



Diagnostic Imaging Specialists Corporation

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Instruction Manual for Carestream QA Mamchex Revision A: February 10th 2009

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WE,

**DIAGNOSTIC IMAGING SPECIALISTS CORPORATION
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- *erklären, dass die Produkte*
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DISC CarestreamQA Mamchex consisting of the following:

Model QMX - Carestream

- *auf die sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt:*
- *to which this declaration relates are in conformity with the following standard:*
- *auquels se referent cette declaration sont conforme a la norme:*

EN61010-1 Safety requirements for electrical equipment for measurement control and laboratory use

Exigences de securite pour de l'equipement electronique afin de controller les mesures et pour l'utilisation du laboratoire

- *Gemass den Bestimmungen der Niederspannungsrichtlinie:*
- *following the provisions of the low voltage Directive:*
- *conformement aux dispositions de la Directive basse tension:*

73/23 EWG und 93/68 EWG

October 5, 2002

QA Mamchex with Carestream Firmware

Theory of operation

The QA Mamchex meter measures the X-ray beam at the image plane and calculates three values:

1. **O.D.:** The Mamchex meter calculates the resultant film O.D. for a reference Carestream MR 2000 film/screen system when exposed to radiation.
2. **MamLU:** The QA Mamchex meter calculates the resultant MamLU (Mammo light units) produced by the radiation. This value is directly proportional to the light produced by the imaging plate.
3. **Radiation Time:** The QA Mamchex meter calculates the total radiation time for each exposure.

Operating Instructions

Turning the Meter on:

To turn meter “ON”, momentarily press the Power/Reset button. The meter will turn ON and do internal diagnostic test. The display will then indicate “**Waiting for Reset**”.

Note: The meter will show the charge level of the internal battery. If the battery charge is “Low”, you should charge the batteries for at least ½ hour before using the meter.

Resetting the Meter:

Just before you are ready to take an exposure, momentarily press the Power/Reset button. The display will change from “**Waiting for Reset**” to “**Reset Detected**” and then to “**Ready for Exposure**”. You can now take your test exposure. The meter measures the exposure and calculates and displays three values.

Canceling Reset:

If you have reset the meter and change your mind about taking a test exposure, you can cancel the reset by momentarily pressing the Power/Reset button. Display will change from “**Ready for Exposure**” to “**Exposure Aborted**” and then back to “**Waiting for Reset**”.

Turning Meter Off:

If you want to turn the meter “OFF”, press and hold the Power/Reset button down until the display reads “**Power Down**” and then release the button.

Note: If the meter is on and not used for ~10 minutes, the meter will automatically power itself down.

Attenuation Matching

Before using the QA Mamchex for AEC driven exposures on any imaging system, you “**must**” attenuation match the Mamchex cassette to the Test cassette of the actual imaging system. The reason for attenuation matching is to ensure that the AEC driven exposures for the Mamchex Cassette(in bucky) is the same as the AEC driven exposures for the actual imaging system test cassette(in bucky). You want to ensure that the X-Ray machine’s AEC system cannot tell the difference between the Mamchex Cassette and the imaging system’s test cassette.

Attenuation matching Procedure

1. Suggested Technique: Use Large Focus, 25kVp, Mo/Mo Anode filter combination, 4 cm breast equivalent phantom, AEC “ON”, and density selector to “0”.
2. Phantom Positioning: Center the Phantom on the table top from Left to Right and overhang the phantom by 1cm over the chest wall. Note: For the small 10x12cm phantoms, center the 10cm dimension from left to right. You must make sure that the phantom adequately covers the entire sensitive area of the Mamchex cassette (Cutaway in cassette where radiation sensor is located).
3. AEC Detector Positioning: Position the X-Ray machine’s AEC detector ~2cm away from the chest wall, this ensures that the AEC detector is positioned in the center of the Mamchex measuring area.
4. Place Imaging system test cassette in bucky and take an AEC driven test exposure. Document the post exposure mAs value.
5. Install one (0.2mm AL shim) and one (0.1 mm Al shim) in the plastic drawer located just below sensitive area of Mamchex cassette.
6. Remove Imaging system test cassette from Bucky and place Mamchex cassette in Bucky. For larger 24cm x 30cm Bucky’s, use the L-bracket in conjunction with Mamchex cassette to position Mamchex cassette in Bucky.
7. Take same AEC driven exposures as in step “4”. Observe post exposure mAs value on Mammo machine. Compare this mAs value to the mAs value in step 4.

If the mAs value from step 7 differs from mAs value in step 4 by more than 2%, remove Mamchex cassette from bucky and adjust attenuating shims in plastic drawer accordingly.

Piece of laminated Paper: ~2%

Plastic drawer: ~ 7%

Al Filter(0.1mm): ~18%

Al Filter(0.2mm): ~35%

8. Repeat Step 7 until mAs value from Step 7 matches mAs value from step 4 to within $\pm 2\%$, the closer the better.

AEC Calibration

Now that you have attenuation matched your Mamchex cassette to your Carestream Test cassette, you can use your Mamchex cassette to calibrate the Mammo AEC system.

Calibration Options

1. Calibrate your AEC system to produce a constant O.D. value with various kVp's, Anode filter combinations and phantom thicknesses. This will cause your AEC system to deliver the same amount of radiation to your CR plate as it would to a Carestream MR 2000 reference film/screen system.
2. Calibrate your AEC to produce a constant MamLU value. This will cause your AEC system to produce a constant CR EI value with various kVp's, Anode filter combinations, and phantom thickness.

Please check with the Carestream factory for appropriate protocols.

Specifications

Mammo Light Units (MamLU) energy dependence:

Simulates the light output of Photostimulatable Phosphor Plate(PSP) +/- 3% over kVp range of 22 to 32 kVp and a patient equivalent thickness range of 2 to 8 cm (within specified rates).

MamLU Gain balance:

Within the in bucky beam conditions associated with film/screen Mammo and CR Mammo, 1 MamLU = Photon Fluence of 340,000 x-ray photons per cm² +/- 5%.

MamLU Digital Range:

0 to 6553.5 MamLU

Minimum MamLU Rate:

15 / Second (~ 1.5mR / Second entrance rate)

Maximum MamLU Rate:

2500 / Second (~ 250 mR / Second entrance rate)

Film O.D. Calculation:

Film O.D. calculated based on data supplied by Carestream Health for a factory reference MR 2000 film/screen system.

Radiation Time:

Mamchex meter displays the total radiation time of each exposure. For mammo machines where exposures consist of several exposure segments, the mamchex meter keeps track of the exposure time in each segment and shows the total accumulated radiation time.

Power On/Off and Reset:

Manual Momentary Switch.

Function:

Meter displays factory reference MR 2000 O.D., MamLU, and radiation time.

Power Requirements:

Built-In NiMH rechargeable battery pack (9.6v) @ 900 mAhr's.

Typical Battery Life between Charges:

Greater than 25 hours of use.

Operating Environment:

59°F to 95°F (15°C to 30°C)

L-Shaped Bracket:

Included for 24cm x 30cm Bucky

AC/DC Adapter:

Input: 120V AC

Output: 12VDC @ 800mA

Electronic Cassette:

~19 x 44 cm. Fits in 18 x 24 cm bucky and also fits into 24 x 30 cm bucky when using L-Bracket adapter.

LIMITED WARRANTY

DISC Carestream QA Mamchex, System (QMX - Carestream System)

This product, except the use, is warranted by Diagnostic Imaging Specialists Corporation (DISC), to the original purchaser to be free from defects in material and workmanship under normal use for a period of one (1) year from the date of purchase. During the warranty period, and upon proof of purchase, the product will be repaired or replaced (with the same or similar model) at our option, without charge for either parts or labor at the DISC factory. The purchaser shall bear all shipping, packing, and insurance costs to the DISC factory. The warranty will not apply to this product if the product has been misused, abused, or altered. Without limiting the foregoing, bending or dropping of unit, broken electrical wires, visible cracking of the product components and/or enclosures are presumed to be defects resulting from misuse or abuse.

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