

## **Equipment Quality Control for Primary Displays**

### **May 10, 2019**

### **Imaging Physics**

#### **CancerCare Manitoba**

#### **Purpose**

An equipment quality control (QC) program establishes baseline performance levels, tracks system performance over time and reveals performance trends. This document outlines the tests that are typically part of a QC program for primary displays. Primary displays are used by radiologists for interpretation and diagnosis. Contact Imaging Physics for assistance in setting up a program.

#### **What are the benefits of a QC program?**

- Performance degradation can be identified leading to preventative action.
- Patients benefit when equipment performance is maintained at acceptable levels.
- A QC program is an important element in achieving accreditation.

#### **What are the components of a QC program?**

The QC program is set up by the facility under the guidance of a medical physicist certified by the Canadian College of Physicists in Medicine. The program consists of acceptance testing, on-going quality control, and periodic review of QC data and outcomes. Typically, the more routine QC activities are carried out by a technologist while in-depth checks are performed by, or under the guidance of, a medical physicist. A typical QC program includes the following:

#### *Acceptance Testing*

Acceptance testing must be performed by a medical physicist when a system is installed, relocated (where relevant) or undergoes significant upgrades or maintenance. Acceptance testing verifies vendor specifications and compliance with performance standards taken from the *ACR–AAPM–SIIM Technical Standard for Electronic Practice of Medical Imaging 2017* or successor documents. It is the facility's responsibility to make arrangements for acceptance testing by a medical physicist.

#### *Monthly*

1. Visual evaluation of the following:
  - a) contrast discrimination and luminance levels using the SMPTE or TG-18QC pattern,
  - b) uniformity and artifacts using a uniform black pattern and
  - c) uniformity and artifacts using a uniform white pattern.

With experience, the monthly tests should require approximately 1 to 3 minutes per display. The QC data should be recorded in a manner that allows monitoring of trends in performance levels. It is recommended that QC data trends be reviewed at least semi-annually.

Step by step instructions and a sample log sheet for primary display monthly QC are appended to this document.

*Annually*

1. Annual testing by a medical physicist or display specialist to evaluate performance against vendor specifications.
2. Annual equipment QC review by a medical physicist.

**Where to go for help?**

Imaging Physics at CancerCare Manitoba provides physics testing for diagnostic imaging systems, and can assist diagnostic imaging departments in setting up QC programs, training staff to perform QC tests and identifying appropriate QC tools. You can contact Imaging Physics at [Imaging.Physics@cancercare.mb.ca](mailto:Imaging.Physics@cancercare.mb.ca) or by calling 204-787-4145.

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## Annual Medical Physics Review – Primary Displays

*This is a sample form of the annual QC review to be conducted by a medical physicist. This form is required by MANQAP to demonstrate ongoing compliance with the QC requirements.*

<b>Facility</b>		<b>Department</b>	
<b>System S/N</b>		<b>System Location</b>	
<b>System make/model</b>		<b>Contact Person</b>	
<b>Date of review</b>		<b>Time period of data reviewed (mm/yy to mm/yy)</b>	
<b>Overall QC Program Assessment</b>		<input type="checkbox"/> ACCEPTABLE <input type="checkbox"/> ACCEPTABLE but requires remediation <input type="checkbox"/> NOT Acceptable. Immediate action required	

QC Test	Status	Comments
Monthly SMPTE/TG18-QC Evaluation		
Monthly White Uniformity and Artifacts		
Monthly Black Uniformity and Artifacts		
Annual Physics Testing (or acceptance if Equipment is new or relocated)		

**Additional Comments:**

**Overall QC Program Assessment:**

**Required changes:**

**Additional Recommendation:**

Review conducted by  Signature
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# Instructions for Monthly Quality Control for Primary Displays: Barco Displays at Radiologist Review Workstations

## Purpose

Monthly visual check of basic performance of primary displays

## Instructions

1. Clean displays for monthly QC, and as required thereafter. Refer to the display cleaning instructions available on the Imaging Physics website.
2. Adjust viewing conditions to best possible:
  - a. Close doors and blinds
  - b. Turn off or dim lights
  - c. Ensure that other light sources are not creating glare on displays
3. Start Barco MediCal QAWeb Agent
  - a. Move the mouse pointer to the Notification area of the Windows Taskbar (bottom right, next to clock)
  - b. Left-click the arrow symbol to *Show hidden icons*
  - c. Double-left-click on the **MediCal QAWeb** icon (white checkmark on a green circle)
4. Wait for status check to complete, at which time the following buttons will highlight on the QAWeb Agent screen:

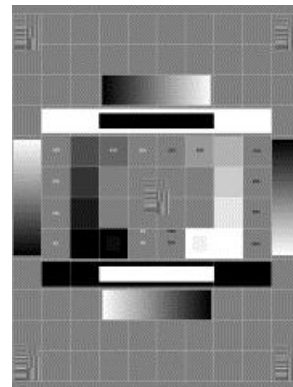
### Status

### Configuration

### Test Patterns

### Service Level

5. Select **Status**
6. Under **Scheduled Actions**, select **Run** for **Visual Test**. Enter your name and press OK. The SMPTE test pattern will appear
7. For each display:
  - a. Check that you can clearly differentiate each of the 12 contrast blocks, from 0% to 100%
  - b. Check that you can clearly see the 5% box in the 0% the 95% box in the 100% block
  - c. Answer the dialog box question for each display appropriately
  - d. Wait for the test to complete
  - e. Close the **Visual Test** screen
  - f. Close the **Status** screen

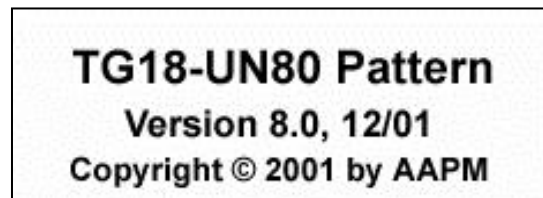


greyscale  
block and

8. You are now back at the main QAWeb Agent screen. Select **Test Patterns**
9. Use arrows at bottom to page through test patterns until you see **AAPM TG18-UN10** (page 8)
10. Select this pattern



11. Wait for **Searching sensor** message to disappear, after which all displays will display a uniform dark image
12. For each display, visually inspect for any obvious non-uniformity or patterns of bright pixels or other artifacts
13. Click anywhere when done to dismiss uniform dark pattern
14. Use arrows at bottom of Test Pattern screen to page to **AAPM TG18-UN80** test pattern (page 8)
15. Select this pattern



16. Wait for **Searching sensor** message to disappear, after which all displays will display a uniform light image
17. For each display, visually inspect for any obvious non-uniformity or patterns of dark pixels or other artifacts
18. Click anywhere when done to dismiss uniform light pattern
19. Close the **Test Patterns** screen
20. Exit MediCal QAWeb Agent screen
21. Log results

