Document No: DD+DIS231.10E

CR 30-X 2nd

Type 5175 / 200 / 205 / 220 / 225

CR 30-Xm

Type 5179 / 100

► Purpose of this Document

This document contains all routines and tests to be carried out during maintenance.

It describes all must maintenance periodical steps in chronological suitable order.

► Document History

Edition. Revision	Release Date	Changes compared to previous Version 1.0
1.1	02-2012	Added information about CR 30-Xm.

► Referenced Documents

Document	Title
DD+DIS230.10E	CR 30-Xm / CR 30-X 2nd Service Manual, Chapter 3.5 - Replacements / Repair Procedures
DD+DIS230.10E	CR 30-Xm / CR 30-X 2nd Service Manual, Chapter 3.2 - Tools and auxiliary means
DD+DIS230.10E	CR 30-Xm / CR 30-X 2nd Service Manual, Chapter 3.6 - Adjustments and Calibrations

This document is separately available. Order number: DD+DIS231.10E

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AGFA HealthCare

Manufacturer

Agfa HealthCare N.V.

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Germany

WARNING:

Improper operation or service activities may cause damage or injuries.

INSTRUCTION:

(1) Read the "Generic Safety Directions" document (see Agfa HealthCare Library > General Info > Agfa HealthCare > Publications > Service Manual) prior to attempting any operation, repair or maintenance task on the equipment.

(2) Strictly observe all safety directions within the "Generic Safety Directions" and on the product.

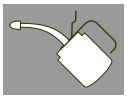
IMPORTANT:

The installation and service of the product(s) described herein is to be performed by qualified personnel who are employed by Agfa HealthCare or one of its affiliates or who are otherwise authorized by Agfa HealthCare or one of its affiliates to provide such services.

NOTE:

To verify the latest version of a chapter of the Service Manual refer to the “Checklist for Completeness” in the Agfa HealthCare Library.

LIST OF CONTENTS



1 General Information on Preventive Maintenance

To ensure quality and functional reliability of the system all the points listed below (minimum maintenance points) must be carried out.

IMPORTANT:

Check if it is necessary to include country specific regulations as additional maintenance points.

1.1 Maintenance Frequency

The maintenance has to be carried out (whatever comes first):

- Every 30.000 image plate cycles or
- Every 2 years

1.2 Required Time

REQUIRED TIME:

Approximately 2 hours

1.3 Required Documents

For a list of required documents see the front page of this document.
Recommendation:
Download the complete Service Manual from the Agfa HealthCare Library:

<Computed Radiography → CR Digitizers → CR 30-Xm / CR 30-X 2nd>

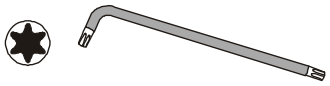
1.4 Required Software

Make sure that the latest digitizer software is available on the Service PC to be prepared for a software upgrade during the preventive maintenance. The latest software can be downloaded from the Agfa HealthCare Library:

<Computed Radiography → CR Digitizers → CR 30-Xm / CR 30-X 2nd → Software>

1.5 Required Tools

Following required tools are part of digitizer delivery:

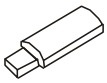


- TX 20
- TX 45

Limit Pattern CD ROM CR 30-X 2nd
Spare part number*: CM+9 5175 9160 1

Limit Pattern CD ROM CR 30-Xm
Spare part number*: CM+604948 00

- 1.5 mm Copper Filter
  Spare part number*: CM+9 5155 1015 2
- 2.0 mm AL Filter
  Spare part number*: CM+9 5148 1090 0



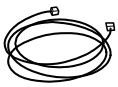
USB Flash Drive
Checked to be virus free
Spare part numbers*:

- CR 30-Xm with CIRMXXXX**: CM+6045180
- CR 30-X 2nd with CIR_XXXX** : CM+6037431

* The last digit in the spare part number indicates the spare part revision at release of this document. When ordering, the current revision of the spare part is delivered.

** XXXX = Version number

Following required tools are not part of digitizer delivery:



Network Cable
Commercially available, Acquire locally

Lint free cloth
Commercially available, Acquire locally

Flash light
Commercially available, Acquire locally

1.6 Required Cleaning Material

Following cleaning material is required:

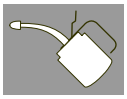
Description	Order Number*
Vacuum cleaner (220/240 V, 50-60 Hz)	CM+9 9999 0895 0 Or a comparable vacuum cleaner: Commercially available, Acquire locally
Dirt bags for vacuum cleaner (10 x)	CM+9 9999 0896 0
CR Phosphor Plate Cleaner (2 bottles)	10+9999911970
Prosat wipes	10+9 9999 1219 0
Polynit wipes	10+9 9999 1273 0
Lint-free cloth	Commercially available: Acquire locally

* The last digit in the spare part number indicates the spare part revision at release of this document. When ordering, the current revision of the spare part is delivered.

1.7 Required Lubrication Material

Description	Order Number*
Isoflex Topas NB52 (50 ml)	CM+9 9999 9247 0

* The last digit in the spare part number indicates the spare part revision at release of this document. When ordering, the current revision of the spare part is delivered.



2 Diagnostics

2.1 Questioning of the Customer

(1) Ask the customer for any problem that appeared since the last maintenance.

2.2 Analyzing the Info Counter

(1) On the NX workstation log-off the current user and log-in as "crservice".

(2) Open the Internet Explorer.

(3) Enter the digitizer IP address in the address window.
If the IP address is not known: Look it up in the Configuration Tool of the NX workstation.

(4) Select in the service menu: <**Reporting → Info Counter**>

(5) Check the image plate cycles since last maintenance and the last maintenance date. Enter these values in the maintenance checklist (see section 7).

(6) Check the errors since last maintenance.

(7) Check whether service documents provides information on error solutions e.g. by HW modifications, software upgrades etc. If applicable implement the provided solution.

2.3 Documenting the Technical Image Quality of the System

2.3.1 Preparing the Image Plate

(1) Select the largest available cassette.
If the largest available cassette is a Full Leg / Full Spine (FLFS) Cassette, use this cassette.

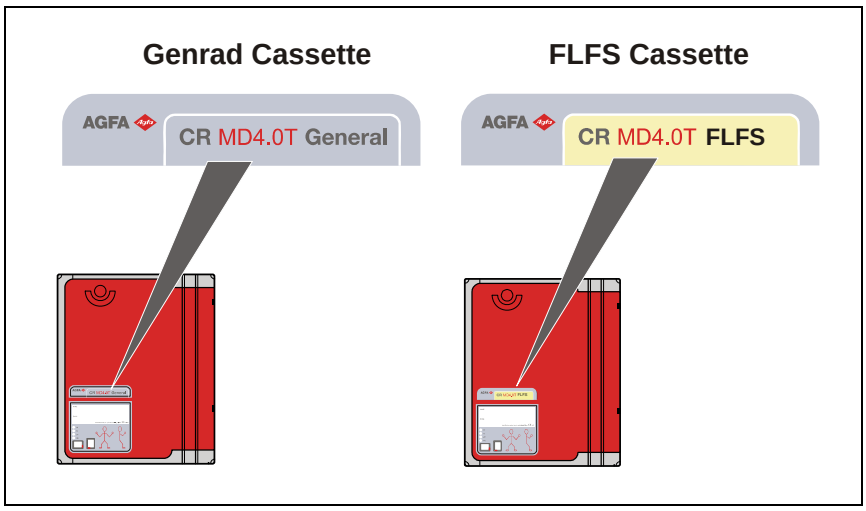


Figure 1

(2) Open the cassette with the dedicated key or a pen.

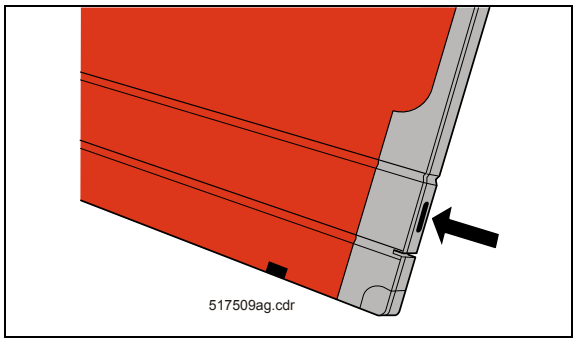


Figure 2

(3) Open the shutter.

(4) Turn the cassette around, so that the black tube side is above.

(5) Let the black tray and image plate slide out carefully onto the table.

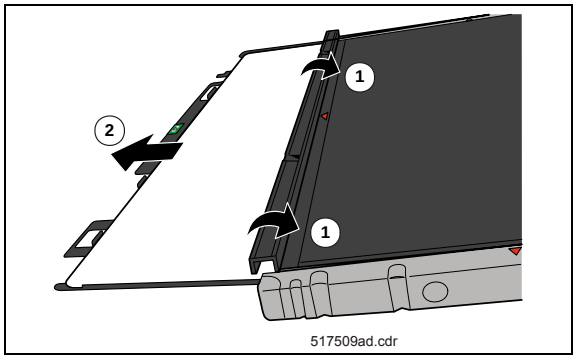


Figure 3

(6) Put the black tray with the image plate onto the cassette.

(7) Check the image plate for any contaminations or signs of damage (e.g. dust particles, scratches).

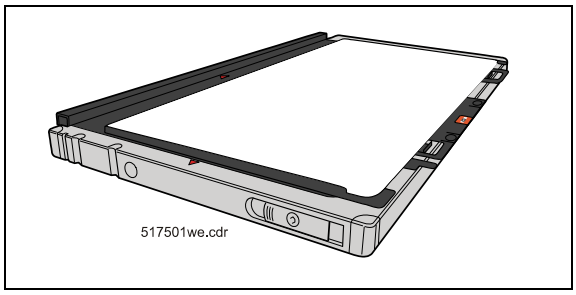


Figure 4

(8) If the image plate is contaminated clean it with the CR screen cleaner and a soft lint-free cloth.

If the image plate is damaged take another cassette and inform the customer.

IMPORTANT for cleaning:

Do **not** put the CR Phosphor Plate Cleaner directly on the image plate. Always put the CR Phosphor Plate Cleaner on the lint-free cloth.

(9) Wait approximately 10 minutes until the surface is dry.

(10) Verify that the white phosphor side is oriented to the black tube side of the cassette.

(11) Put the image plate back into the cassette so that the shutter does not scratch over the image plate.

(12) Insert the key or a pen into the cassette.

(13) Close the shutter.

(14) Remove the key.

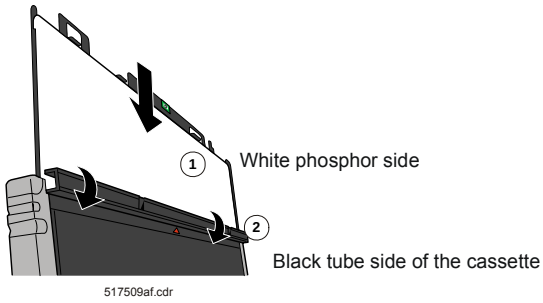


Figure 5

2.3.2 Erasing the Cassette

(1) Press the Erase button.

The Digitizer switches to erase mode. The status indicator is continuously lighting up in blue.

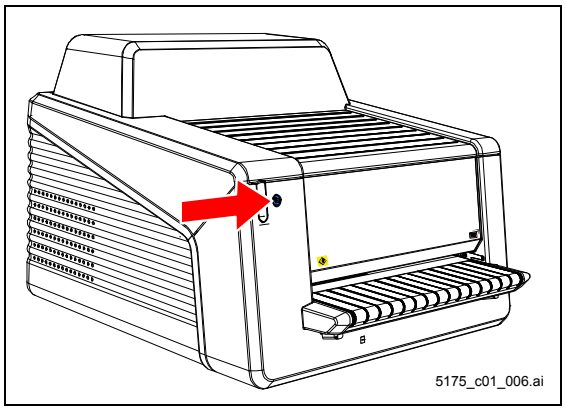


Figure 6

(2) Put the cassette in the digitizer: Erasing starts.

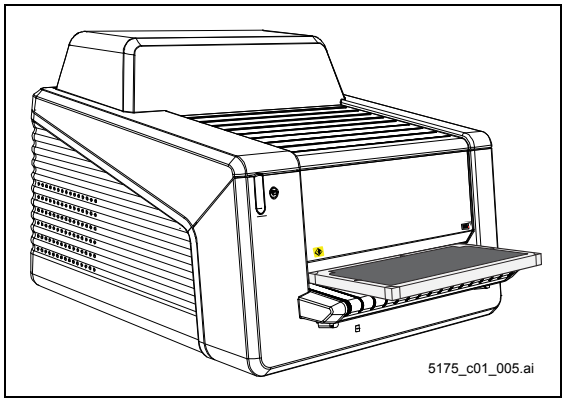


Figure 7

(3) Remove the cassette with the erased image plate from the cassette output.

2.3.3 Exposing the Cassette

2.3.3.1 Exposing the Cassette at GenRad Modality

(1) Mount the 1,5 mm Cu-filter at the modality.

(2) Place the Genrad cassette with the black side facing up.

(3) Ensure that the entire image plate is fully exposed. The collimated field must be larger than the image plate.

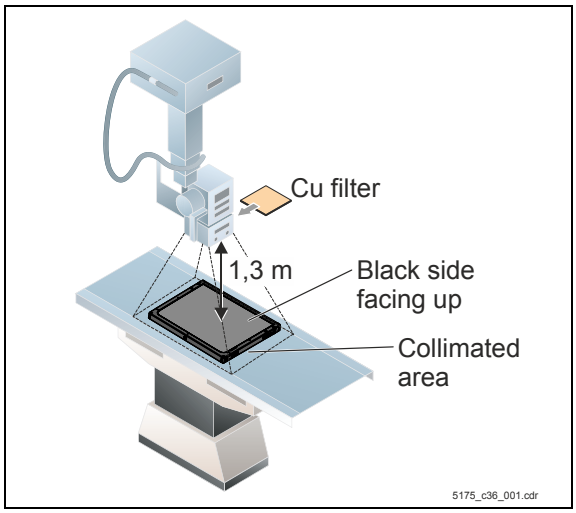


Figure 8

(4) Select the following exposure parameters to obtain a dose of 10 µGy:
- 12 mAs
- 75 kVp
- 1.3 m (51,2”) distance
- Large focus

(5) Expose the cassette.

(6) Turn the cassette 180° (black side suntil facing up).

(7) Expose the cassette again.
After the second exposure the cassette has been exposed in total with a dose of approximately 20 µGy.

(8) Remove the Cu-filter from the X-ray device.

2.3.3.2 Exposing the Cassettes at a Mammography Modality

(1) Select the movdality according to following preference list, if more than one Mammography modality is available on site:
1. Siemens Mammomat
2. GE DMR
3. Instrumentarium

(2) Mount the Al-filter at the modality.

(3) Insert the Mammo cassette with the black side facing up.

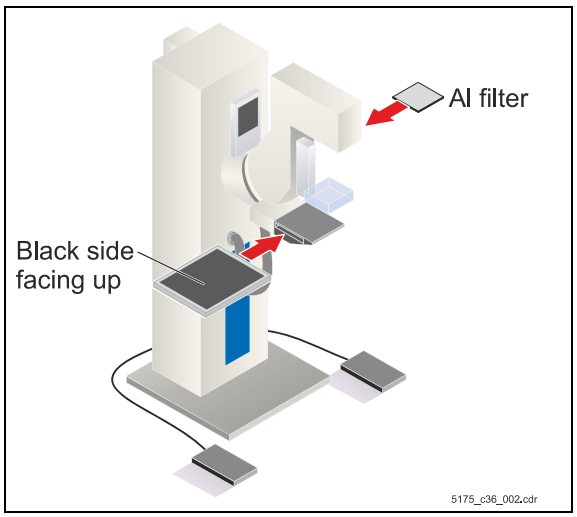


Figure 9

(4) Select the following exposure parameters:
- 200 mAs
- 28 kVp
- Mo source / MO filter

(5) Expose the cassette.

(6) Repeat the exposure for the other cassette format, if available.

(7) Remove the Al-filter from the X-ray device.

2.3.4 Scanning the Flatfield Image

(1) Insert the exposed cassette in the digitizer.

(2) At the NX workstation select the examination type:
<**System Diagnosis → Flatfield**>

IMPORTANT:

By selection of examination type "System Diagnosis → Flatfield", the correct settings for image processing of the flatfield are used. Any other examination type may give a result which cannot be compared with the limit pattern.

This exam type is only available, when working as user “crservice”.

(3) Identify the cassette.

(4) Wait until the digitizer has finished the scan process.

(5) Print the image or send it to the archive (depending on what is available).

(6) Keep the image as reference image "before maintenance".

(7) Put the scanned cassette aside. It is used again for checking the image quality at the end of the preventive maintenance.

3 Maintenance – Power Off

The “maintenance power off” is split up into the following steps:

#	Step	Section
1	Checking of power and network cable.	3.1
2	Checking of the covers.	3.2
3	Checking of the cables.	3.3
4	Checking of the IP guide plate.	3.4
5	Checking of the four belt drives.	3.5
6	Performing a mechanical check of the drawer slider.	3.6
7	Performing a visual check of the transport rollers.	3.7
8	Performing a visual check of all Motors.	3.8
9	Cleaning the inside.	3.9
10	Cleaning the erasure unit.	3.10
11	Cleaning the prescan antistatic brush.	3.11
12	Greasing the spindle at the cassette fixation unit.	3.12
13	Reassembling of the removed parts.	3.13
14	Checking the cassette condition.	3.14

NOTE:

When performing a visual check of the digitizer make sure that the components are not damaged. If damage is visible replace the defective part.

For more information of the replacement refer to the CR 30-Xm / CR 30-X 2nd Service Manual, chapter 3.5 Replacements / Repair Procedures.

3.1 Checking of Power and Network Cable

(1) Switch off the digitizer.

(2) Unplug the mains and network cable at the digitizer.

(3) Check the condition of both cables for:

- Damages at insulation
- Symptoms of bending or squeezing

3.2 Checking of the Covers

CAUTION:

Parts underneath the top cover can be damaged.

Carefully remove the top cover.

(1) Remove all covers of the digitizer. For instructions refer to CR 30-Xm / CR 30-X 2nd Service Manual, chapter 3.5 Replacements / Repair Procedures.

(2) Check all covers for damages (e.g. cracks).

3.3 Checking of the Cables

(1) Check the condition of all cables inside of the digitizer.

(2) Have a close look to the cables that are moved when the cassette unit is opened. See Figure 10.

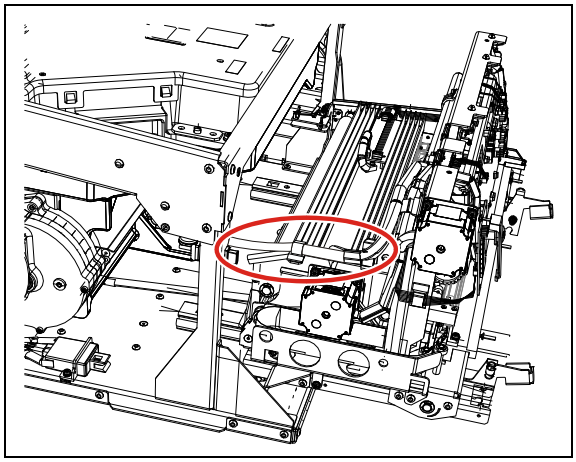


Figure 10

(3) Remove the screw which fixates the Handling Control Board and lift the board slightly up.

(4) Check the flexible cable of the Chip Card Reader for any signs of damage.

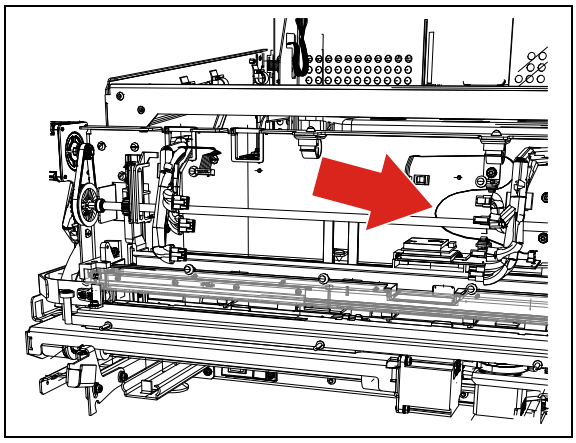


Figure 11

3.4 Checking of the IP Guide Plate

CAUTION:

IP jams possible if IP guide plate is deformed.

Do not bend IP guide plate at removal.

(1) Remove the Erasure Unit and IP guide plate. Refer to CR 30-Xm / CR 30-X 2nd Service Manual, chapter 3.5 Replacements / Repair Procedures.

(2) Check the condition of the IP guide plate. It may not be bent or damaged (e.g. scratches).

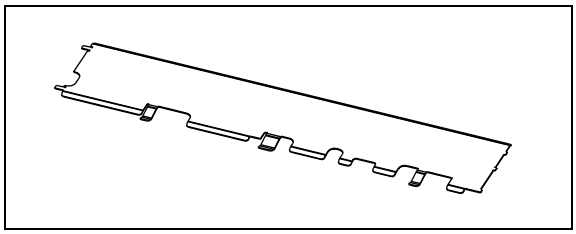


Figure 12

3.5 Checking of the four Belt Drives

(1) Check the condition of the 4 belt drives in the cassette unit.

Especially check for:

- Abrasion in the area of the belts
- Worn out belts (e.g. broken steel cores)
- Worn out gears

(2) Move the belts forward and backward manually when checking.

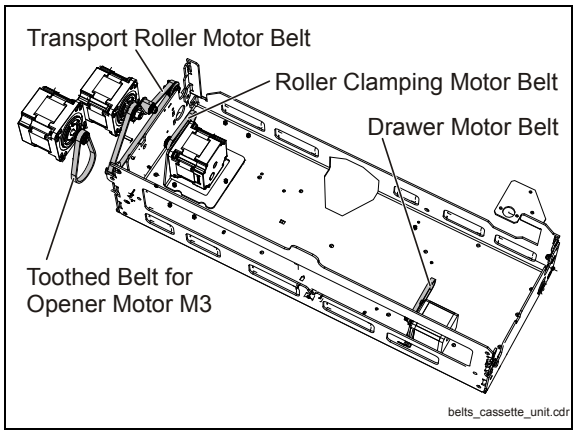


Figure 13

3.6 Performing a mechanical Check of the Drawer Slider

(1) Move the slider backward: It must move smoothly.

(2) Put the slider back to home position (i.e. attached to the magnets)

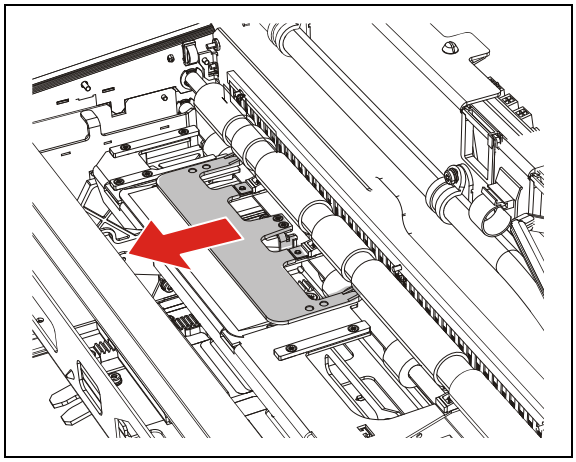


Figure 14

3.7 Performing a visual Check of the Transport Rollers

(1) Check that the surface of the transport rollers in the cassette unit is free from defects.

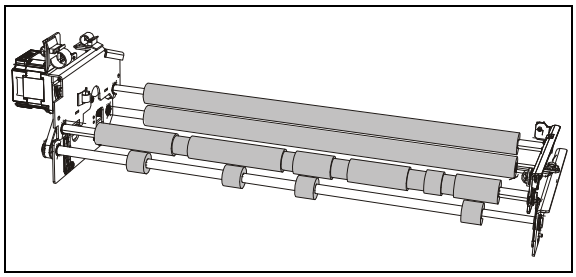


Figure 15

3.8 Performing a visual Check of all Stepper Motors

NOTE:

The following conditions listed below are prerequisites to perform a successful stall calibration. For more information refer section 4.2 Performing a Stall Calibration.

(1) Check the following conditions of the stepper motors which are using a stall detection (home/end position):

- Smooth-running of the motor drive
- Functionality of the mechanism for detection of the home/end position
- No barriers in the movement available

3.9 Cleaning the Inside

REQUIRED TOOLS:

Vacuum cleaner

(1) Clean the inside with a vacuum cleaner.
Especially check for dust in the IP transport unit, and clean this thoroughly with the vacuum cleaner.

3.10 Cleaning the Erasure Unit

REQUIRED TOOLS:

Lint-free cloth

WARNING:

During operation the erasure unit is hot: Risk of burns.

- Avoid contact with the Erasure Unit.
- Observe the relevant sticker on the Erasure Unit.

CAUTION:

Sensitive surface. Reduced image quality possible due to clouded reflector.

- Do not touch the reflector of the erasure unit by hand.
- Do not use cleaning agents to clean the reflector.
- Only use a lint-free cloth for cleaning.

(1) Check the reflector, i.e. the lower side of the erasure unit.
(2) Remove dust or any other particles with a lint-free cloth.

3.11 Cleaning the Prescan Antistatic Brush

(1) Remove the Optic Module. Refer to CR 30-Xm / CR 30-X 2nd Service Manual, chapter 3.5 Replacements / Repair Procedures.

(2) Check the Prescan Antistatic Brush for contamination by using a flash light.

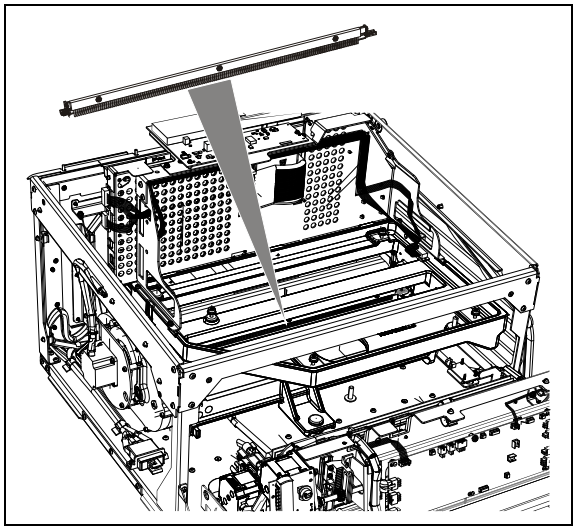


Figure 16

(3) If dust is visible, clean the area before the Prescan Antistatic Brush with a small vacuum cleaner nozzle.

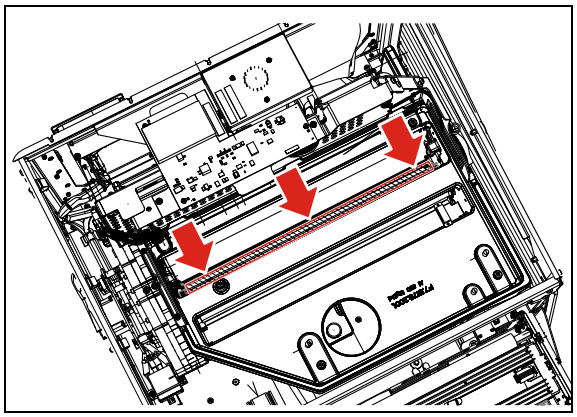


Figure 17

3.12 Greasing the Spindle at the Cassette Fixation Unit

IMPORTANT:

Be careful when putting grease at the spindle. When grease gets into the digitizer it can affect the image quality or the functionality of the digitizer.

(1) Put some grease (Isoflex Topas NB 52) at the spindle in the area of the spindle nut.

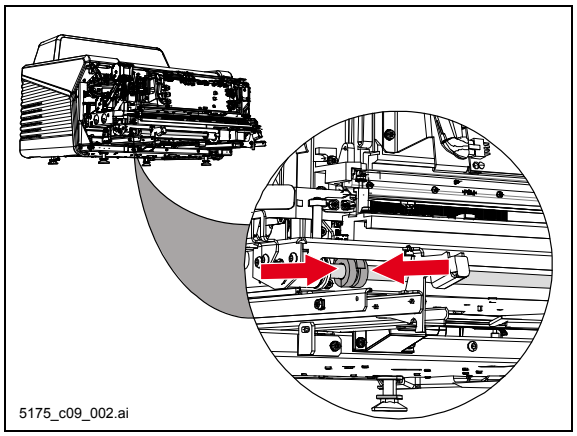


Figure 18

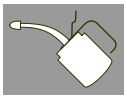
3.13 Reassembling of the removed Parts

(1) Reassemble the removed parts:

- Optic Module
- IP Guide Plate
- Erasure Unit
- Covers

(2) Connect the mains and network cable.

(3) Switch on the digitizer.



3.14 Checking the Cassette Condition

(1) Check the following items of the cassettes:

Outside of the cassette:

- No signs of wear or defects like cracks, broken layers, buckling of the cassette, split off parts, worn or loose protection edges
- Proper function of the shutter

Inside of the cassette:

- No signs of wear or defects like detached fleece, cracks or split off parts
- No signs of wear or defects of the tray like cracks, split off parts especially on the rear edges
- No contamination or signs of wear or defects of the IP like any kind of particles, traces of glue, twisted edges, buckling of the IP, split off parts of the layer or scratches

(2) If any of the above listed symptoms are detected, separate the defective cassettes or IP's and instruct the operator / customer about the possible risks of using defective cassettes or IP's.

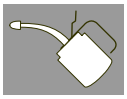
NOTE:

It is strongly recommended to replace affected cassettes or IP's, if any of the above listed symptoms are detected.

4 Maintenance – Power On

The "maintenance power on" is split up into the following steps:

#	Step	Section
1	Checking the safety switch	4.1
2	Performing a stall calibration for all motors	4.2
3	Performing test cycles for each used cassette format	4.3



4.1 Checking the Safety Switch

(1) Pull out the cassette unit approximately 1 cm (0.4 in). The safety switch has to switch off the digitizer.

(2) Close the cassette unit.

4.2 Performing a Stall Calibration

NOTE:

Only perform a stall calibration, if a specific error exists.

(1) On the NX workstation log-off the current user and log-in as "crservice".

(2) Open the browser.

(3) Enter the digitizer IP address in the address window.

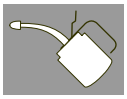
NOTE:

If the IP address is not known: Look it up in the Configuration Tool of the NX workstation.

(4) Enter username (default: **mega**) and password (obtained during the classroom training).

(5) Select in the service menu: **<Maintain and calibrate → Stall Calibration>**

(6) Wait until the stall calibration is finished. This takes approximately 5 minutes. For more information to the Stall Calibration refer to CR 30-Xm / CR 30-X 2nd Service Manual chapter 3.6 Adjustments and Calibrations.



4.3 Performing Test Cycles

(1) Insert the cassette in the digitizer.

NOTE:
Perform the test cycle with every used cassette format.

(2) In the Service GUI select: <**Analysis and Repair → Endurance Run Cycle**>

(3) Keep the default settings.

(4) Select **START.**

(5) Check for proper IP transport and abnormal noise.

(6) Repeat this test cycle for all other cassette formats used at the site.

5 Technical Image Quality Check of the System

The “technical image quality check” is split up into the following steps:

#	Step	Section
1	Expose the cassette.	5.1
2	Clean the Scan Line	5.2
3	Scan the flatfield image	5.3
4	Checking the Image at the Lightbox or Viewing Station	5.4

5.1 Exposing the Cassette

Use the same cassette as in the beginning of the preventive maintenance.

Refer to the instructions in section 2.3 of this document.

5.2 Cleaning of the Scan Line and the Mirror

(1) Check the condition of the cleaning brush (e.g. brush is not dirty or damaged).

(2) Clean the scan line by wiping with the cleaning brush a few times over the whole scan length.

The last movement must be continuous from rear to front.

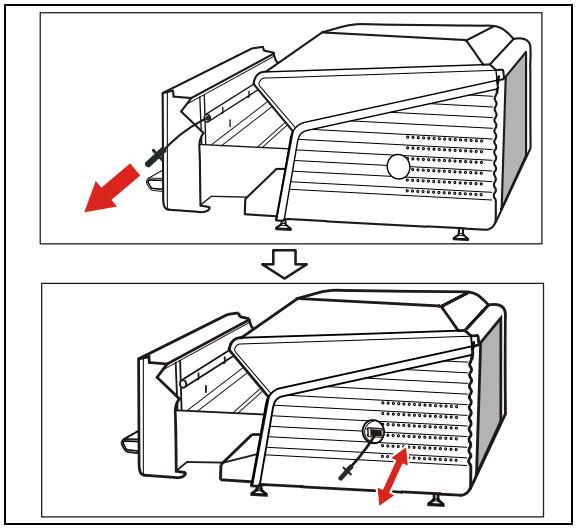


Figure 19

5.3 Scanning the Flatfield Image

(1) Insert the exposed cassette in the digitizer.

(2) At the NX workstation select the examination type:
<System Diagnosis → Flatfield>

IMPORTANT:

By selection of examination type "System Diagnosis → Flatfield", the correct settings for image processing of the flatfield are used. Any other examination type may give a result which cannot be compared with the limit pattern.

(3) Identify the cassette.

(4) Wait until the digitizer has finished the scan process.

(5) Print the image or send it to the archive (depending on what is available).

5.4 Checking the Image at the Lightbox or Viewing Station

NOTE:

Checking the images and comparing to the limit patterns may only happen on lightboxes and viewing stations that comply with the specified installation and configuration conditions for diagnostic reading. For details please refer to the respective instructions of the viewing stations / light boxes.

NOTE:

The slow scan direction is always parallel to the short side of the image plate (except 35 x 35 cm cassettes). Due to the hanging protocol* the appearance of the saved flatfield might differ from the physical orientation of the cassette as it has entered the digitizer.

* The hanging protocol (DICOM expression) defines the format and presentation how the images are displayed on the monitor.

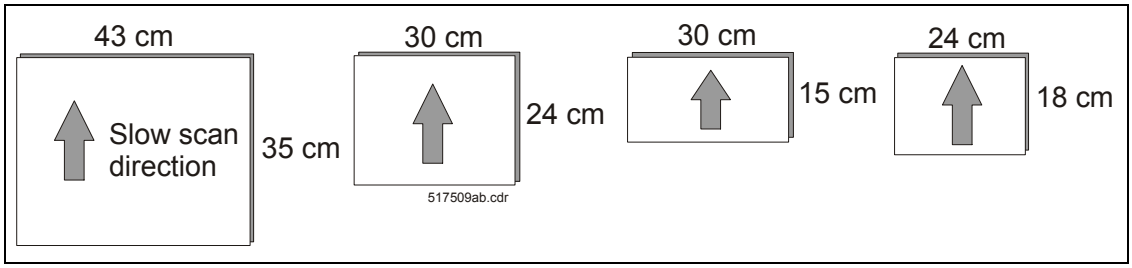


Figure 20

(1) Check the image quality of the flatfield for the following artifacts:

- Stripes in fast scan or slow scan direction
- Large area inhomogeneities
- Unacceptable number of white dots.

Evaluation:

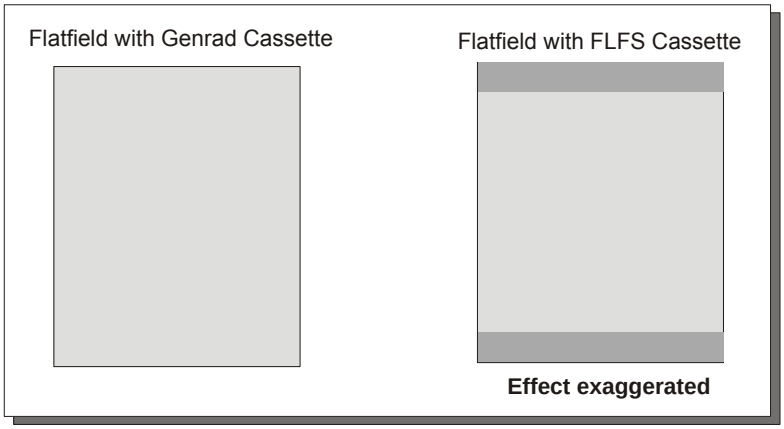
(2) If the scanned flatfield does **not** show one of the artifacts, no further action is required.

(3) If the scanned flatfield shows one of the artifacts compare the flatfield with the limit pattern. Compare the image with the limit pattern set. For detailed instructions see enclosure document which is part of the limit pattern set. The limit pattern set is in scope of the delivery of the digitizer or is available in Mednet GSO Library. It is also available as spare part:

- Limit Pattern Set for verification CR 30-X 2nd:
  Spare part number* CM+9 5175 9160 1
- Limit Pattern Set for verification of CR 30-Xm:
  Spare part number* CM+604948 00

IMPORTANT:

If a FLFS cassette for flatfield exposure is used, the image will be slightly darker in the upper and lower image area where the backscatter protection is removed (approximately 1 cm each). These darker zones also have to be used for image quality evaluation in slow scan and fast scan direction.



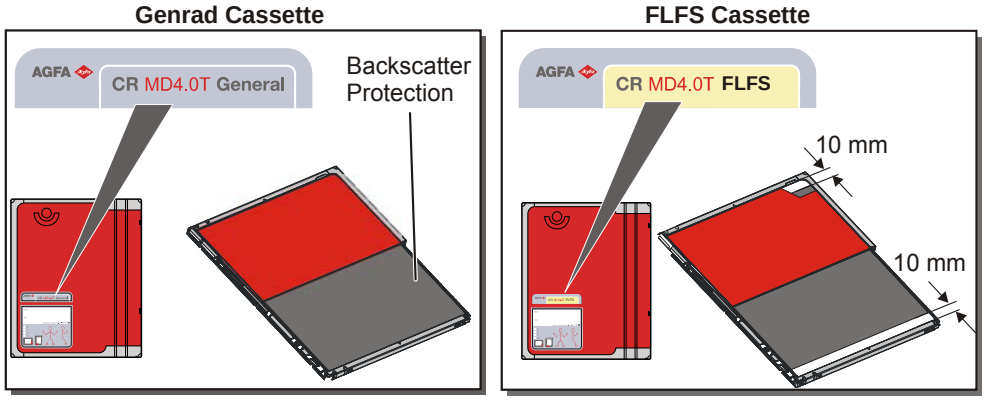


Figure 21

6 Completion of the Maintenance

The “completion of the maintenance” is split up into the following steps:

#	Step	Section
1	Resetting the Maintenance Indicator	6.1
2	Creating a Backup of Device specific Data	6.2
3	Performing the Customer Conversation	6.3

6.1 Resetting the Maintenance Indicator

(1) In the digitizer service menu select: <**Maintenance Indicator**>

(2) Select: <**Reset of Maintenance Indicator**>

NOTE:
Resetting the maintenance indicator also resets the relative counters.

6.2 Creating a Backup of Device specific Data

(1) In the service menu select: <**Backup & Restore**>

(2) Leave default settings.

(3) Select **<Complete Backup>** to perform a backup.

(4) Select **<Save to PC Hard disk>**.

(5) Select **<Logout>**.

(6) Copy the Backup ZIP file from The NX Workstation to the digitizer USB Flash Drive and the Service PC.

6.3 Performing the Customer Conversation

(1) Fill out the Maintenance checklist and hand it out to the customer.

(2) Explain the results of the maintenance to the customer.

7 Maintenance Checklist

Digitizer Serial Number:	Image Plate Cycles and months since last maintenance:

The maintenance has to be carried out:

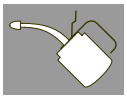
- Every 30.000 Image Plate Cycles or
- Every 2 years

NOTE:

Maintenance must be carried out according to the maintenance instructions: DD+DIS231.10E

Diagnostics	**OK**	**Not OK**	**Solved**
Questioning of the customer	☐	☐	☐
Analyzing the Info Counter	☐	☐	☐
Documenting the Technical Image Quality of the System	☐	☐	☐

Maintenance points - Power off	**OK**	**Not OK**	**Solved**
Checking of Power and Network Cable	☐	☐	☐
Checking of the Covers	☐	☐	☐
Checking of the Cables	☐	☐	☐
Checking of the IP Guide Plate	☐	☐	☐
Checking of the four Belt Drives	☐	☐	☐
Performing a mechanical Check of the Drawer Slider	☐	☐	☐
Performing a visual Check of the Transport Rollers	☐	☐	☐
Performing a visual Check of the Stepper Motors	☐	☐	☐
Cleaning the Inside	☐	☐	☐
Cleaning the Erasure Unit	☐	☐	☐
Cleaning the Prescan Antistatic Brush	☐	☐	☐
Greasing the Spindle at the Cassette Fixation Unit	☐	☐	☐



Maintenance points - Power off	OK	Not OK	Solved
Reassembling of the removed Parts	☐	☐	☐
Checking the Cassette Condition	☐	☐	☐

Maintenance points - Power on	OK	NOT OK	Solved
Checking the Safety Switch	☐	☐	☐
Performing a Stall Calibration	☐	☐	☐
Performing Test Cycles	☐	☐	☐

Technical Image Quality Check of the System	OK	NOT OK	Solved
Exposing the Cassette	☐	☐	☐
Cleaning of the Scan Line and the Mirror	☐	☐	☐
Scanning the Flatfield Image	☐	☐	☐
Checking the Image at the Lightbox or Viewing Station	☐	☐	☐

Completion	OK	NOT OK	Solved
Resetting the Maintenance Indicator	☐	☐	☐
Creating a Backup of Device specific Data	☐	☐	☐
Performing the Customer Conversation	☐	☐	☐

Remarks:

....

Date / Signature Service Technician Date / Signature Customer