

Practical Solutions for Frequently Asked Questions About Mammography Quality Control

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About Your Speaker



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Memberships:

- Canadian Organization of Medical Physicists (COMP)
- Ontario Association of Medical Physicists (OAMP)
- American Association of Physicists in Medicine (AAPM)
- Sociedad Paraguaya de Física Medica (SPFM)
- Society for Imaging Informatics in Medicine (SIIM)

Leadership Roles:

- Chair of TG 367 Quality Control of Dual-energy X-ray Absorptiometry (DXA) Systems (AAPM)
- Chair of MPPG 23 Radiation Protection Surveys for Diagnostic and Nuclear Medicine Facilities
- Board of Directors American Board of Magnetic Resonance Safety (ABMRS)
- President PACS Administrators Registry and Certification Association (PARCA)



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Presenter Disclosures/Disclaimers

- Disclosures
 - JF Medical Physics does provide a full spectrum of medical physics services related to mammography quality management
- Disclaimers
 - Certain manufacturers are mentioned in this talk. I have no endorsements or agreements with any of them



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Acknowledgements

- Miss Marilyn Bailey (MRT) for her input on FAQ's



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Learning Objectives

At the end of this session the participant will be able to:

- Identify common quality control challenges encountered by mammography technologists
- Apply acquired practical knowledge to enhance and improve the efficacy of local quality control programs
- Compare and contrast the quality control standards and requirements with respect to Canadian Association of Radiologists - Mammography Accreditation Program, Ontario Breast Screening Program, and manufacturers' recommendations

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Quality comes not from inspection, but from improvement of the production process.

W. Edwards Deming

quote fancy

<https://quote fancy.com/quote/1160453/W-Edwards-Deming-Quality-comes-not-from-inspection-but-from-improvement-of-the-production>

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Ontario Breast Screening Program (OBSP) Mammography Equipment Quality Assurance (QA) Guidance Document

Sent out to facilities in Winter 2020

States that the document contains:

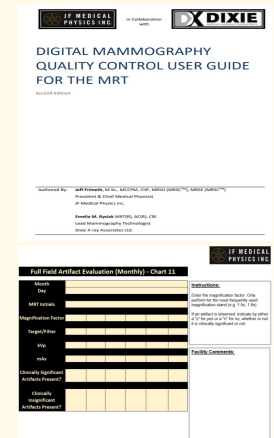
- A summary of and reporting requirements for the QC tests required by CAR MAP and the OBSP. For QC tests not required by CAR MAP there is additional guidance provided.
- OBSP's requirements for physicists performing physics inspections on mammography units and guidelines on when physicist consultation is required.
- The roles and responsibilities of radiologists, technologists and physicists.
- Not intended to be a comprehensive manual with all the details



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Technologist QC Tests

- OBSP states “advisable that sites document QC tests using forms or charts provided by the vendor or physicist” (in addition to CAR-MAP approved forms)
- JFMP offers facilities a “Digital Mammography Quality Control User Guide For the MRT” meeting all current CAR-MAP/OBSP standards



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Technologist QC Tests

- Table 1 within guidance document
- OBSP has a column for “Corrective Action Timeline”
 - Before clinical use (BCU)
 - Within 30 days (W30D)
 - Issues need to be corrected and verified by physicist

Therefore, keep your physicist in the loop! If he/she does not know, then he/she cannot help you!

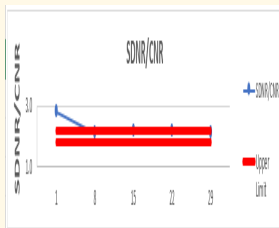
Overlap with CAR-MAP and OBSP

Table 1. List of required technologist QC tests for OBSP sites

Test	Frequency	CAR MAP requirement	OBSP requirement	Corrective action timeline
Visual check/daily checklist	Daily	✓	✓	N/A
Acquisition workstation (AWS) display cleaning	Daily	✓	✓	Before clinical use*
Radiologist review workstation (RWS) display cleaning and viewing conditions	Daily	✓	✓	Before clinical use
Artifact evaluation (flat field)	Weekly and Monthly	✓	✓	Before clinical use if artifacts are clinically significant; all other artifacts within 30 days**
AWS monitor QC	Weekly	✓	✓	Before clinical use if artifacts hinder image review; all other defects within 30 days

FAQ #1

- When a QC test shows “higher” than expected or “lower” than expected results, what does this look like in my images?
 - Very likely will not see any changes!
 - Digital images (all modalities) function such that an underexposed or an overexposed area of anatomy will appear with sufficient image quality
 - A higher value (e.g. SDNR) will generally indicate improved image quality due to lower noise (standard deviation)
 - Likely due from potentially use of a higher dose mode (e.g. CNT – GE Senographe Essential) or from recent servicing
 - Normally your results will stay in the +/- 15% range per OBSP requirements
 - If this fails, repeat your steps (phantom positioning, compression force, analysis)
 - If this still fails, contact your medical physicist
 - We can advise you if this is felt to be clinically significant or not



FAQ #2

- I schedule my HARP and annual medical physics evaluations with JF Medical Physics, but what does this actually evaluate?
 - HARP
 - Every six months (or upon alteration/servicing)
 - Only for mammography unit (not review workstation)
 - four parameters: “penetrability of the X-ray beam” is above a minimum threshold, collimation, mean glandular dose < 3 mGy, back up timer does not exceed a maximum threshold
 - Annual CAR-MAP/OBSP medical physics evaluation
 - Technical evaluation of mammography unit
 - Mechanical function, radiation dose, image quality
 - Technical evaluation of on-site review workstation (if applicable)
 - Ensure appropriate calibration and other items
 - QC review (this is best done with the medical physicist AND the MRT on-site)
 - What about a hardware or software change/upgrade?
 - Inform your medical physicist!
 - At minimum, artifact, SDNR, and RMI images must be reviewed by the medical physicist
 - JF Medical Physics recommends following the ACR standards



4.3 Physicist Oversight after Repairs and Upgrades

After repairs or upgrades to the mammography gantry or RWS, it is important to verify that the equipment performs according to standards.

Sites must consult with their physicists after conducting any of the repairs listed below. The physicist will determine whether an inspection is required or whether it is sufficient for the physicist to provide oversight and review results of tests carried out by other qualified personnel, such as the radiographic technologist or service personnel.

At a minimum, after any of the repairs listed below, the physicist must review the results of the artifact test (flat field), the MAP phantom image quality test and the SDNR test, including system-reported dose values and exposure parameters. For the RWS, the physicist must review the results of the GSDP calibration and luminance levels. The physicist must provide the site with a letter stating that they reviewed the results of post-repair tests.

The following describes major equipment repairs and upgrades that require physicist oversight:

- Automatic exposure control recalibration, replacement or adjustments which affect dose;
- Selectable density step adjustment;
- Compression force or thickness indicator;
- X-ray tube replacement;
- High voltage generator replacement;
- Collimator replacement;
- Collimator blade adjustment;
- Filter replacement;
- Software upgrade or modification;
- Digital detector;
- kV, mA and exposure time adjustment;
- RWS display video card changes or software upgrade; and
- RWS display relocation.

II. Introduction

Table 3. Medical Physicist Involvement in Equipment Adjustments, Changes, or Repairs

Item	Component	Major Repair	Medical Physicist Involvement
Automatic Exposure Control (AEC)	AEC replacement	Y	On site
	AEC recalibration that affects dose	Y	On site
	AEC sensor replacement	Y	On site
	AEC circuit board replacement	Y	On site
Bucky Replacement	Density control - internal adjustment*	N	Oversight
	Thickness compensation - internal* adjustment	N	Oversight
	AEC sensor also replaced	Y	On site
	AEC sensor not replaced	N	Oversight
Collimator	DM detector also replaced	Y	On site
	DM detector not replaced	N	Oversight
	Replacement	Y	On site
Compression Device	Reassembly with blade replacement	Y	On site
	Adjustment	N	Oversight
	Pressure adjustment	N	Optional
Compression Padicle	Thickness scale accuracy adjustment but only if it affects AEC performance	N	Oversight
	Repair of auto decompression	N	Optional
	Padicle slow to factory	N	Oversight
	Deflection adjustment	N	Oversight
X-ray Unit	Adjustment due to extension beyond allowable limit, or visible on images	N	Oversight
	Installation	Y	On site
	Reassembly	Y	On site
	X-ray tube replacement	Y	On site
	High voltage generator replacement	Y	On site
	Filter replacement	Y	On site
	Manufacturer's software upgrade or modifications	Y	On site
	DM detector replacement or repair	Y	On site
	kVp, mA, or time - internal* adjustments	N	Oversight
	Reduction	Y	On site
Display Devices	New installation or replacement	Y	On site
	New video card or software upgrade	Y	On site
	Reduction	N	Oversight
Computed Radiography (CR) and Photostimulable Phosphor (PSP) Plates	New installation or replacement of CR reader	Y	On site
	Replacement of all PSP plates	Y	On site
	Clean or new PSP plates	N	Oversight

*Internal adjustments refer to equipment adjustments that typically cannot be made by the operator.

Ontario Breast Screening Program (OBSP) Mammography Equipment Quality Assurance (QA) Guidance Document (March 2020)



© 2026, JF Medical Physics Inc. ACR Digital Mammography Quality Control Manual (May 2020)

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FAQ #3

• What QC should I be doing for Contrast Enhanced Digital Mammography (CEDM)?

- Currently no OBSP standards/requirements
- CAR-MAP has nothing specifically stated either
- JF Medical Physics recommends following the manufacturer's QC manual "as is"
- Likely more recommendations once AAPM TG 410 is published
 - Basic Performance Testing of Contrast-Enhanced Mammography Systems

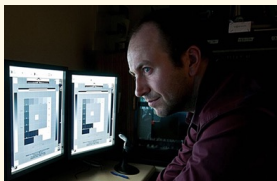


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FAQ #4

- How can I keep track of all the QC for the "at home radiologists"?
 - Consider setting up a calendar reminder to ask them for the annual medical physics report and required QC documentation
 - They likely require QC education (generally not from site but from medical physicist at their home)
 - Help them out, otherwise the QC won't get done



Side note: JF Medical Physics sets up the calibration software installed to automatically remind the radiologist to perform the QC. This software keeps logs as well for any future review. Less button clicking and higher radiologist adherence.



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FAQ #5

• We changed our X-ray tube. What next?

- Inform CAR
 - D-phantom, artifact phantom, and RMI phantom images
- At minimum to be sent to the medical physicist for oversight
- If tube is different from the approved OEM, then an XRIS submission is to occur
 - Prior to tube installation
- Consider performing vendor QC tests (these might be performed by the vendor and likely will, but you never know!)
- Detector calibrations



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FAQ #6

- Is there a better way to check the displays since it is dependent on the operator's eyesight?
 - Not really
 - The best way is to standardize HOW the QC is performed
 - Jeff's tricks
 - Keep consistent room lighting
 - Let your eyes adjust to the surrounding light
 - AWS – likely not a problem (just do it)
 - RWS – again likely not an issue, but it will help since these are dark compared to your mammo room
 - It takes about 10 mins for the eyes to be "dark adapted" and 20 mins to be full dark adapted
 - MRT QC is not concerned with looking at subtle aspects of the displays, so the results should be rather consistent overall
 - Gross reflections on the displays (direct light and indirect light) can reduce how well you see the image



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FAQ #7

- Do I really have to do all the CAR-MAP, all the OBSP, AND all the manufacturer's QC? Ugh!!
 - CAR-MAP and OBSP most definitely, but...
 - If you do this, you will pretty much be adhering to the manufacturer's QC too
 - Your medical physicist can help advise on this to reduce unnecessary overlaps and ensure compliance
 - Don't necessarily need to fill in multiple QC forms
 - E.g. no need to complete the manufacturer's form for artifact evaluation and then another one for OBSP
 - They are generally "one in the same"
 - Again, contact your medical physicist



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FAQ #8

- A medical physicist is a medical physicist is a medical physicist, eh?
 - With respect to OBSP, no
 - Sites must use a (Canadian College of Physicians in Medicine) CCPM certified mammography physicist
 - This physicist might not even be the one to show up on-site and the one you interact with
 - OBSP allows the medical physicist to delegate this work
 - My opinion is that sites actually have the CCPM certified physicist on-site. Why?
 - They are the ones that carry the mammography-specific certification
 - They are the ones to best address your questions on QC and engage you on any aspects of QC
 - If there is an issue with the unit, they will be able to discuss a way to rectify the issue(s) rather than waiting for the medical physicist to review the results, then potentially fail your unit (after more patients have been imaged)
 - A specific advantage to having JF Medical Physics on-site
 - Our staff is not only mammography-certified but also certified in all areas (except RT) of medical physics. We can head on over to work with your CT, SPECT, MRI, general X-ray after we are finished with mammo



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FAQ #9

- What do I need to do if we have a software upgrade and all our reject rate data is lost?
 - Know ahead of time what will occur! Be in the loop
 - Download reject data
 - Contact your medical physicist
 - If the software upgrade has the potential to change the look of clinical images an RMI phantom image needs to be imaged
 - I would likely recommend a D-phantom image analysis also be performed
 - Software might change pixel values



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FAQ #10

- If I find an artifact, can I still image patients?
 - It really depends on
 - The Chief Radiologist (primarily)
 - They are responsible for the QA program at your facility (name is on CAR documentation)
 - Location of the artifact
 - Is it near the chest wall vs. other edges?
 - Central FOV or periphery?
 - The look of the artifact(s)
 - Is it only one dead pixel? Does it mimic a microcalcification? Is it dust?

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FAQ #10

- I generally recommend contacting your medical physicist if you think there is an issue or are unsure if you should halt imaging or not or just need to simply call service
- With education, time, and practice, you as an MRT will gain experience to be able to decide on your own (or at least minimize the assistance from the medical physicist)
 - Troubleshooting:
 - Take a phantom image
 - Flatfield – only on one T/F combo or multiple?
 - How does the artifact look compared to features in the RMI phantom?

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FAQ #11

- What QC should I perform for tomosynthesis?
 - Routine QC
 - Currently no OBSP standards/requirements
 - CAR-MAP has nothing specifically stated either
 - JF Medical Physics recommends following the manufacturer's QC manual "as is"
 - Acceptance Testing/Annually/Repair or Replacement
 - Medical Physics evaluations
 - Will be up to the individual Medical Physicist how they wish to evaluate
 - JF Medical Physics Inc. will evaluate to the latest American College of Radiology standards
 - Likely more recommendations once AAPM TG 245 is published
 - Tomosynthesis Quality Control

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FAQ #12

- How do I perform the semi-annual compression force evaluation?
 - Scale on breast support
 - Be mindful that the bucky cover is made of a carbon fibre – sensitive
 - Use foot pedal only to compress until it stops (no tapping)
 - Be mindful that the paddle is made of a plastic which can crack
 - Siemens users - OpComp
 - Ensure between 11-20 daN/kg or 25-45 lbs
 - If underside of scale is not level, ensure it is levelled
 - Easier to remove face shield and have scale display facing you



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FAQ #13

- How do I know if my phantom images are good enough to pass with CAR?
 - Sorry, but you don't. It will depend on the reviewer and their knowledge/experience. However, we can give you much more confidence upon our review.
 - Send DICOM images to jf@jfmedphys.com for a careful evaluation of image quality
 - This is COMPLIMENTARY if you are already our client (value-add)
 - Review of any artifacts, appropriate DICOM header information
 - Be sure to include both your RMI phantom and flatfield phantom (MG and BTO formats as applicable)

FAQ #14

- I'm still confused and find it pretty subjective how to count the fibres/specks/masses. What's the deal dude?
 - RMI 156 phantom (minimum: 4/3/3)
 - Fibres
 - Full point if full length and correct location/orientation
 - Half point if > 50% is visible and correct location/orientation
 - Deduct if artifacts present
 - Speck Groups
 - Full point if 4-6 specks visible and correct location
 - Half point if 2-3 specks visible and correct location
 - Deduct if artifacts present
 - Masses
 - Full point if mass visible and correct location and generally circular (> 3/4)
 - Half point if mass visible and correct location but not generally circular
 - Deduct if artifacts present



ACR Mammography Quality Control Manual (1999)

FAQ #14

- I'm still confused and find it pretty subjective how to count the fibres/specks/masses. What's the deal dude?
 - ACR DM phantom (minimum: 2/3/2)
 - Fibres
 - Full point if full length and correct location/orientation
 - Half point if > 50% is visible and correct location/orientation
 - Speck Groups
 - Full point if 4-6 specks visible and correct location
 - Half point if 2-3 specks visible and correct location
 - Masses
 - Full point if mass visible and correct location and generally circular (> 3/4)
 - Half point if mass visible and correct location but not generally circular
 - Artifacts
 - Not clinically significant



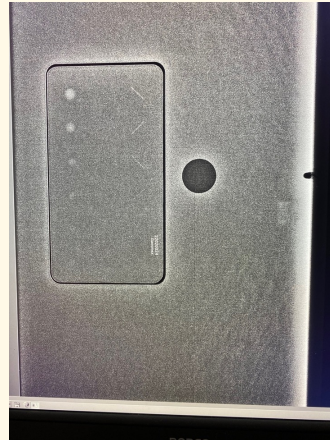
https://www.sunnclear.com/uploads/documents/dotshesht/Diagnostir/FFDM_Mamma_Phantom_071323.pdf

FAQ #15

- We just replaced our mammography unit. Do I still have to keep my QC records? How long?
 - CAR-MAP has told me years ago for one full accreditation cycle (3 years)
 - HARPA Reg. 543
 - QC records to be kept for at least six years
 - Keep records for six years
 - Check your local regulatory and accreditation requirements as well as any local facility retention policies

FAQ #16

- I found some artifacts on my phantom this morning. We also have a full day of patients. Help!
 - Recall FAQ #10
 - Good thing this is found BEFORE your first patient
 - Importance of evaluating for artifacts daily vs. weekly
 - Identify and determine if this would be a clinical issue
 - Will it mimic breast cancer?
 - Will it overlap any anatomy of importance?
 - Is the artifact located in the area of the breast or outside?
 - Is this so subtle that it can wait for servicing?



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Dead Line Artifact and Debris Near Focus

- Cause:
 - Dead line in detector and dust/metal fillings near focus
- Solution:
 - Map out dead line (service function) or replace detector
 - If this is Hologic, Siemens, or Planned, you can try performing a detector/gain calibration first before any service intervention
 - Clean in tube head, re-calibrate detector
 - Ensure appropriate medical physics evaluation

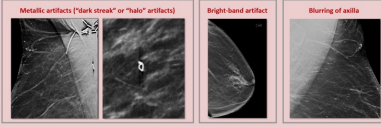
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FAQ #17

RSNA

Synthetic Mammography: Benefits, Drawbacks, and Pitfalls

Artifacts seen at synthetic mammography



Chikarmane SA et al. Published online: September 28, 2023
<https://doi.org/10.1148/rg.230018>

RadioGraphics

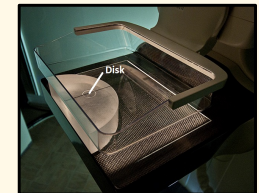
Chikarmane SA. Published Online: September 28, 2023
<https://doi.org/10.1148/rg.230018>

RadioGraphics

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FAQ #18

- So I heard I don't have to use that D-phantom. Is that correct?
 - Yes, you heard correctly
 - D-phantom → not commercially available
 - JFMP does sell it however
 - ACR DM phantom → commercially available
 - You can perform ALL phantom tests with it
 - Caveat: does not cover full field
 - Quick fix: take two exposures



<https://www.sunuclear.com/products/mammography-compliance-phantoms>

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Your Turn

- What FAQ's would you like answered?
- Do you agree/disagree or would like to add anything to the FAQ's previously mentioned?
- Share your own personal experiences
- Floor is open

More Information

Contact JF Medical Physics Inc.
for more information

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