



CESO 2019

TROUBLESHOOTING

MEDICAL IMAGING CT PROBLEMS/CASE STUDY

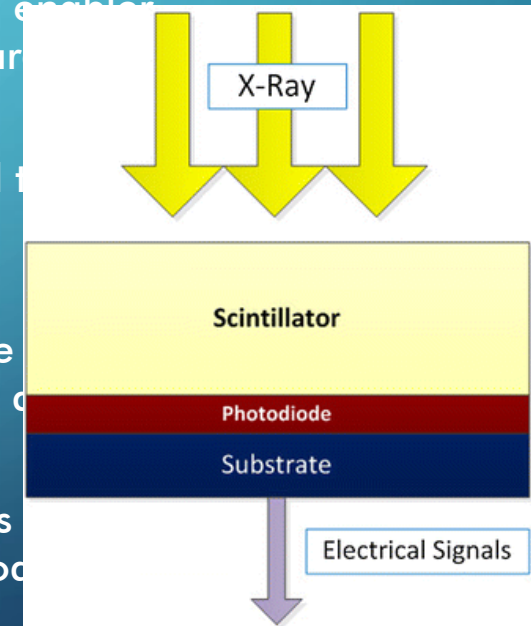
CT DETECTOR ARTIFACT ANALYSIS

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CT DETECTOR ARTIFACT ANALYSIS

•CT Detector Technology

- Over the last two decades, CT detection and source technologies evolved to support three major CT imaging trends : increasing number of slices, increased speed of acquisition and dose reduction.
- Solid-state detectors, segmented into detector elements arrays, were the main enabler for the emergence of multi-slice CT scanners. CT sources evolved to support large coverage per rotation.
- In order to enable increased speed of acquisition, X-ray sources were required to support greater accelerations and increased peak power while the detections systems evolved to support shorter integration periods.
- Over the last few years, the emergence of iterative reconstruction is driving the need for low and ultra-low dose acquisition. This has a direct impact on the need for a low noise floor in the detection systems.
- Most manufacturers share a common detector design. The compact design has three essential layers: conversion of X-ray to light (scintillator), light to current (photodiode) and a substrate to provide the mechanical and electrical infrastructure.



CT DETECTOR ARTIFACT ANALYSIS

- CT System located at UHN

- Aquilion 64 CT system

- 64-row Quantam Detector with 64 detector channels

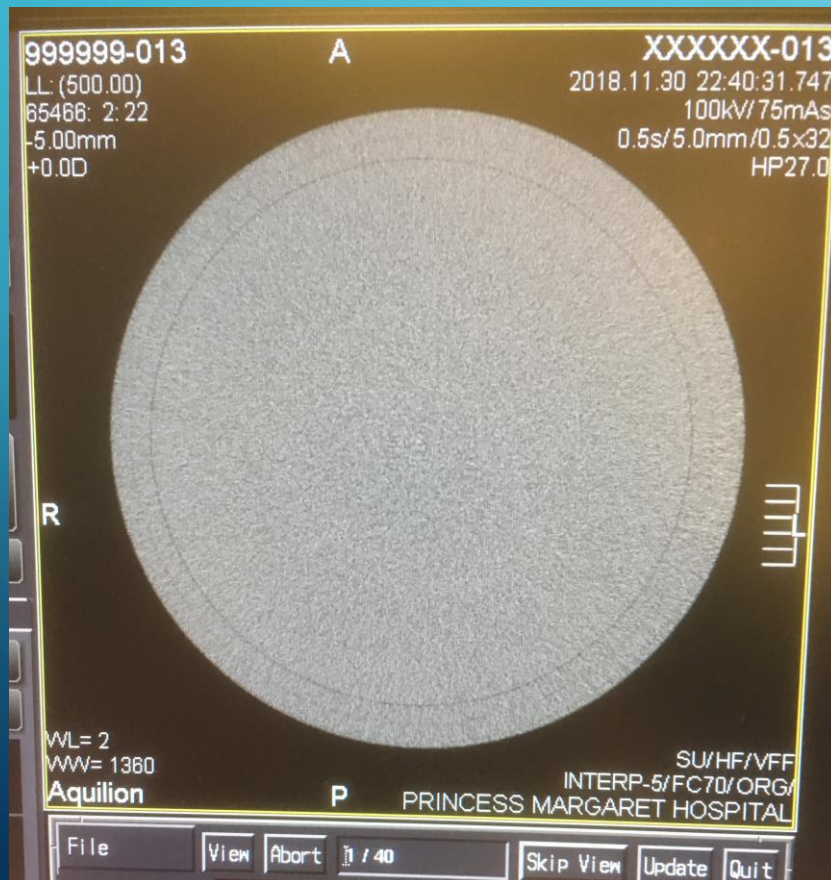
- The Aquilion 64 has been designed to produce high-speed scans, high-resolution images as well as low contrast resolution.

- Fast temporal resolution, high spatial resolution, outstanding low contrast resolution and automatic selection of scan parameters.



CT DETECTOR ARTIFACT ANALYSIS

- Problem
- Multiple ring artifacts reported on CT image



CT DETECTOR ARTIFACT ANALYSIS

- Troubleshooting steps
- CT Service completed a physical inspection of CT detector for contrast spill on surface of detector
- A CT phantom scan confirmed that ring artifacts were reproducible at lower kV settings (80/100kV)
- Water/Air calibrations were completed
- Service retested phantom scans and artifacts were still visible.
 - Calibration did not remove ring artifacts
- Service replaced QV detector control boards (converts charge to reference voltage) and retested phantom scans
 - Replacing QV boards did not remove ring artifacts

CT DETECTOR ARTIFACT ANALYSIS

- Problem Resolution
- CT Service contacted Canon to confirm possible detector fault
- Canon confirmed after analysis that CT detector was faulty and causing ring artifacts on low kV settings (80/100kV)
- CT Service/Canon replace CT detector and completed full Water/Air calibrations. Service retested phantom scans and ring artifacts were eliminated.



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