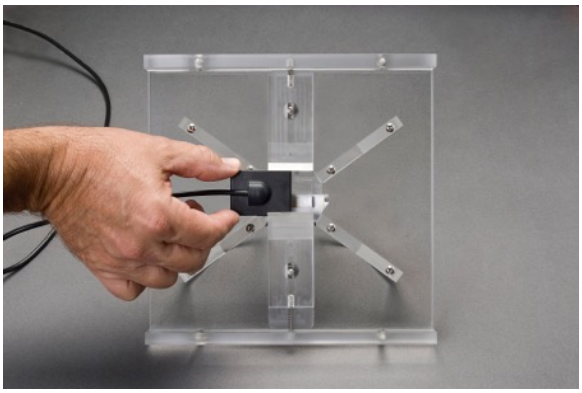
Digital Dental Quality Assurance Phantom Manual

Initial Acceptance and Constancy Assessments

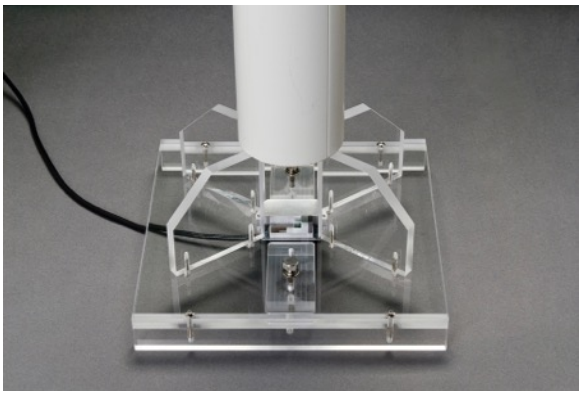
Because every x-ray source is slightly different in tube potential, exposure timer accuracy, x-ray filtration, half-value layer, and tube output, every x-ray receptor/sensor must be evaluated with a specific x-ray source. This means that the following steps must be performed on each x-ray source that is used with a specific sensor.

Initial Acceptance Assessment

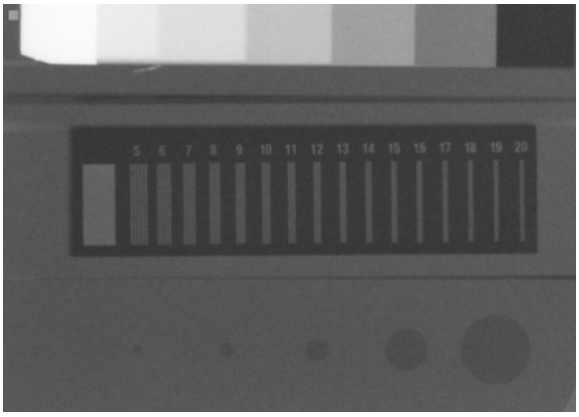
1. Place the receptor/sensor to be evaluated directly under the central portion of the Digital Dental Quality Assurance (DDQA) phantom and secure in position by adjusting the two spring loaded clamps to center the detector. With size 0 or 1 sensors, the operator may need to adjust the position of the sensor to image all the contrast detail wells. This may cut off part of the stepwedge portion of the DDQA device due to the small active areas on the size 0 or 1 detectors.



2. Place the DDQA phantom with the digital sensor attached to the underside on a flat surface within reach of the x-ray source.
3. Place the x-ray beam indicating device directly on top of the four rest tabs on the top of the DDQA phantom



4. Adjust the kVp and mA to the settings which will be used for clinical exposures. Start at the lowest possible exposure time and save a series of images while incrementally increasing the exposure time. Determine the highest and lowest exposure where all the steps (7 density levels) of the stepwedge can be clearly delineated. The highest exposure should not exceed the Diagnostic Reference Level (DRL) for an intraoral bitewing image of 1.6 mGy (183 mR) entrance skin dose. Record these values on the Initial Acceptance Assessment Worksheet (See Page 4). An example of image showing all seven step is shown below.



Note: Seven Steps, 5-20 line pairs, and two rows of 5 holes

5. Count the number of visible line pairs in the image at the highest exposure time as determined in step 4. Record the visible line pairs value on the Initial Acceptance Assessment Worksheet.
6. In the same images, count the number of visible holes (maximum 5) in the row that have increasing diameters and count the number of visible holes (maximum 5) in the row that have the same diameters. Record both of these values on the Initial Acceptance Assessment Worksheet.
7. For each image acquired in Step 4, count the number of visible line pairs and holes. Record these values on the Initial Acceptance Assessment Worksheet.
8. The lowest exposure in which the maximum line-pairs and number of holes can be visualized is the Initial Acceptance Testing Optimal Exposure.
9. Record this exposure time as the Optimal Exposure setting on the Initial Acceptance Assessment Worksheet.
10. Acquire and save a digital image with the Optimal Exposure setting determined in step 9. This image will be used for comparison in the subsequent Constancy assessments for the x-ray sensor/ x-ray source combination
11. To test another sensor from the same manufacturer, the operator only needs to loosen one side of the adjustment clamp to remove and replace the sensor thereby saving time.
12. Data for each sensor should be recorded separately on a separate Initial Acceptance Assessment Worksheet.

Constancy Assessment

1. Position the sensor and x-ray machine to be evaluated as described in step 1 through 3 in the Initial Acceptance Assessment.
2. Acquire a digital image using the Optimal Exposure settings from the corresponding Initial Acceptance Assessment Worksheet.
3. Compare the number of steps, line-pairs and holes present in the Initial Acceptance image to the new image.
4. Record the date, technician and results in the Constancy Assessment Record (See Page 5).
5. This procedure can be repeated to verify sensor performance at scheduled intervals to be determined by the individual facility such as weekly, biweekly or monthly. However, it is strongly recommended that a quality control assessment evaluation be performed on the sensor if the sensor has been dropped, mishandled or bitten by a patient.

Digital Dental Quality Assurance
Initial Acceptance Assessment Worksheet

Date: _____

Technician: _____

Sensor (Manufacturer, Model, Serial #): _____

X-ray Machine (Manufacturer, Model, Serial #): _____

kVp: _____ mA: _____

Highest Exposure Limit: _____ Lowest Exposure Limit: _____

Exposure Time	Steps	Line-Pairs	Holes same diameter	Holes increasing diameter

Optimal Exposure: _____sec.

Digital Dental Quality Assurance

Constancy Assessment Worksheet

Sensor (Manufacturer, Model, Serial #): _____

X-ray Machine (Manufacturer, Model, Serial #): _____

kVp: _____ mA: _____

Optimal Exposure: _____sec.

Acceptance Date	Technician	Steps	Line-Pairs	Holes same diameter	Holes increasing diameter

Date	Technician	Steps	Line-Pairs	Holes same diameter	Holes increasing diameter