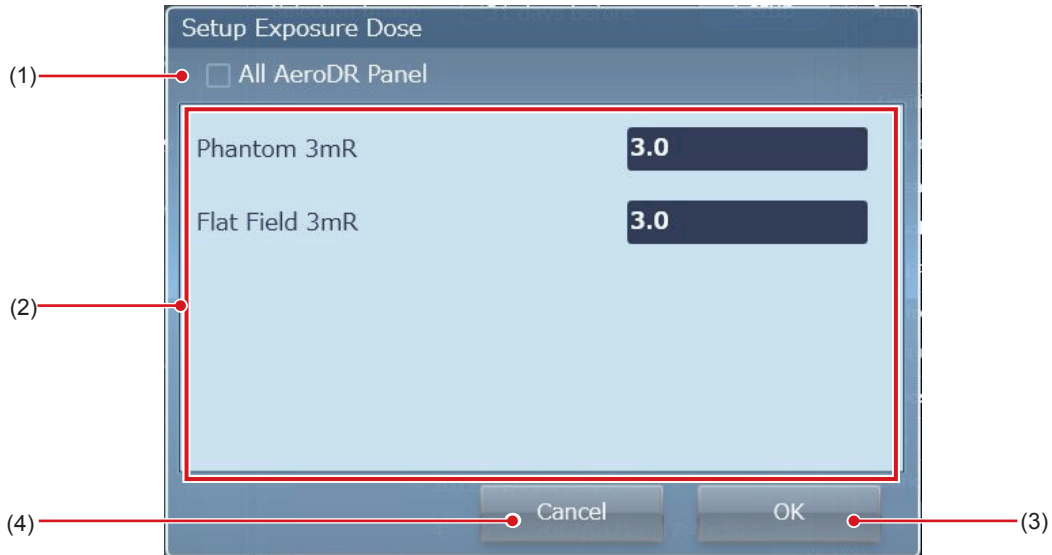
## 7.5 Screen Details

	Screen	Description
(9)	[History] button	<p><b>&lt;Only on the AeroDR Panel Basic Quality Control and AeroDR Panel Detail Quality Control screens&gt;</b>            Displays the AeroDR Panel Time Graph screen. Click to select an AeroDR Panel and check Analysis Results for the selected AeroDR Detector on a Time Graph. (Refer to "<a href="#">7.5.4 AeroDR Panel Time Graph Screen</a>".)</p>
(10)	[Output] button	<p>Displays the output dialog box where Analysis Results and judgments can be output as a pdf file or CSV file. (Refer to "<a href="#">7.5.15 Output Dialogue Screen</a>".)</p>
(11)	[Delete] button	<p>Deletes the displayed Analysis Results. Results are deleted when the [OK] button is clicked on the displayed delete dialog box.</p>
(12)	Analysis Result display area	<p>Analysis results (calculation value) and judgments (Pass/Fail/Error) are displayed for each analysis item.            [Pass]: Indicates that the calculation result is within the standard value range.            [Fail]: Indicates that the calculation result is outside of the standard value range.            [Error]: Indicates that an error occurred while calculating.</p> <p> <b>IMPORTANT</b> .....</p> <ul style="list-style-type: none"> <li>• <b>An error occurs if the image is incorrectly matched to the exposure condition key. Because calculations are not done for analysis items where errors occur, "-----" is displayed for the analysis result.</b></li> </ul> <p>.....</p> <p>When an analysis item is selected, the image used to calculate the analysis result becomes highlighted.            If an analysis item with a "FAIL" analysis result is selected, the corresponding troubleshooting procedure, response status and a note are displayed. Clicking on the troubleshooting area displays a screen for inputting the response status and a note. (Refer to "<a href="#">7.5.14 Response / Note Input Screen</a>".)</p>
(13)	Analysis Result [Setup] button	<p><b>&lt;Only on the AeroDR Panel Basic Quality Control screen&gt;</b>            Displays the AeroDR Panel Control Range setting screen. Set the control range used for quality control judgments of the AeroDR Detector. (Refer to "<a href="#">7.5.3 AeroDR Panel Control Range Setting Screen</a>".)            Only administrators or service engineers with authority can change the setting.</p>
(14)	[Utility] button	<p><b>&lt;Only on the AeroDR Panel Basic Quality Control and AeroDR Panel Detail Quality Control screens&gt;</b>            Displays the utility screen where maintenance features can be set. (Refer to "<a href="#">7.5.16 Utility Screen</a>".) The Acceptance Test screen appears by clicking on the [Acceptance Test] button on the utility screen.            Only administrators or service engineers with authority can change the setting.</p>
(15)	[Exit] button	<p><b>&lt;On the AeroDR Panel Basic Quality Control and AeroDR Panel Detail Quality Control screens&gt;</b>            Ends the simple check QC.</p>
	[Back] button	<p><b>&lt;On the AeroDR Panel Acceptance Test screen&gt;</b>            Returns to the utility screen.</p>

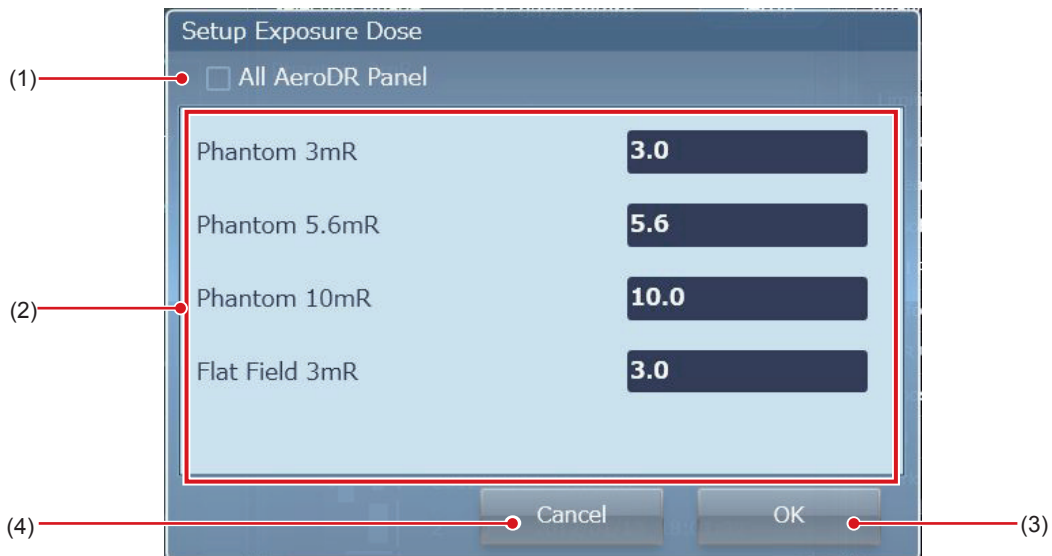
## 7.5.2 AeroDR Panel Radiation Exposure Dose Setting Screen

This is the screen to check type and status of regular replacement parts when the time for replacement comes.

### AeroDR Panel Basic Quality Control



### AeroDR Panel Detail Quality Control and Acceptance Test



	Screen	Description
(1)	[All AeroDR Panel] checkbox	Place a checkmark in the checkbox to apply the set radiation exposure doses to all AeroDR Detectors.
(2)	Radiation Exposure Dose setting areas	Input the radiation exposure dose for each image. The displayed image types differ according to the analysis method.
(3)	[OK] button	Saves settings and closes the AeroDR Detector radiation exposure dose setting screen. If a checkmark is placed in the [All AeroDR Panel] checkbox, the radiation exposure doses of all AeroDR Detectors are changed.
(4)	[Cancel] button	Closes the AeroDR Detector radiation exposure dose setting screen without saving settings.



### 7.5.3 AeroDR Panel Control Range Setting Screen

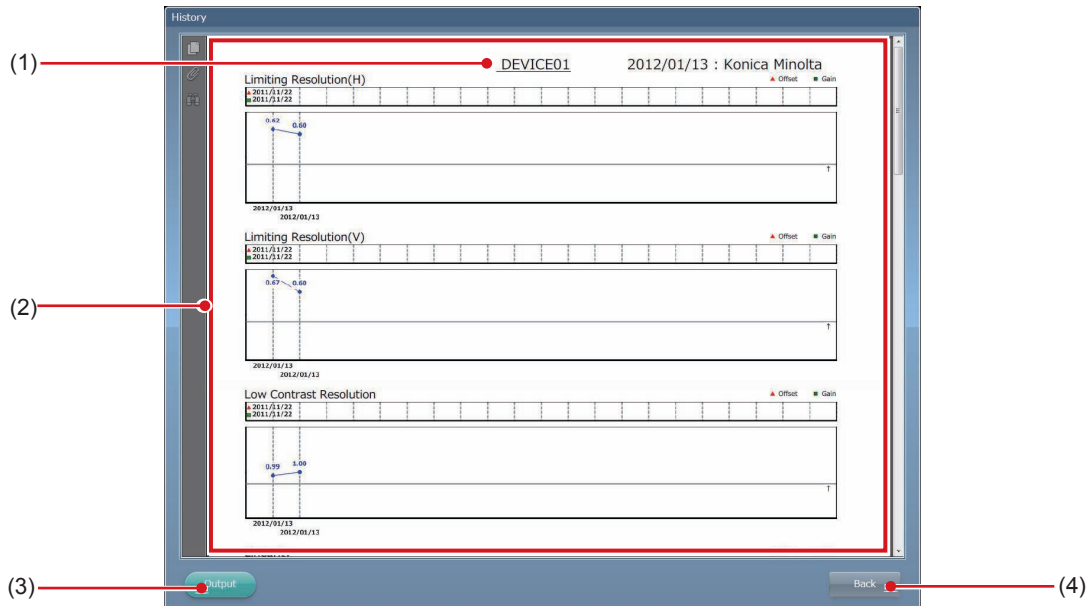
This is the screen to check type and status of regular replacement parts when the time for replacement comes.


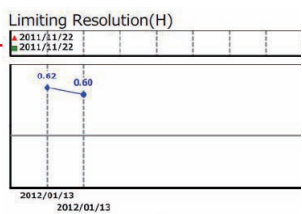


	Screen	Description
(1)	[All AeroDR Panel] checkbox	Place a checkmark in the checkbox to apply the set control ranges to all AeroDR Detectors.
(2)	Control range setting area	Select a setting for each analysis item from the Current Value sector to set the control range.
(3)	[OK] button	Saves settings and closes the AeroDR Panel Control Range Setting Screen. If a checkmark is placed in the [All AeroDR Panel] checkbox, the control ranges of all AeroDR Detectors are changed.
(4)	[Cancel] button	Closes the AeroDR Panel Control Range Setting Screen without saving settings.



## 7.5.4 AeroDR Panel Time Graph Screen

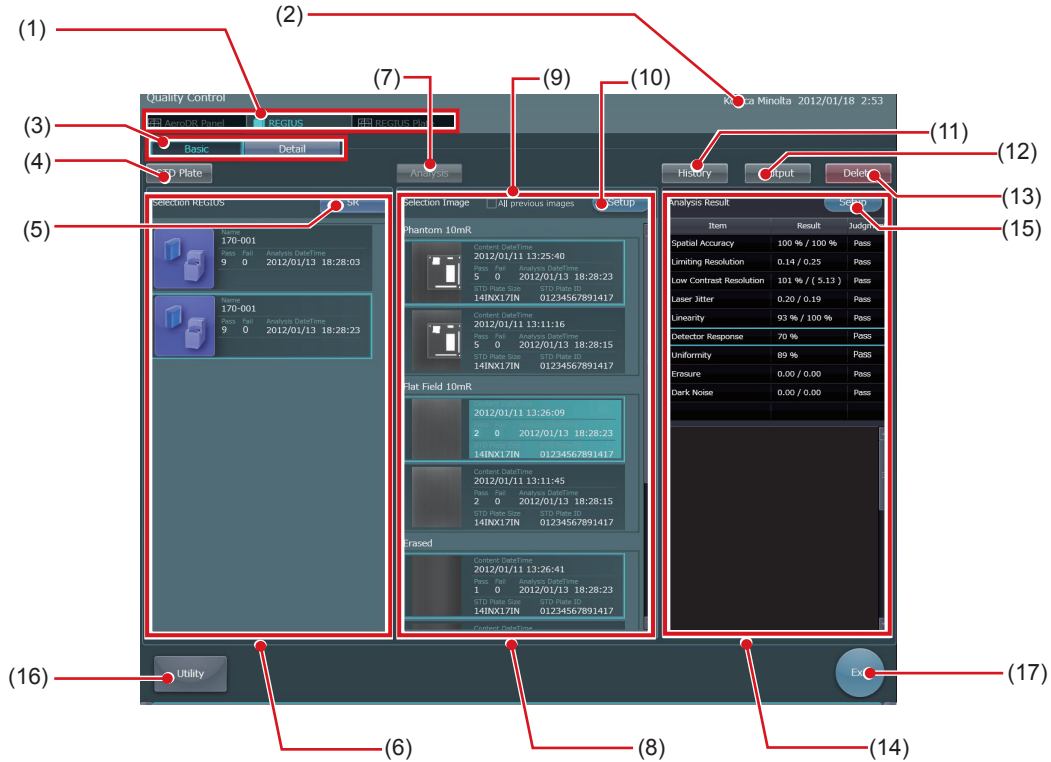


Screen	Description
(1) AeroDR Detector serial No.	Displays the serial No. of the AeroDR Detector selected on the screen where the [History] button was clicked.
(2) Time Graph	<p>Displays a time graph of the AeroDR Detector selected on the screen where the [History] button was clicked. The graph displays results from 10 past analyses centered on the date of the test data displayed on the AeroDR Panel Basic Quality Control Screen / AeroDR Panel Detail Quality Control Screen where the [History] button was clicked.</p> <p>Date calibrated </p> 
(3) [Output] button	Displays the output dialog box where the time graph can be output as a pdf file or CSV file. (Refer to "7.5.15 Output Dialogue Screen".)
(4) [Back] button	Closes the AeroDR Panel Time Graph Screen.

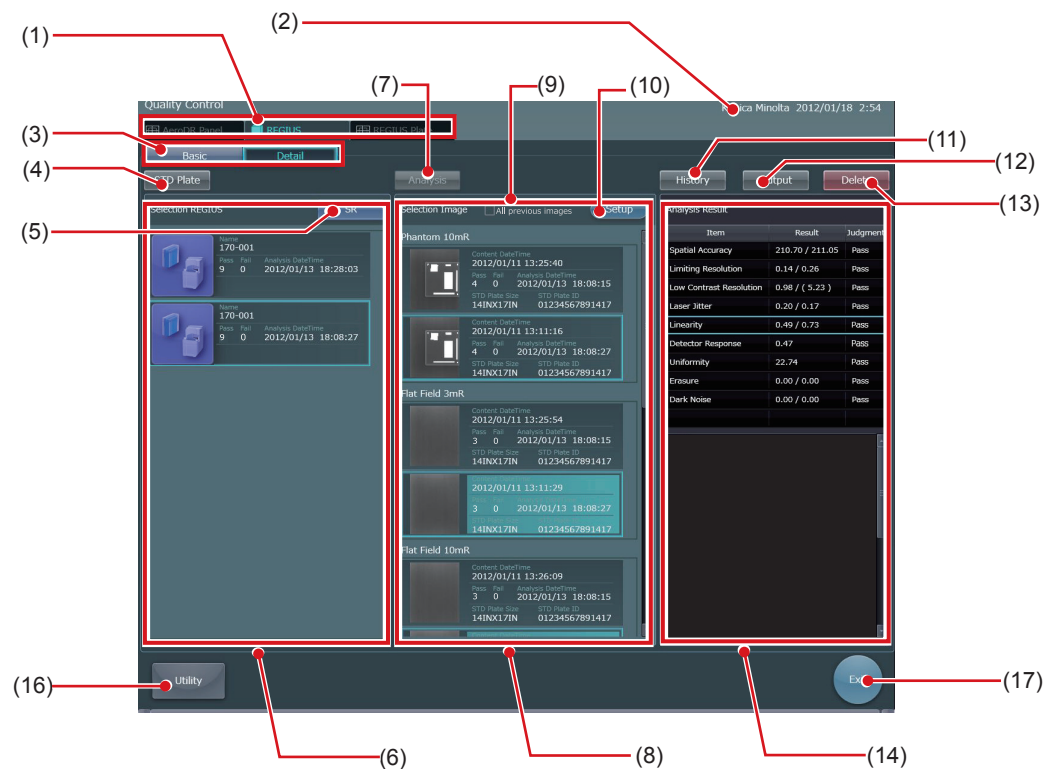
The display magnification can be changed by pressing [Ctrl] key on keyboard and scrolling wheel on mouse.

## 7.5.5 REGIUS Basic Quality Control, Detail Quality Control and Acceptance Test Screens

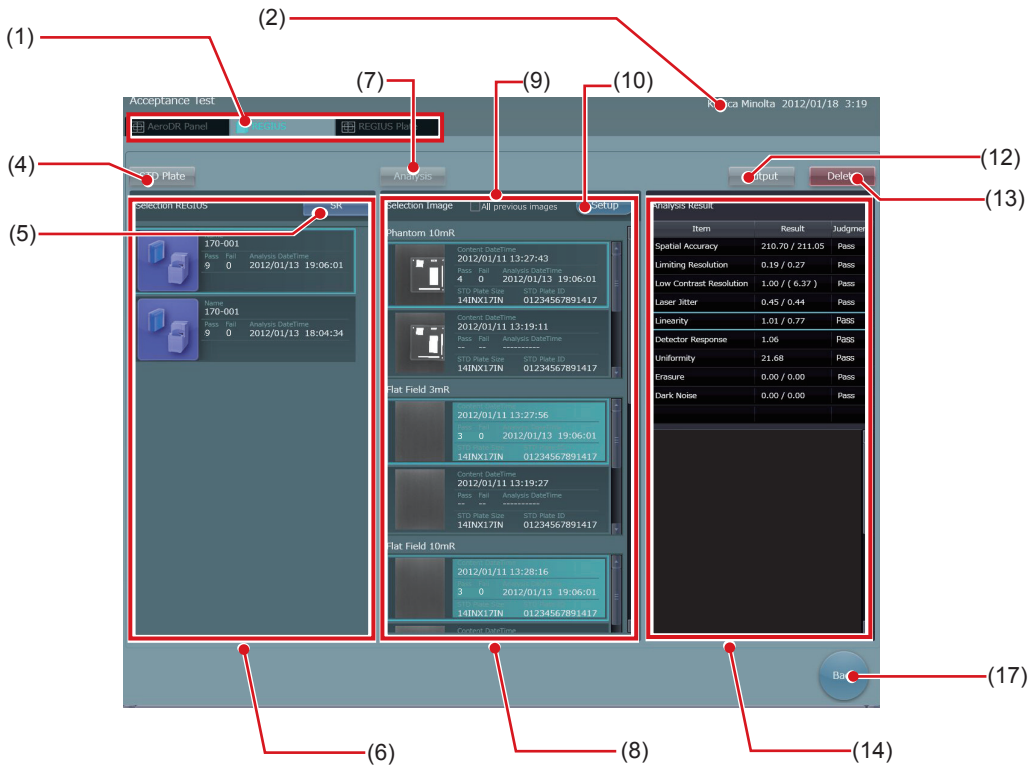
### REGIUS Basic Quality Control Screen



### REGIUS Detail Quality Control Screen































REGIUS Acceptance Test Screen



Screen	Description
(1) Selection Device tabs	Selects a device. Only connected devices are displayed. If both AeroDR SYSTEM and REGIUS are connected or only the REGIUS is connected, you can switch screens.
(2) Operator, date and time	Displays the name of the operator and the current date and time.
(3) [Basic] and [Detail] radio buttons	<b>&lt;Only on the REGIUS Basic Quality Control and REGIUS Detail Quality Control screens&gt;</b> You can switch the REGIUS Basic Quality Control and REGIUS Detail Quality Control screens.
(4) [STD Plate] button	Displays the Standard Plate Setup Screen. Sets the standard plate to be used for the Basic Quality Control, Detail Quality Control and Acceptance Test of the REGIUS. (Refer to " <a href="#">7.5.6 Standard Plate Setting Screen</a> ".)
(5) Read Resolution toggle	Switches the Read Resolution to Standard ([SR], 175 μm) or High resolution ([HR], 87.5 μm). The image is displayed at the resolution you selected. When the Simple Check QC starts, the read resolution is set to Standard. If the REGIUS connection license is CR MED THROUGHPUT or CR LOW THROUGHPUT, only Standard resolution can be used.


7.5 Screen Details

	Screen	Description
(6)	REGIUS selection area	<p>Displays all REGIUS connected to the CS-7. Select a REGIUS that you wish to test.</p> <p><b>IMPORTANT</b> .....</p> <ul style="list-style-type: none"> <li>• If the Standard Plate is not set, the operation after the selection of the image analyses cannot be performed.</li> </ul> <p>.....</p> <p>When a REGIUS is selected, the latest image taken within the effective image days of the REGIUS is extracted and the most recent analysis date and time and the date and time that the image was taken is compared.</p> <p>* For the <b>Acceptance Test</b>, the last date and time of exposure is selected in regardless of the effective image days.</p> <p>Images to be extracted vary according to the analysis methods.</p> <ul style="list-style-type: none"> <li>• On the <b>Basic Quality Control</b> screen: QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image, Erase Image</li> <li>• On the <b>Detail Quality Control</b> and <b>Acceptance Test</b> screen: C Phantom (10.0 mR) Image, Flat field (3.0 mR) Image, Flat Field (10.0 mR) Image, Flat field (30.0 mR) Image, Erase Image, Dark Noise Image</li> </ul> <p>The following are displayed depending on the results of comparison.</p> <ul style="list-style-type: none"> <li>● <b>If all images were captured at new dates and times</b> The images are selected and automatically tested, and the results of those tests are displayed.</li> <li>● <b>If all images were captured at old dates and times</b> The images used for tests on the last test date are selected and the results of those tests are displayed.</li> <li>● <b>If some of the images were captured at new dates and times</b> The images are not selected and test data is not displayed.</li> </ul> <p><b>&lt;On the REGIUS Basic Quality Control screen&gt;</b></p> <p>If the Erasing ability is failed and the Dark Noise Image has not been tested yet, the Dark Noise Image will additionally be tested for troubleshooting. QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image and Erase Image analyzed by the selected REGIUS on the last date and time of exposure within the effective image days are sampled, and the dates and times of the last test are compared against the dates and times that the images were captured. The following are displayed depending on the results of comparison.</p> <ul style="list-style-type: none"> <li>● <b>If QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image and Erase Image were captured at new dates and times</b> The QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image, Erase Image and the above Dark Noise Image are selected and automatically tested, and the results of those tests are displayed.</li> <li>● <b>If QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image and Erase Image were captured at old dates and times</b> The QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image, Erase Image and the above Dark Noise Image used for tests on the last test date are selected, only the dark noise image is tested and the results of this test is displayed.</li> <li>● <b>If some of the QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image and Erase Image were captured at new dates and times</b> The images are not selected and test data is not displayed.</li> </ul> <p>REGIUS information is displayed in the REGIUS key.</p> 

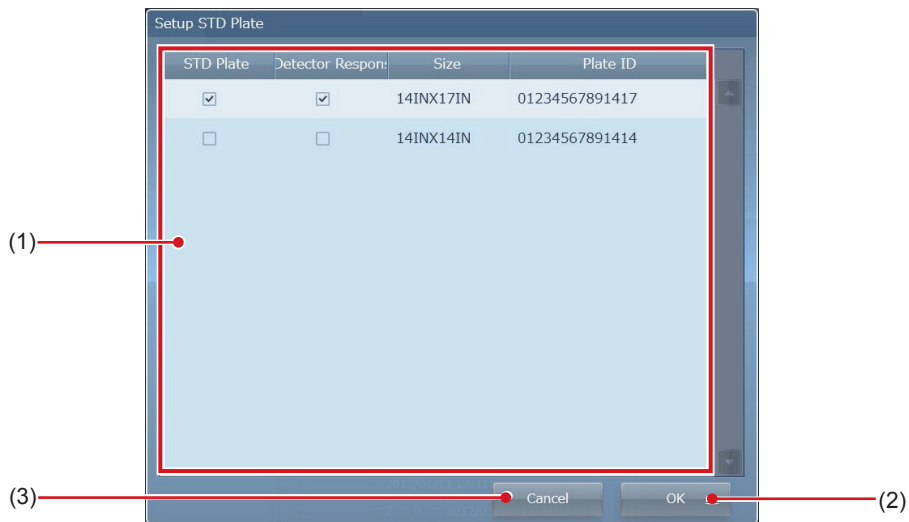
	Screen	Description																		
		<p>a) Colored icons indicate the statuses described below.</p> <p><b>On the REGIUS Basic Quality Control or REGIUS Detail Quality Control screen</b></p> <table border="1" data-bbox="523 327 1394 609"> <thead> <tr> <th data-bbox="523 327 971 383"></th> <th data-bbox="971 327 1182 383">Within quality control interval</th> <th data-bbox="1182 327 1394 383">Beyond quality control interval</th> </tr> </thead> <tbody> <tr> <td data-bbox="523 383 971 461">If quality control was not implemented</td> <td data-bbox="971 383 1182 461"></td> <td data-bbox="1182 383 1394 461"></td> </tr> <tr> <td data-bbox="523 461 971 533">If all test items of the last quality control test "passed"</td> <td data-bbox="971 461 1182 533"></td> <td data-bbox="1182 461 1394 533"></td> </tr> <tr> <td data-bbox="523 533 971 609">If any of the test items of the last quality control test "failed"</td> <td data-bbox="971 533 1182 609"></td> <td data-bbox="1182 533 1394 609"></td> </tr> </tbody> </table> <p><b>On the REGIUS Acceptance Test screen</b></p> <table border="1" data-bbox="523 647 1182 875"> <tbody> <tr> <td data-bbox="523 647 971 725">If an acceptance test was not performed</td> <td data-bbox="971 647 1182 725"></td> </tr> <tr> <td data-bbox="523 725 971 797">If all test items of the last acceptance test "passed"</td> <td data-bbox="971 725 1182 797"></td> </tr> <tr> <td data-bbox="523 797 971 875">If any of the test items of the last acceptance test "failed"</td> <td data-bbox="971 797 1182 875"></td> </tr> </tbody> </table> <p>b) REGIUS name            c) Status and analysis date and time            Information on the last test results is displayed on the respective screens.            For the Status, the numbers of "Passed" items and "Failed" items for the analysis judgement are displayed. The number of "Error" items are included in that of "Failed" items.            If testing was not performed even once, "-- -- -----" is displayed.            On the <b>REGIUS Basic Quality Control</b> screen, if 3 images (QC Phantom (10.0 mR), Flat field (10.0 mR) and Erase images) are tested, the Dark noise image is not included in the results.</p>		Within quality control interval	Beyond quality control interval	If quality control was not implemented			If all test items of the last quality control test "passed"			If any of the test items of the last quality control test "failed"			If an acceptance test was not performed		If all test items of the last acceptance test "passed"		If any of the test items of the last acceptance test "failed"	
	Within quality control interval	Beyond quality control interval																		
If quality control was not implemented																				
If all test items of the last quality control test "passed"																				
If any of the test items of the last quality control test "failed"																				
If an acceptance test was not performed																				
If all test items of the last acceptance test "passed"																				
If any of the test items of the last acceptance test "failed"																				
(7)	[Analysis] button	<p>When a device to be tested is selected, the result for the last image is displayed automatically. You can select an image for analysis.            Click this button to start image analyses of the images selected in the Selection Image area and the results are displayed.            If an image that was not analyzed within the effective image days set in the system is selected, an analysis starts. If an analyzed image is selected, analysis will not be conducted.</p>																		

## 7.5 Screen Details

	Screen	Description
(8)	Analyzed image selection area	<p>The list of quality control exposure condition keys of the REGIUS selected in the REGIUS Selection area is categorized and displayed by the following quality control exposure conditions.</p> <ul style="list-style-type: none"> <li>• When the <b>REGIUS Basic Quality Control</b> screen is displayed:</li> <li>• QC Phantom (10.0 mR) Image, Flat field (10.0 mR) Image, Erase Image, Dark Noise Image</li> <li>• When the <b>REGIUS Detail Quality Control</b> or <b>REGIUS Acceptance Test</b> screen is displayed:</li> <li>• QC Phantom (10.0 mR) Image, Flat field (3.0 mR) Image, Flat field (10.0 mR) Image, Flat field (30.0 mR) Image, Erase Image, Dark Noise Image</li> </ul> <p>Select an image that you wish to test. If an image that was already analyzed is selected, all of the images used in those analyses are selected. Unanalyzed images beyond the effective image days set in the system are not displayed. To determine whether analyzed images are within the effective image days or not, the oldest image among all analyzed images is used as the criteria. To cancel the selection, press the Ctrl key and while holding it pressed down click the selected image.</p> <p>Information on analyzed images is displayed in the quality control exposure condition key.</p> <p>a) Quality control exposure condition b) Thumbnail of the analyzed images Click an image within the effective image days to display the Image display screen. (Refer to "7.5.13 Image Display Screen".) c) Exposure date and time d) Status and analysis date and time Analysis information is displayed on the respective screens. For the Status, the numbers of "Passed" items and "Failed" items for the analysis judgement are displayed. The number of "Error" items are included in that of "Failed" items. If testing was not performed even once, "-- -- ----" is displayed. On the <b>REGIUS Basic Quality Control</b> screen, if 3 images (QC Phantom (10.0 mR), Flat field (10.0 mR) and Erase images) are tested, the Dark noise image is not included in the results. e) Standard plate size and standard plate ID</p>
(9)	Selection Image [All previous images] checkbox	<p>When the box is un-checked, only analyzed images whose exposure date, dating back from the present date, is within the effective image days set in the system are displayed. When a checkmark is placed in the checkbox, all analyzed images are displayed.</p>
(10)	Selection Image [Setup] button	<p>Displays REGIUS or REGIUS plate radiation exposure dose setting screen. Set the exposure dose for capturing images for quality control, Detail Quality Control and acceptance test of the REGIUS and REGIUS plate. (Refer to "7.5.7 REGIUS/ REGIUS Plate Radiation Exposure Dose Setting Screen".) Only administrators or service engineers with authority can change the setting.</p>
(11)	[History] button	<p><b>&lt;Only on the REGIUS Basic Quality Control and REGIUS Detail Quality Control screens&gt;</b> Displays the REGIUS Time Graph screen. Click to select a REGIUS and check the Time Graph in the Analysis Results for the selected REGIUS. (Refer to "7.5.9 REGIUS Time Graph Screen".)</p>
(12)	[Output] button	<p>Displays the output dialog box where the analysis results and judgments can be output as a pdf file or CSV file. (Refer to "7.5.15 Output Dialogue Screen".)</p>
(13)	[Delete] button	<p>Deletes the displayed Analysis Results. Results are deleted when the [OK] button is clicked on the displayed delete dialog box.</p>

	Screen	Description
(14)	Analysis Result display area	<p>Analysis results (calculation value) and judgments (Pass/Fail/Error) are displayed for each analysis item.                      [Pass]: Indicates that the calculation result is within the standard value range.                      [Fail]: Indicates that the calculation result is outside of the standard value range.                      [Error]: Indicates that an error occurred while calculating.</p> <p> .....                      • An error occurs if the image is incorrectly matched to the exposure condition key. Because calculations are not done for analysis items where errors occur, "-----" is displayed for the analysis result.                      .....</p> <p>When an analysis item is selected, the image used to calculate the analysis result becomes highlighted.                      If an analysis item with a "FAIL" analysis result is selected, the corresponding troubleshooting procedure, response status and a note are displayed. Clicking on the troubleshooting area displays a screen for inputting the response status and a note. (Refer to "<a href="#">7.5.14 Response / Note Input Screen</a>".)</p>
(15)	Analysis Result [Setup] button	<p><b>&lt;Only on the REGIUS Basic Quality Control screen&gt;</b>                      Displays REGIUS or REGIUS Plate Control Range setting screen. Set the control range used for quality control judgment of the REGIUS and REGIUS plate. (Refer to "<a href="#">7.5.8 REGIUS / REGIUS Plate Control Setting Screen</a>".)                      Only administrators or service engineers with authority can change the setting.</p>
(16)	[Utility] button	<p><b>&lt;Only on the REGIUS Basic Quality Control and REGIUS Detail Quality Control screens&gt;</b>                      Displays the utility screen where maintenance features can be set. (Refer to "<a href="#">7.5.16 Utility Screen</a>".)                      Only administrators or service engineers with authority can change the setting.</p>
(17)	[Exit] button	<p><b>&lt;On the REGIUS Basic Quality Control and REGIUS Detail Quality Control screens&gt;</b>                      Ends the simple check QC.</p>
	[Back] button	<p><b>&lt;On the REGIUS Acceptance Test screen&gt;</b>                      Returns to the utility screen.</p>

### 7.5.6 Standard Plate Setting Screen

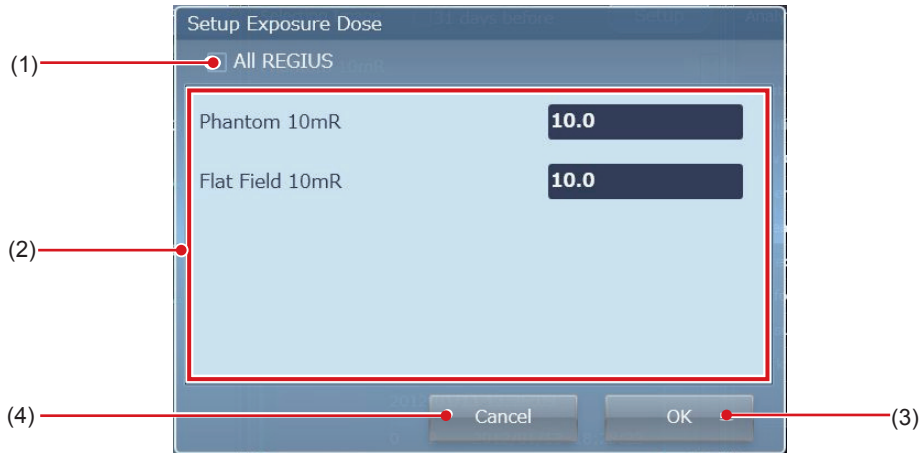


	Screen	Description
(1)	Standard Plate list	Displays the list of the 14×14 and 14×17 sized REGIUS plates in the order of the plate size (14×17 and then14×14). For the plates with the same size, they are displayed in ascending sequence of the bar code IDs. <b>STD Plate checkbox</b> Select plates to set the Standard Plate (one to three plates depending on setting made by service engineers) and place a checkmark in the checkbox. <b>Detector Responsive checkbox</b> Select a plate to set the system sensitivity reference of the REGIUS plate from the selected plates and place a checkmark in the check box.
(2)	[OK] button	Saves settings and closes the Standard Plate setting screen.
(3)	[Cancel] button	Closes the Standard Plate setting screen without saving settings.

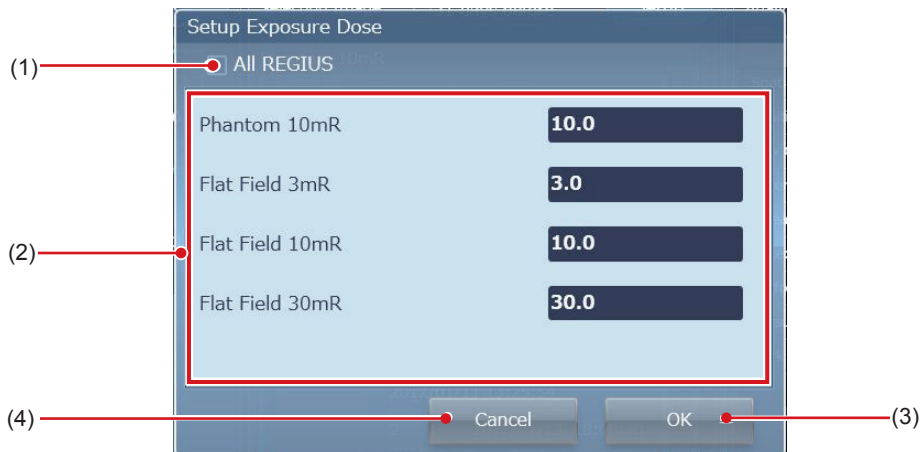


## 7.5.7 REGIUS/ REGIUS Plate Radiation Exposure Dose Setting Screen

### REGIUS Basic Quality Control



### REGIUS Detail Quality Control and Acceptance Test

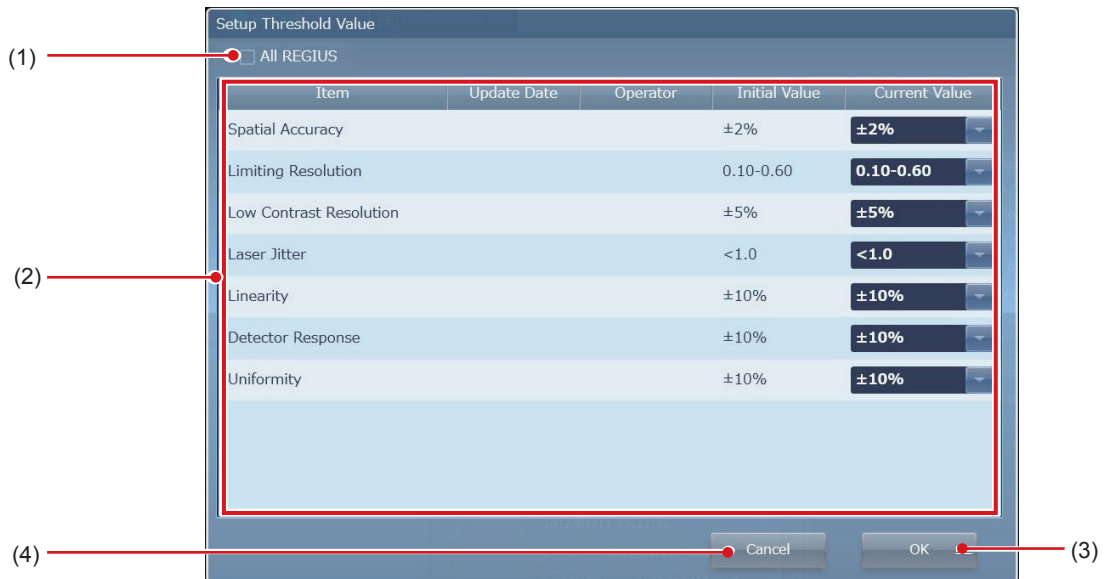


	Screen	Description
(1)	[All REGIUS] checkbox	Place a checkmark in the checkbox to apply the set radiation exposure doses to all REGIUS.
(2)	Radiation Exposure Dose setting areas	Input the radiation exposure dose for each image. The displayed image types differ according to the analysis method.
(3)	[OK] button	Saves settings and closes the REGIUS radiation exposure dose setting screen. If a checkmark is placed in the [All REGIUS] checkbox, the radiation exposure doses of all REGIUS are changed.
(4)	[Cancel] button	Closes the REGIUS radiation exposure dose setting screen without saving settings.

With the REGIUS Plate, the radiation exposure dose item is not provided. The REGIUS radiation exposure dose for the REGIUS plate readout is used.

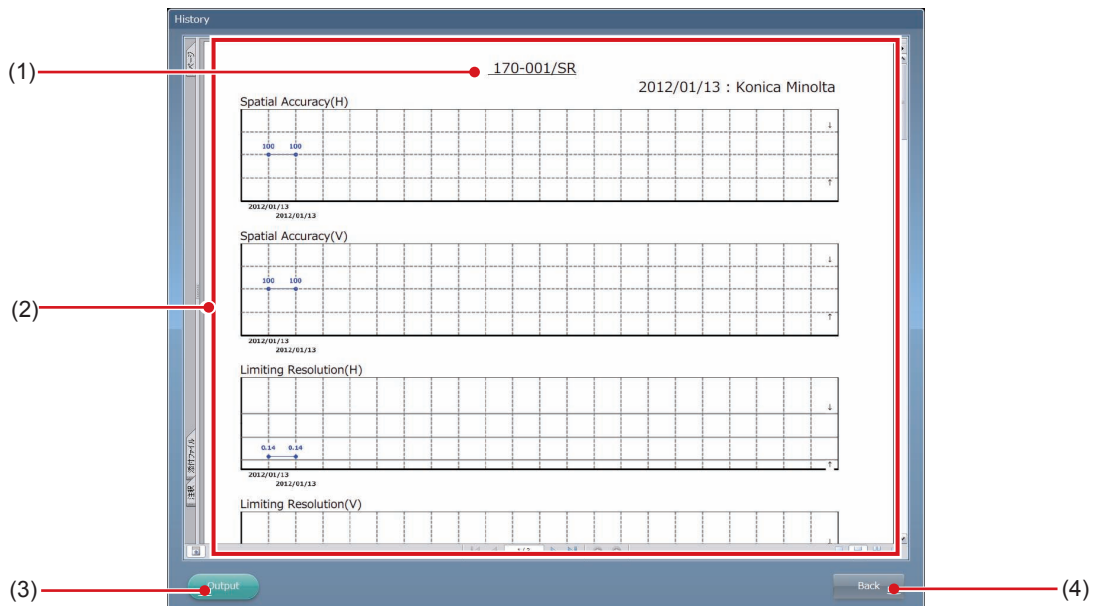
### 7.5.8 REGIUS / REGIUS Plate Control Setting Screen

This is the screen to check type and status of regular replacement parts when the time for replacement comes.



	Screen	Description
(1)	[All REGIUS] checkbox	Place a checkmark in the checkbox to apply the set control range to all REGIUS.
(2)	Control range setting area	Select a setting for each analysis item from the Current Value sector to set the control range.
(3)	[OK] button	Saves the control range and closes the REGIUS or REGIUS Plate Control Range setting screen. If a checkmark is placed in the [All REGIUS] checkbox, the control ranges of all REGIUS are changed.
(4)	[Cancel] button	Closes the REGIUS or REGIUS Plate control range setting screen without saving settings.

## 7.5.9 REGIUS Time Graph Screen

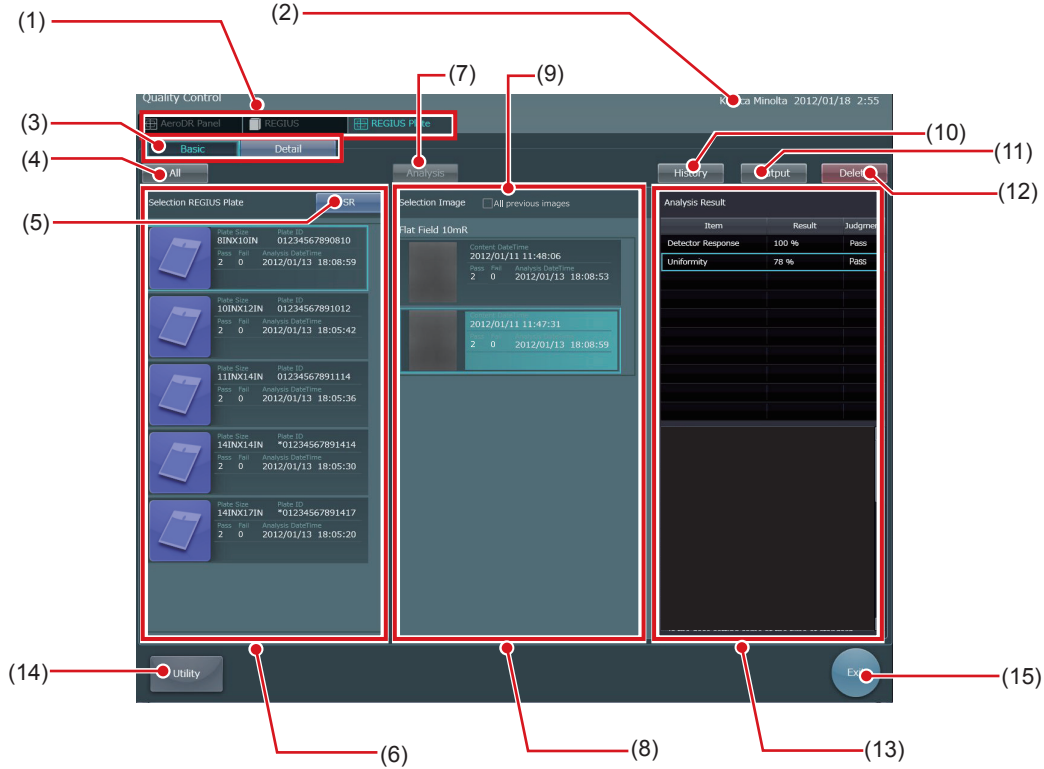


	Screen	Description
(1)	REGIUS Name/Resolution	Displays the name of the REGIUS and the resolution of the time graph (analyzed image) on the screen where the [History] button was clicked.
(2)	Time Graph	Displays a time graph of the REGIUS on the screen where the [History] button was clicked. The graph displays results from 10 past analyses centered on the date of the test data displayed on the REGIUS screen where the [History] button was clicked.
(3)	[Output] button	Displays the output dialog box where the time graph can be output as a pdf file or CSV file. (Refer to " <a href="#">7.5.15 Output Dialogue Screen</a> ")
(4)	[Back] button	Closes the REGIUS time graph screen.

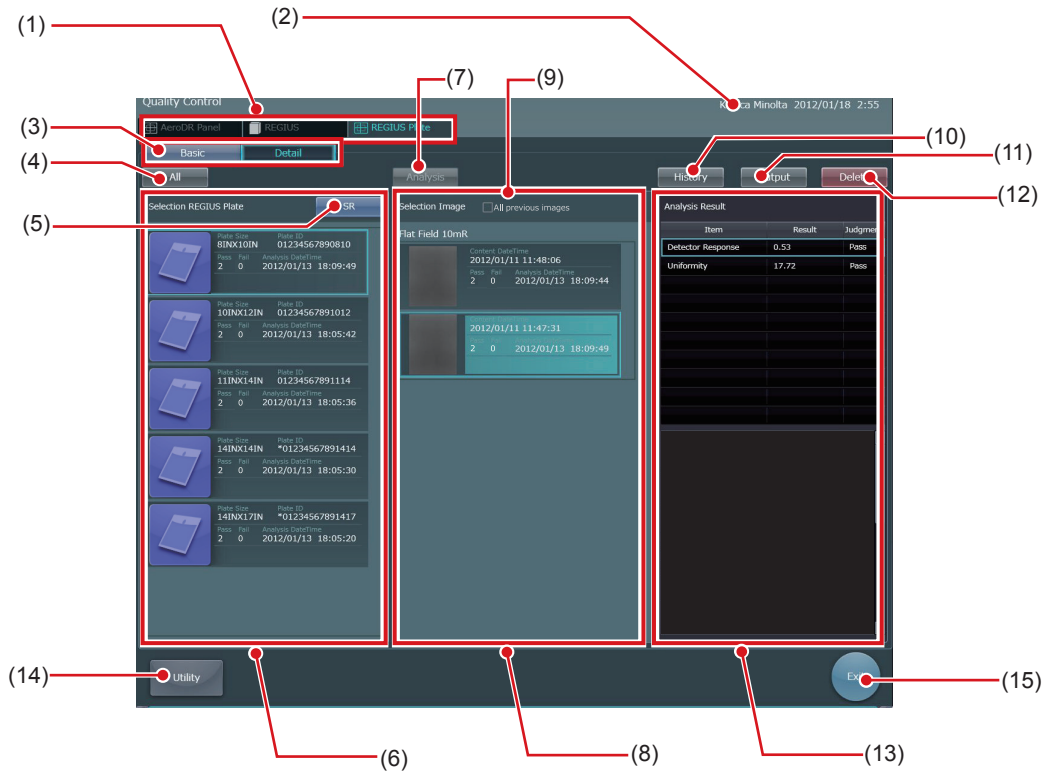
The display magnification can be changed by pressing the [Ctrl] key on the keyboard and scrolling wheel on the mouse.

### 7.5.10 REGIUS Plate Basic Quality Control/Detail Quality Control/Acceptance Test Screens

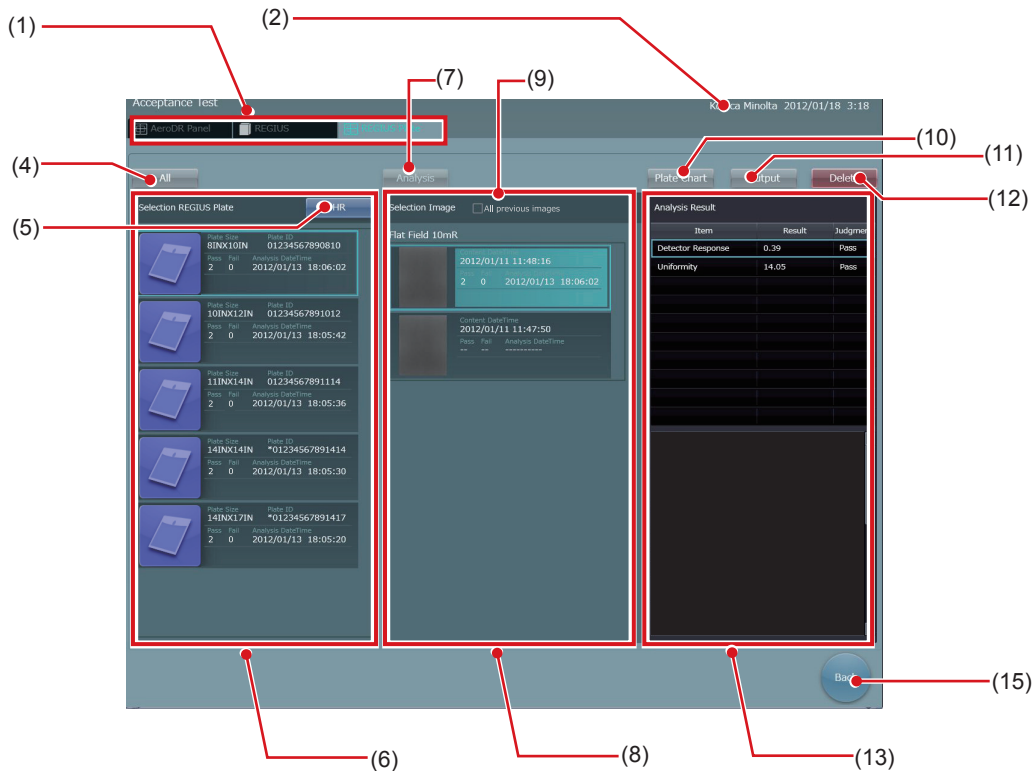
#### REGIUS Plate Basic Quality Control Screen



#### REGIUS Plate Detail Quality Control Screen





























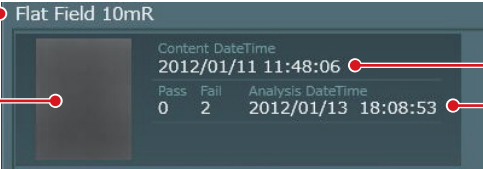



REGIUS Plate Acceptance Test Screen



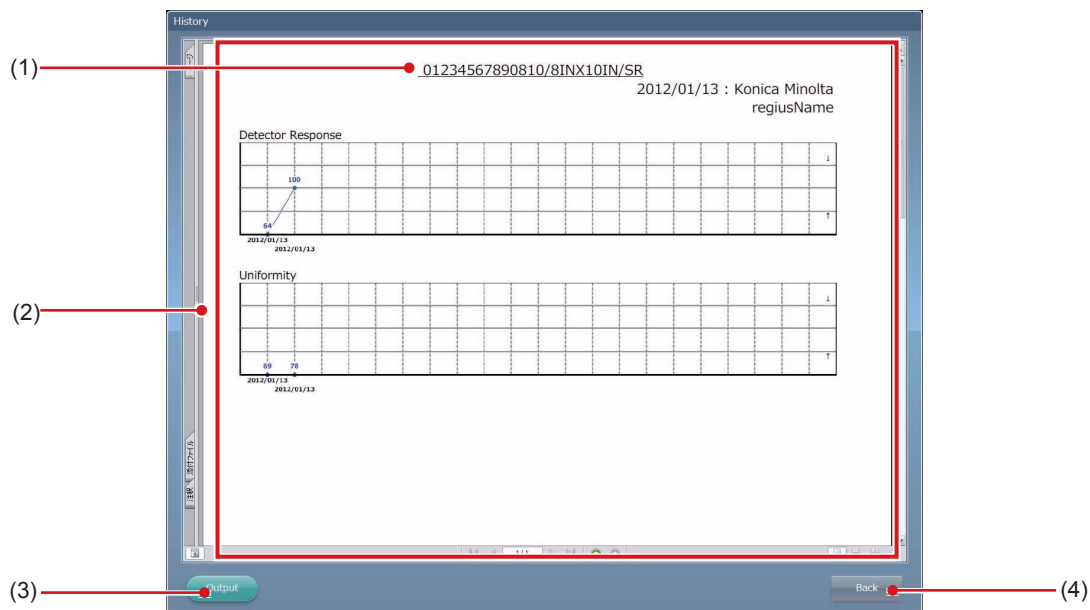
	Screen	Description
(1)	Selection Device tabs	Selects a device. Only connected devices are displayed. If both AeroDR SYSTEM and REGIUS are connected or only the REGIUS is connected, you can switch screens.
(2)	Operator, date and time	Displays the name of the operator and the current date and time.
(3)	[Basic] and [Detail] radio buttons	<b>&lt;Only on the REGIUS Plate Basic Quality Control and REGIUS Plate Detail Quality Control screens&gt;</b> You can switch the REGIUS Plate Basic Quality Control and REGIUS Plate Detail Quality Control screens.
(4)	[All] button	If an image in the quality control exposure condition key of the REGIUS Plate has not been analyzed within the effective image days set in the system, the image is automatically analyzed by clicking this button.
(5)	Read Resolution toggle	Switches the Read Resolution to Standard ([SR], 175 μm) or high resolution ([HR], 87.5 μm). The image is displayed at the resolution you selected. When the Simple Check QC starts, the read resolution is set to Standard. If the REGIUS connection license is CR MED THROUGHPUT or CR LOW THROUGHPUT, only Standard resolution can be used.
(6)	REGIUS Plate selection area	Displays the all REGIUS plates read by the CS-7 in the order of the plate size (8×10, 10×12, 11×14, 14×14, 14×17, 15×30, 18×24 and then 24×30). For the plates with the same size, they are displayed in ascending sequence of the bar code IDs. Select a REGIUS Plate that you wish to test. When a REGIUS Plate is selected, the latest image taken within the effective image days of the REGIUS Plate is extracted and the most recent analysis date and time and the date and time that the image was taken is compared. The following are displayed depending on the results of comparison. <ul style="list-style-type: none"> <li>● <b>If images were captured at new dates and times</b> The images are selected and automatically tested, and the results of those tests are displayed.</li> <li>● <b>If images were captured at old dates and times</b> The images used for tests on the last test date are selected and the results of those tests are displayed.</li> </ul>

7.5 Screen Details

	Screen	Description																		
		<p>REGIUS Plate information is displayed in the plate key.</p>  <p>a) Colored icons indicate the statuses described below.  <b>On the REGIUS Plate Basic Quality Control or REGIUS Plate Detail Quality Control screen</b></p> <table border="1" data-bbox="523 555 1393 835"> <thead> <tr> <th></th> <th>Within quality control interval</th> <th>Beyond quality control interval</th> </tr> </thead> <tbody> <tr> <td>If quality control was not implemented</td> <td></td> <td></td> </tr> <tr> <td>If all test items of the last quality control test "passed"</td> <td></td> <td></td> </tr> <tr> <td>If any of the test items of the last quality control test "failed"</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>On the REGIUS Plate Acceptance Test screen</b></p> <table border="1" data-bbox="523 875 1182 1099"> <tbody> <tr> <td>If an acceptance test was not performed</td> <td></td> </tr> <tr> <td>If all test items of the last acceptance test "passed"</td> <td></td> </tr> <tr> <td>If any of the test items of the last acceptance test "failed"</td> <td></td> </tr> </tbody> </table> <p>b) Plate size and plate ID            If the plate is set to Standard Plate, ""* is displayed in front of the Plate ID.            c) Status and analysis date and time            Information on the last test results is displayed on the respective screens. For the Status, the numbers of "Passed" items and "Failed" items for the analysis judgement are displayed. The number of "Error" items are included in that of "Failed" items.            If testing was not performed even once, "-- -- ----" is displayed.            On the <b>REGIUS Basic Quality Control</b> screen, if 3 images (QC Phantom (10.0 mR), Flat field (10.0 mR) and Erase images) are tested, the Dark noise image is not included in the results.</p>		Within quality control interval	Beyond quality control interval	If quality control was not implemented			If all test items of the last quality control test "passed"			If any of the test items of the last quality control test "failed"			If an acceptance test was not performed		If all test items of the last acceptance test "passed"		If any of the test items of the last acceptance test "failed"	
	Within quality control interval	Beyond quality control interval																		
If quality control was not implemented																				
If all test items of the last quality control test "passed"																				
If any of the test items of the last quality control test "failed"																				
If an acceptance test was not performed																				
If all test items of the last acceptance test "passed"																				
If any of the test items of the last acceptance test "failed"																				
(7)	[Analysis] button	<p>When a device to be tested is selected, the result for the last image is displayed automatically. You can select an image for analysis. Click this button to start image analyses of the images selected in the Selection Image area and the results are displayed. If an image that was not analyzed within the effective image days set in the system is selected, an analysis starts. If an analyzed image is selected, analysis will not be conducted.</p>																		
(8)	Analyzed image selection area	<p>Displays the list of quality control exposure condition keys (Flat field (10.0 mR)) of the REGIUS Plate selected with [Selection REGIUS Plate]. Select an image that you wish to test. Unanalyzed images beyond the effective image days set in the system are not displayed. To determine whether analyzed images are within the effective image days or not, the oldest image among all analyzed images is used as the criteria. To cancel the selection, press the Ctrl key and while holding it pressed down click the selected image.</p> <p>Information on analyzed images is displayed in the quality control exposure condition key.</p> 																		

	Screen	Description
		a) Quality control exposure condition b) Thumbnail of the analyzed images Click an image within the effective image days to display the Image display screen. (Refer to "7.5.13 Image Display Screen".) c) Exposure date and time d) Status and analysis date and time Analysis information is displayed on the respective screens. For the Status, the numbers of "Passed" items and "Failed" items for the analysis judgement are displayed. The number of "Error" items are included in that of "Failed" items. If testing was not performed even once, "-- --" is displayed.
(9)	Selection Image [All previous images] checkbox	When the box is un-checked, only analyzed images whose exposure date, dating back from the present date, is within the effective image days set in the system are displayed. When a checkmark is placed in the checkbox, all analyzed images are displayed.
(10)	[History] button	<b>&lt;Only on the REGIUS Plate Basic Quality Control and REGIUS Plate Detail Quality Control screens&gt;</b> Displays the REGIUS Plate Time Graph screen. Click to select an REGIUS Plate and check the time graph of the analysis results for the selected REGIUS Plate. (Refer to "7.5.11 REGIUS Plate Time Graph Screen".)
	[Plate Chart] button	<b>&lt;Only on the REGIUS Plate Acceptance Test screen&gt;</b> Displays the Plate Chart screen where you can check the Acceptance Test data distribution graph of the REGIUS plate. (Refer to "7.5.12 REGIUS Plate Plate Chart Screen".)
(11)	[Output] button	Displays the output dialog box where the analysis results and judgments can be output as a pdf file or CSV file. (Refer to "7.5.15 Output Dialogue Screen".)
(12)	[Delete] button	Deletes the displayed Analysis Results. Results are deleted when the [OK] button is clicked on the displayed delete dialog box.
(13)	Analysis Result display area	Analysis results (calculation value) and Judgment (Pass/Fail/Error) are displayed for each analysis item. [Pass]: Indicates that the calculation result is within the standard value range. [Fail]: Indicates that the calculation result is outside of the standard value range. [Error]: Indicates that an error occurred while calculating.  <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">  <b>IMPORTANT</b> </div> ..... <ul style="list-style-type: none"> <li>• <b>An error occurs if the image is incorrectly matched to the exposure condition key. Because calculations are not done for analysis items where errors occur, "--" is displayed for the analysis result.</b></li> </ul> ..... When an analysis item is selected, the image used to calculate the analysis result becomes highlighted. If an analysis item with a "FAIL" analysis result is selected, the corresponding troubleshooting procedure, response status and a note are displayed. Clicking on the troubleshooting area displays a screen for inputting the response status and a note. (Refer to "7.5.14 Response / Note Input Screen".)
(14)	[Utility] button	<b>&lt;Only on the REGIUS Plate Basic Quality Control and REGIUS Plate Detail Quality Control screens&gt;</b> Displays the utility screen where maintenance features can be set. (Refer to "7.5.16 Utility Screen".) Only administrators or service engineers with authority can change the setting.
(15)	[Exit] button	<b>&lt;On the REGIUS Plate Basic Quality Control and REGIUS Plate Detail Quality Control screens&gt;</b> Ends the simple check QC.
	[Back] button	<b>&lt;On the REGIUS Plate Acceptance Test screen&gt;</b> Returns to the utility screen.

### 7.5.11 REGIUS Plate Time Graph Screen



	Screen	Description
(1)	Cassette ID / Size / Resolution	Displays the REGIUS Cassette ID, plate size and the resolution of time graph (analyzed image) resolution of the REGIUS plate on the screen where the [History] button was clicked.
(2)	Time Graph	Displays a time graph of the REGIUS plate on the screen where the [History] button was clicked by each REGIUS that read the time graph. The graph displays results and background from 10 past analyses centered on the date of the test data displayed on the REGIUS screen where the [History] button was clicked.
(3)	[Output] button	Displays the output dialog box where the time graph can be output as a pdf file or CSV file. (Refer to "7.5.15 Output Dialogue Screen".)
(4)	[Back] button	Closes the REGIUS time graph screen.

The display magnification can be changed by pressing the [Ctrl] key on the keyboard and scrolling wheel on the mouse.



## 7.5.12 REGIUS Plate Plate Chart Screen

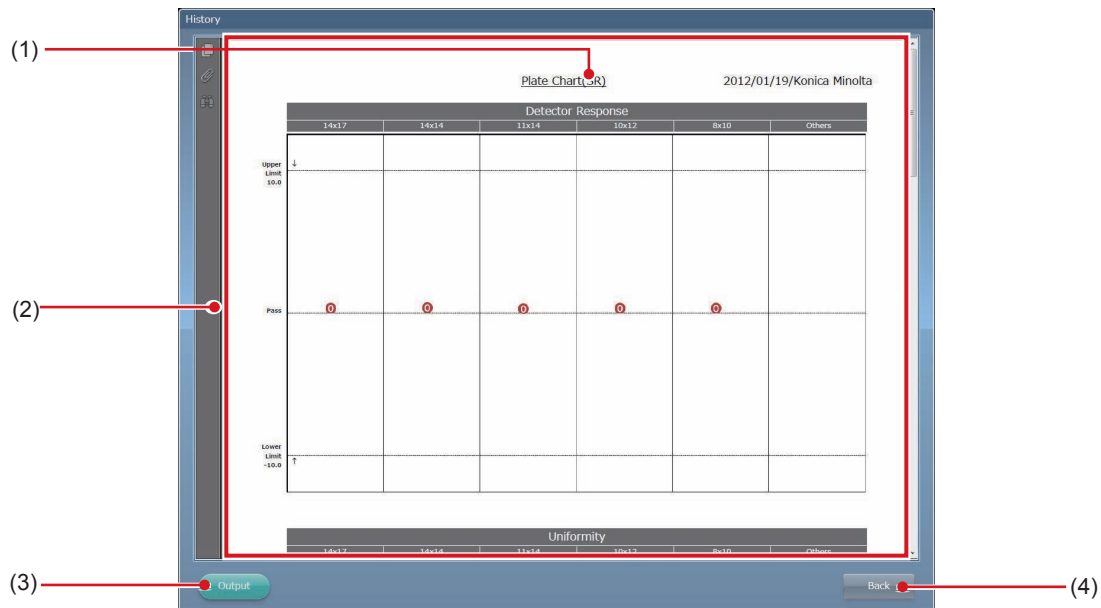


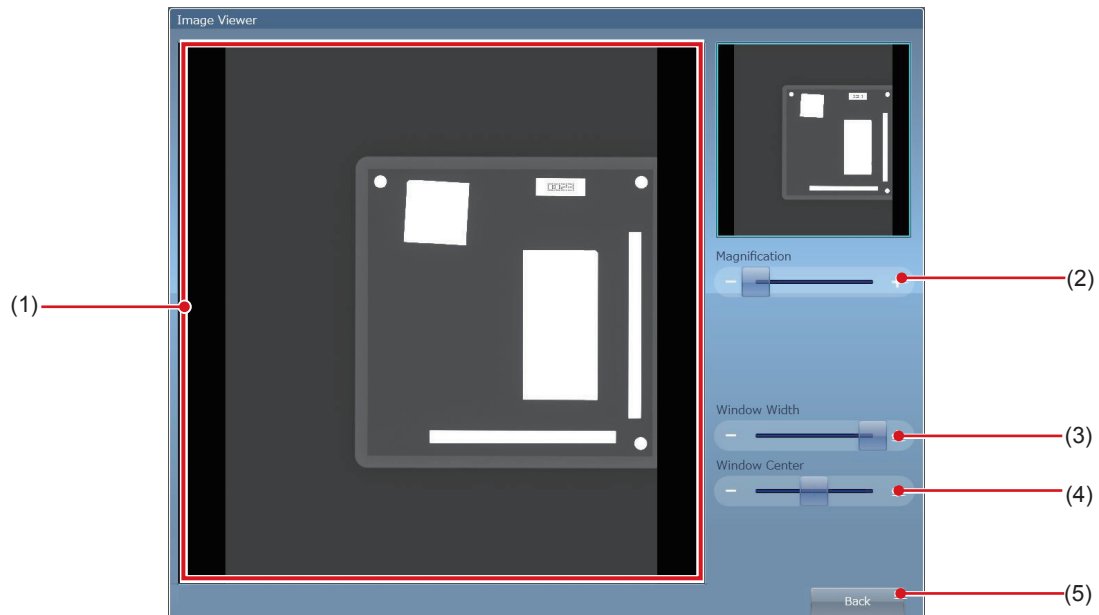
Plate Size	Plate ID	REGIUS	Detector Response	Uniformity
14x17	01234567891417	REGIUS	0.33	20.17
	01234567891414	REGIUS	0.36	15.99
14x14	01234567891414	REGIUS	0.36	15.99
	01234567891114	REGIUS	0.28	9.95
11x14	01234567891114	REGIUS	0.28	9.95
	01234567891012	REGIUS	0.35	11.42
10x12	01234567891012	REGIUS	0.35	11.42
	01234567890810	REGIUS	0.34	15.74
8x10	01234567890810	REGIUS	0.34	15.74

	Screen	Description
(1)	Resolution	Displays the resolution of the Plate Chart (analyzed image).
(2)	Plate Chart	Displays the last test data of all REGIUS plates by plate size. Displays max. 10 same size REGIUS plates by color in a graph. If the number of data is 11 or more, another graph will be created. You can check the color coding for each REGIUS Plate and numerical values of the data in the table below the graph. The REGIUS cassette ID corresponding to each color, read REGIUS name, system sensitivity and uniformity values are displayed.
(3)	[Output] button	Displays the output dialog box where the time graph can be output as a pdf file or CSV file. (Refer to "7.5.15 Output Dialogue Screen".)
(4)	[Back] button	Closes the REGIUS time graph screen.

The display magnification can be changed by pressing the [Ctrl] key on the keyboard and scrolling wheel on the mouse.

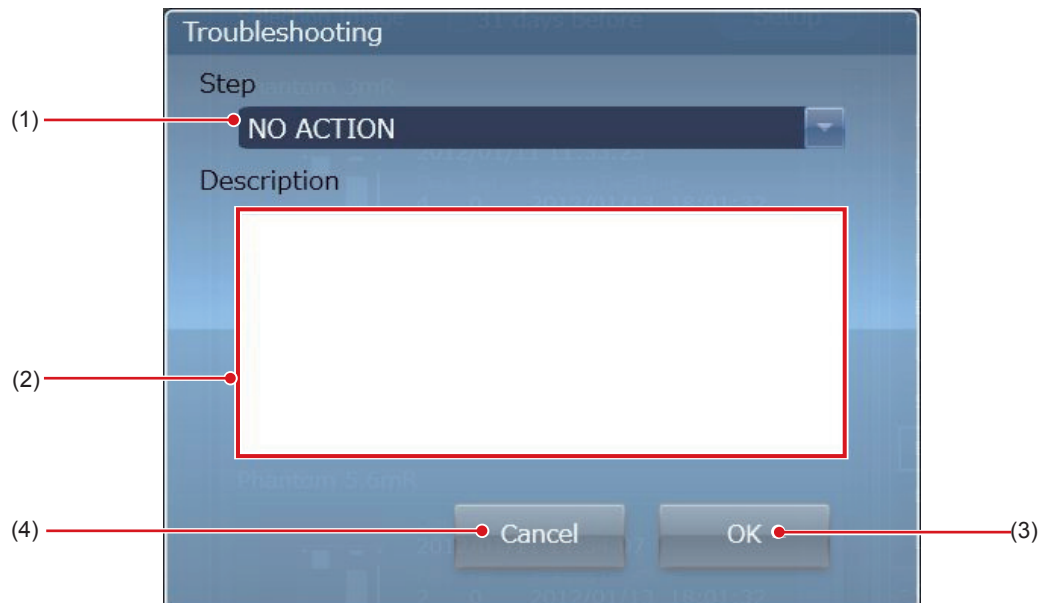
### 7.5.13 Image Display Screen

Only images taken within effective image days can be displayed.



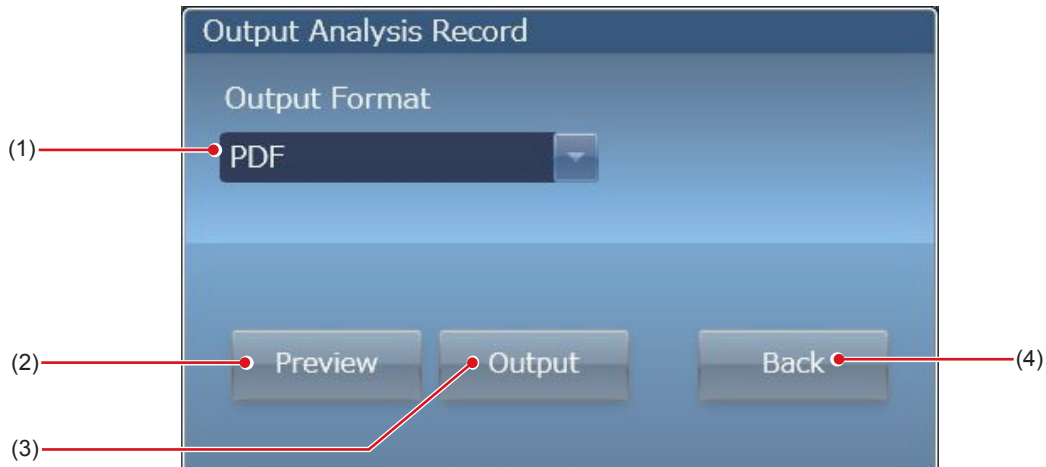
	Screen	Description
(1)	Image display area	Displays the whole analyzed image. If the whole image data is not displayed, drag the image while pressing the left button of the mouse. Then, the display position can be changed.
(2)	Magnifica slider	Changes the display magnification. The left end of the slider displays the whole image and the right end of the slider displays the 100% indication (all data display), and you can be scaled by moving the slider. A square in the preview area on the slider shows which area of the image is currently displayed in the Image display area. Moving this square using the left-click of the mouse allows you to specify the display area (that is displayed in the center of the Image display area).
(3)	Window Width slider	Adjusts the window width for the displayed image.
(4)	Window Center slider	Adjusts the window center of the displayed image.
(5)	[Back] button	Closes the Image Display screen.

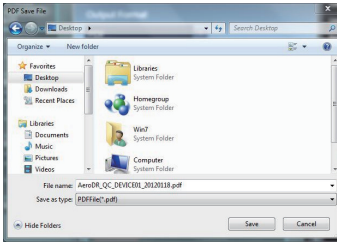
### 7.5.14 Response / Note Input Screen



	Screen	Description
(1)	[Response] Selector	Select a response from the following items. NO ACTION/INVESTIGATION/REPORTED TO THE MAKER/ COMPLETE (Parts replacement)/COMPLETE (Adjustment)/OTHERS
(2)	Note	Can record the response. Up to 1,024 characters can be input.
(3)	[OK] button	Saves the record and close the Response / Note input screen. The input records are displayed under the troubleshooting.
(4)	[Cancel] button	Closes the Response / Note input screen without saving records.

### 7.5.15 Output Dialogue Screen



	Screen	Description
(1)	[Output Format] selector	Specifies the output file format. Can be selected from the PDF or CSV format.
(2)	[Preview] button	You can check the preview screen. When the CSV format is selected for the output format, the preview becomes invalid and the preview is not displayed. Even if the PDF format is selected, the preview becomes invalid when the time graph screen or Plate Chart screen is output.
(3)	[Output] button	Displays the File Save Dialog Box. Select a destination folder and click the [Save] button.  Saves the file in the format selected in the [Output Format] selector and closes the File Save Dialog Box.
(4)	[Back] button	Closes the Output Dialog Box.

**The saved file is named as follows at the default.**

AeroDR Panel Basic Quality Control	AeroDR_QC_Serial NO_YYYYMMDD
AeroDR Panel Detail Quality Control	AeroDR_QC2_Serial NO_YYYYMMDD
AeroDR Panel Acceptance Test	AeroDR_QA_Serial NO_YYYYMMDD
REGIUS Basic Quality Control	REGIUS_QC_REGIUS Name_Standard PlateID_Resolution_YYYYMMDD
REGIUS Detail Quality Control	REGIUS_QC2_REGIUS Name_Standard PlateID_Resolution_YYYYMMDD
REGIUS Acceptance Test	REGIUS_QA_REGIUS Name_Standard PlateID_Resolution_YYYYMMDD
REGIUS Plate Basic Quality Control	PLATE_QC_Plate ID_Resolution_YYYYMMDD
REGIUS Plate Detail Quality Control	PLATE_QC2_Plate ID_Resolution_YYYYMMDD
REGIUS Plate Acceptance Test	PLATE_QA_Plate ID_Resolution_YYYYMMDD
AeroDR Panel Time Graph Basic Quality Control	AeroDR_QC_HISTORY_Serial NO_YYYYMMDD
AeroDR Panel Time Graph Detail Quality Control	AeroDR_GC2_HISTORY_Serial NO_YYYYMMDD
REGIUS Time Graph Basic Quality Control	REGIUS_QC_HISTORY_REGIUS Name_Standard PlateID_Resolution_YYYYMMDD

REGIUS Time Graph Detail Quality Control	REGIUS_QC2_HISTORY_REGIUS Name_Standard PlateID_Resolution_YYYYMMDD
REGIUS Plate Time Graph Basic Quality Control	PLATE_QC_HISTORY_Plate ID_Resolution_YYYYMMDD
REGIUS Plate Time Graph Detail Quality Control	PLATE_QC2_HISTORY_Plate ID_Resolution_YYYYMMDD
REGIUS Plate Plate Chart	PLATE_VARIATION_Resolution_YYYYMMDD

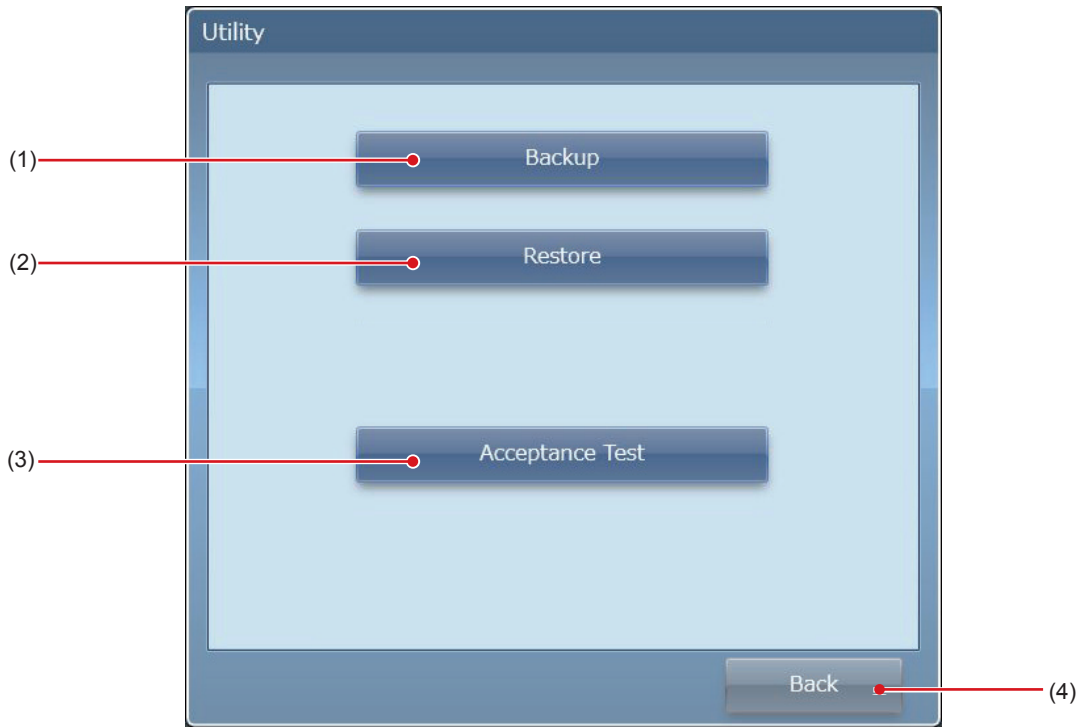
YYYYMMDD: Follows the current date or OS date format.

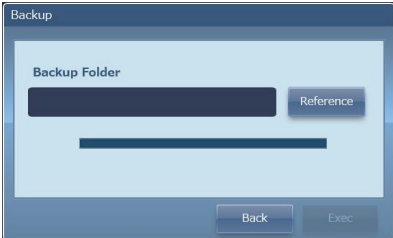
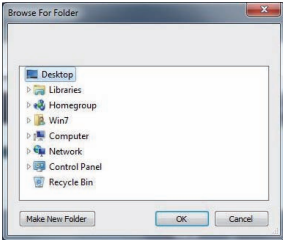
Standard resolution: SR, High resolution: HR

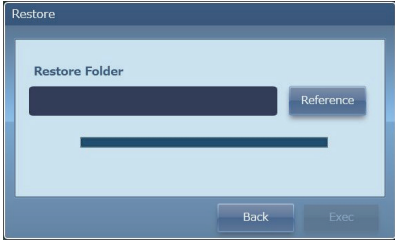
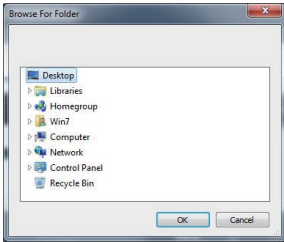


- When printing out the PDF, set the PostScript to level 2. If level 3 is set, it may produce blurred copy.

7.5.16 Utility Screen



	Screen	Description
(1)	[Backup] button	<p>Displays the Backup Dialog Box to back up all references, all control ranges and all analysis results.</p> <ol style="list-style-type: none"> <li>Click the [Reference] button.</li> </ol>  <ol style="list-style-type: none"> <li>Select a destination folder and click the [OK] button.</li> </ol>  <ol style="list-style-type: none"> <li>Click [Exec] on the Backup Dialog Box. The folder and file you want to back up are compressed in one zip folder and saved.</li> </ol>

	Screen	Description
(2)	[Restore] button	<p>Displays the Restore Dialog Box to restore the backups of all references, all control ranges and all analysis results.</p> <ol style="list-style-type: none"> <li>Click the [Reference] button.</li> </ol>  <ol style="list-style-type: none"> <li>Select the backup file and click the [OK] button.</li> </ol>  <ol style="list-style-type: none"> <li>Click [Exec] on the Restore Dialog Box. Decompress the zip backup file to restore.</li> </ol>
(3)	[Acceptance Test] button	<p>Displays the Acceptance Test screen. (Refer to <a href="#">"7.5.1 AeroDR Panel Basic Quality Control/Detail Quality Control/Acceptance Test Screen"</a>, <a href="#">"7.5.5 REGIUS Basic Quality Control, Detail Quality Control and Acceptance Test Screens"</a> and <a href="#">"7.5.10 REGIUS Plate Basic Quality Control/Detail Quality Control/Acceptance Test Screens"</a>.)</p> <p>The [Acceptance Test] button may not be displayed depending on the settings.</p>
(4)	[Back] button	Closes the Utility screen.

## 7.6 • Warning

Error messages displayed on Simple Check QC together with methods of resolution are listed below.

### 7.6.1 Displayed Messages

Messages	Relevant Operation	Meaning/Restoration
QC Orders are not available. Could not access the QC program.	Starting Up	There is not image data that is exposed using the Exam Tag key exclusive to QA/QC. Try again after exposing the image by using Exam Tag of QA/QC.
No QC cassette is available!	Starting Up	There is not image data by exposing the specified cassette size that is able to register as QC cassette. Try again after exposing of QA/QC by using 14x17 or 14x14 size of cassette.
Unsaved QC result is found! Do you want to exit without saving?	Exiting	There is the system that completed the calculation but not complete the saving. Search the "Calculation Completed" icon of REGIUS or cassette and change to "Result Saved" icon by displaying the judgment on the screen. ("Calculation Completed" icon is displayed with yellow "C" mark.)
QC Data which was not renewed during 1.5 years is found. Do you want to delete this QC Data?	Exiting	There is the system which 1.5 years is not renewed from last updating. If you want to delete all QC results of this system, click "YES".
File Writing Error	Function of "EXPORT PDF" and "EXPORT CSV"	There is not enough free disk space. Delete one or more files to free disk space, and then try again. Or this disk is writing protection. Confirm the protection, and then try again.



## A Note on Exposure condition of Phantom Image

for AeroDR Detector (Detail Quality Control/Acceptance Test)

The determined exposure condition

X-ray Generator Device : _____ <b><u>3.0 mR</u></b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm
<b><u>5.6 mR</u></b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm
<b><u>10.0 mR</u></b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm

Average value after 5 exposures under the above setting

Average Dose : _____ mR, _____ mR, _____ mR
---

### IMPORTANT

- .....
- When implementing the Simple Check QC without using a dosimeter, make a note of the exposure condition (X-ray generator, tube voltage, tube current, exposure time, interval before reading) for the 1st trial, and use these records for 2nd trial onward.

#### Exposure Condition for the 1<sup>st</sup> Simple Check QC

X-ray Generator Device : _____ Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm Exposure Dose: _____mR (if measurable) Interval before detecting : _____min
--

.....

## A Note Exposure condition of Phantom/Flat Field Image

for AeroDR Detector (Basic Quality Control/ Detail Quality Control/Acceptance Test)

The determined exposure condition

X-ray Generator Device : \_\_\_\_\_

**3.0 mR**

Tube Voltage: 80kV Tube current: 200mA

Exposure Time : \_\_\_\_\_msec

Exposure Distance : \_\_\_\_\_cm

Average value after 5 exposures under the above setting

Average Dose : \_\_\_\_\_mR

**IMPORTANT** .....

- When implementing the Simple Check QC without using a dosimeter, make a note of the exposure condition (X-ray generator, tube voltage, tube current, exposure time, interval before reading) for the 1st trial, and use these records for 2nd trial onward.

**Exposure Condition for the 1<sup>st</sup> Simple Check QC**

X-ray Generator Device : \_\_\_\_\_

Tube Voltage: 80kV Tube current: 200mA

Exposure Time : \_\_\_\_\_msec

Exposure Distance : \_\_\_\_\_cm

Exposure Dose: \_\_\_\_\_mR (if measurable)

Interval before detecting : \_\_\_\_\_min

## A Note Exposure condition of Phantom/Flat Field Image

for REGIUS (Basic Quality Control/ Detail Quality Control/Acceptance Test),  
REGIUS plate (Basic Quality Control/ Detail Quality Control/Acceptance Test)

The determined exposure condition

X-ray Generator Device : _____ <b>10.0 mR</b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____ msec Exposure Distance : _____ cm
--

Average value after 5 exposures under the above setting

Average Dose : _____ mR
-------------------------



- .....
- When implementing the Simple Check QC without using a dosimeter, make a note of the exposure condition (X-ray generator, tube voltage, tube current, exposure time, interval before reading) for the 1st trial, and use these records for 2nd trial onward.

<b>Exposure Condition for the 1<sup>st</sup> Simple Check QC</b> X-ray Generator Device : _____ Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____ msec Exposure Distance : _____ cm Exposure Dose: _____ mR (if measurable) Interval before detecting : _____ min
--

.....

**A Note Exposure condition of Flat Field Image**  
for REGIUS (Detail Quality Control/Acceptance Test)

The determined exposure condition

X-ray Generator Device : _____ <b><u>3.0 mR</u></b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm
<b><u>10.0 mR</u></b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm
<b><u>30.0 mR</u></b> Tube Voltage: 80kV Tube current: 200mA Exposure Time : _____msec Exposure Distance : _____cm

Average value after 5 exposures under the above setting

Average Dose : \_\_\_\_\_mR, \_\_\_\_\_mR, \_\_\_\_\_mR

**IMPORTANT**

- .....
- When implementing the Simple Check QC without using a dosimeter, make a note of the exposure condition (X-ray generator, tube voltage, tube current, exposure time, interval before reading) for the 1st trial, and use these records for 2nd trial onward.

**Exposure Condition for the 1<sup>st</sup> Simple Check QC**

X-ray Generator Device : \_\_\_\_\_  
 Tube Voltage: 80kV Tube current: 200mA  
 Exposure Time : \_\_\_\_\_msec  
 Exposure Distance : \_\_\_\_\_cm  
 Exposure Dose: \_\_\_\_\_mR (if measurable)  
 Interval before detecting : \_\_\_\_\_min

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KONICA MINOLTA

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2015-09-03  
(IT)