Rad-X Medical Power Filtration System® (Rad-X Filter)
Catastrophic Voltage Event
Case Study

Site Name	McLaren Imaging Center
Location:	Flint, Michigan
Protected Equipment:	Philips Diamond Select 64 Slice CT
CT Manufacturer Supplied Protection:	TVSS mandated by the CT manufacturer
McLaren Health Supplied Protection:	Rad-X Filter

BACKGROUND

In October 2007, McLaren Imaging Center purchased and installed a Philips Diamond Select 64 slice CT. Included, as part of the CT installation was a Philips supplied Transient Voltage Surge Suppression (TVSS) unit. With a recommendation from McLaren's Clinical Engineering Services, they also purchased and installed a Rad-X Filter from Applied Power Quality Solutions.

On Wednesday March 31, 2009 what appears to have been a major voltage event hit the Imaging Center's electrical system. The Philips supplied TVSS unit was completely destroyed **(pages 2 & 3)**. The Rad-X Filter which was installed between the TVSS unit and the CT was undisturbed by the event. Most importantly, the CT itself did not sustain any damage as a result of the event.

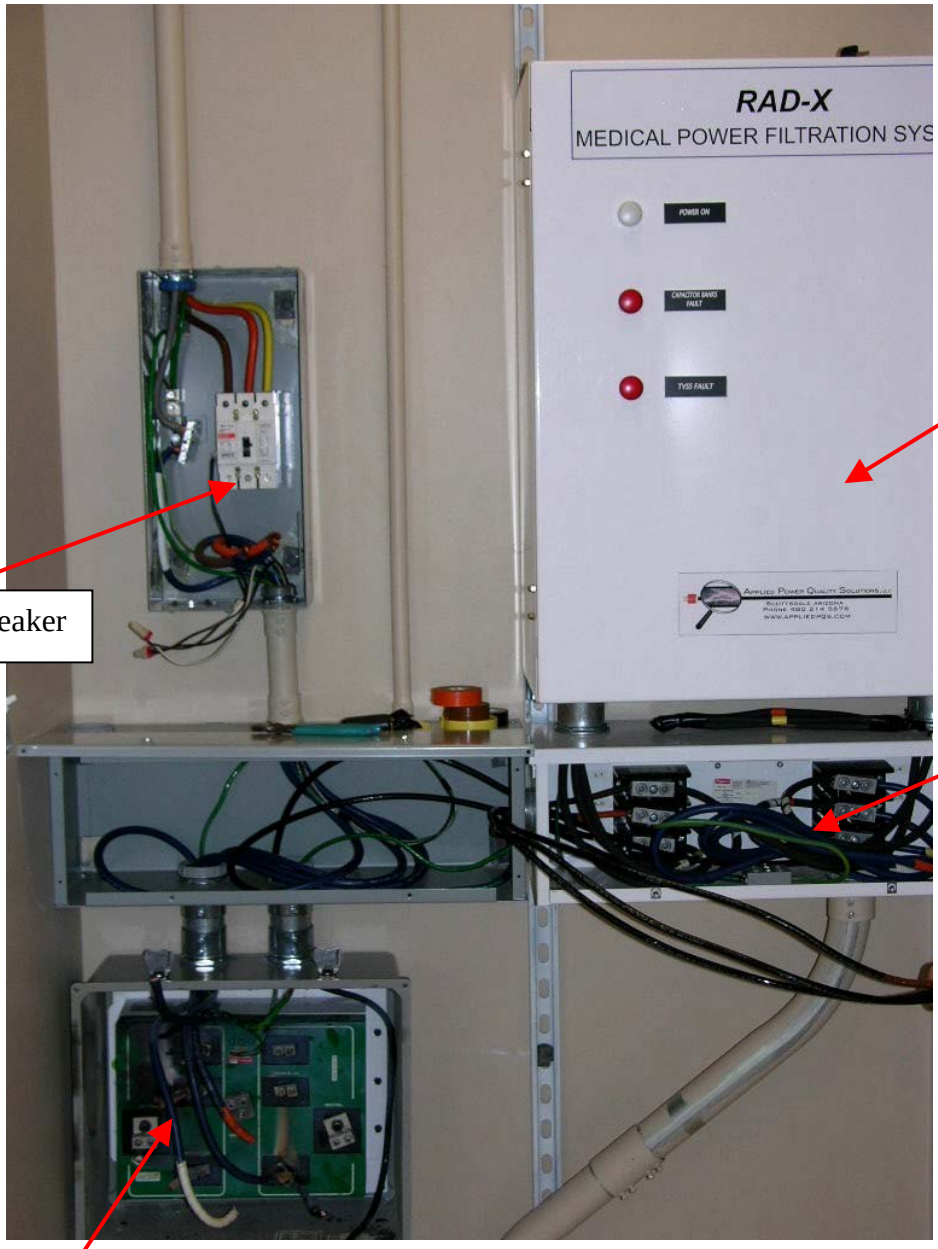
CONCLUSIONS

Traditional TVSS equipment is designed to help prevent potentially catastrophic failures caused by transient voltages and related surge currents. These events are generated by sources outside of the facility such as lightning and utility company equipment failure. As evidenced by this case, the Rad-X Filter performs the traditional TVSS function in a superior fashion. The reason is the combination of substantial reactive and capacitive components operating in concert with its internal TVSS unit. The result is a system that can attenuate extremely high levels of transient voltage and surge current energy without self-destructing.

Beyond the superior TVSS function provided by the Rad-X Filter is its ability to dramatically attenuate high frequency electrical noise and low-level voltage impulses: an ability that is not offered by traditional TVSS equipment. This fact is clearly illustrated in the before and after Rad-X Filter activation report documented on **pages 4 & 5.** In the pre-activation portion of that report we observe high levels of high frequency electrical noise and voltage impulses, in spite of the Philips supplied TVSS unit.

Many power quality experts believe that it is these high frequency events that are responsible for the lion's share of day-to-day equipment disruptions and failures.

Picture 1 illustrates the destroyed TVSS unit and the Rad-X Filter which was unaffected by the voltage anomaly.

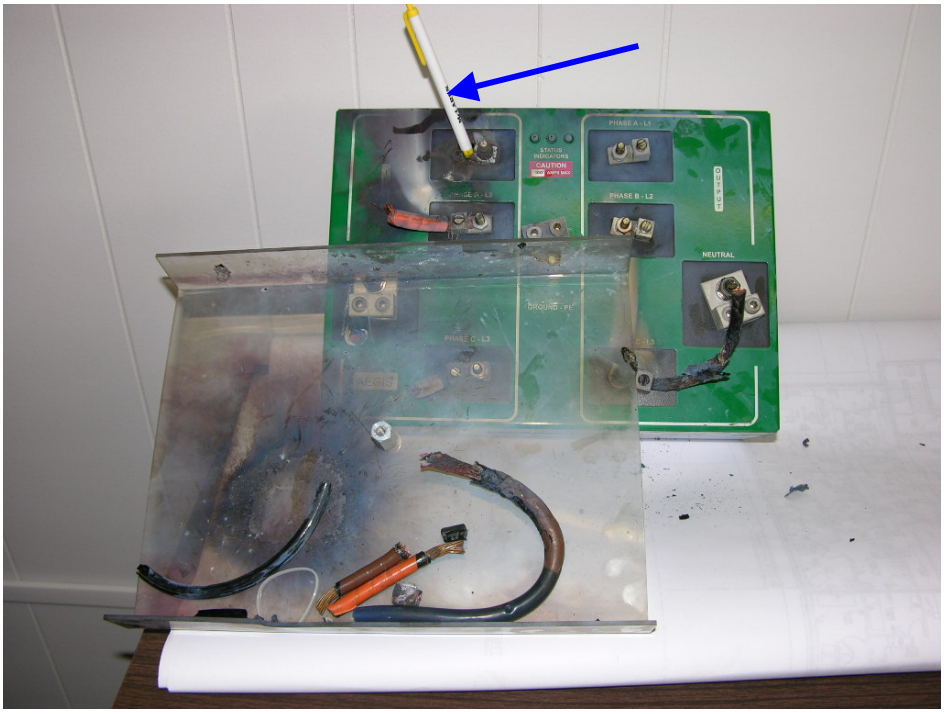


Picture 1

Picture 2 illustrates the complete destruction of the TVSS unit. All phase, neutral and ground conductors were blown off of their connectors.

Picture 2

The blue arrow in **Picture 3** illustrates a pen size hole blown through the front of the TVSS unit. We can see several of the burned conductors lying on the clear plastic faceplate.



Picture 3

Rad-X Filter Activation at the McLaren Radiology Clinic

On October 12, 2007, Applied Power Quality Solutions (APQS) activated a Rad-X Filter purchased for a Philips Diamond Select 64 Slice CT installed in the McLaren Imaging Center in Flint, Michigan. The following report documents pre and post Rad-X Filter activation monitoring. A Dranitz/BMI Model 8800 power disturbance analyzer was used for the purpose of this work

CONCLUSIONS

Pre Rad-X Filter activation monitoring revealed high levels of high frequency electrical noise and thousands of voltage impulses. This activity was recorded in spite of the manufacturer supplied TVSS unit that was installed on the line side of the Rad-X Filter.

Post Rad-X Filter activation monitoring revealed a dramatic reduction of high frequency electrical noise and no voltage impulses were recorded.

Pre Rad-X Filter Activation

Figure 1 is a status report graph illustrating conditions with the Philips CT in idle mode and the Rad-X Filter not yet activated. Voltage levels were good and high frequency electrical noise levels were low with a maximum of 0.5 volts peak to peak (Vpp). **Figure 2** is a 1-hour strip chart report illustrating conditions with the Philips CT in operation and the Rad-X Filter not yet activated. There are three columns in the graph: The left column shows the parameter being monitored, the middle column shows the minimum value and the right column shows the maximum value recorded during the monitoring period. Voltage remained stable, high frequency noise levels were elevated to a maximum of 4.3 Vpp and thousands of low-level voltage impulses were recorded.

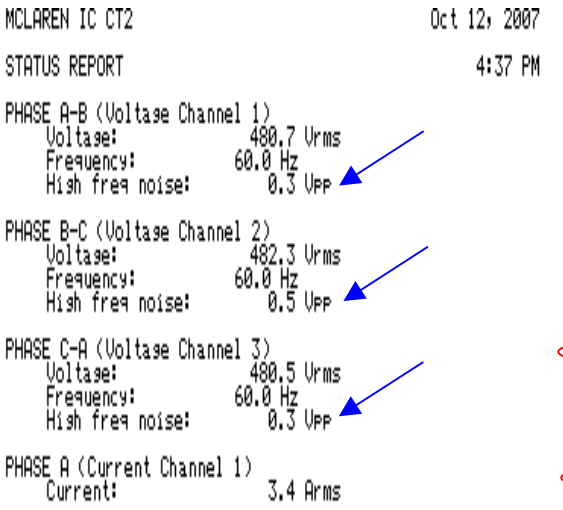


Figure 1

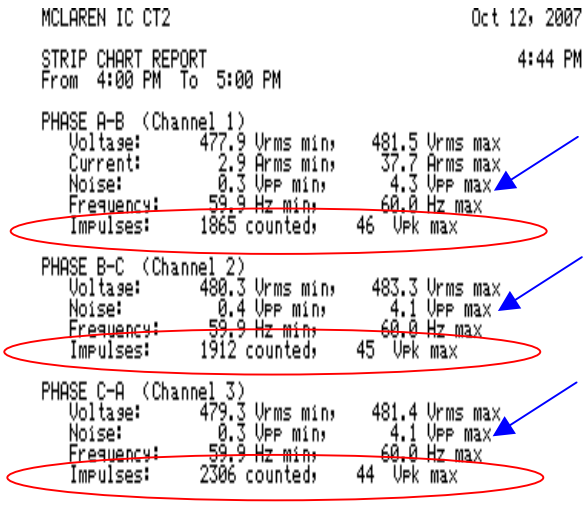


Figure 2

Post Rad-X Filter Activation

Figure 3 illustrates conditions with the Philips CT in idle mode and the Rad-X Filter activated. Voltage levels are good and high frequency noise levels are low. **Figure 4** is a 1-hour strip chart report illustrating conditions with the Philips CT in operation and the Rad-X Filter activated. Voltage remained stable, high frequency noise levels remained low and no voltage impulses were recorded.

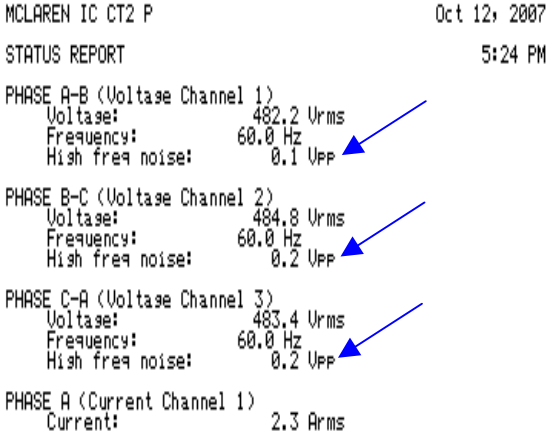


Figure 3

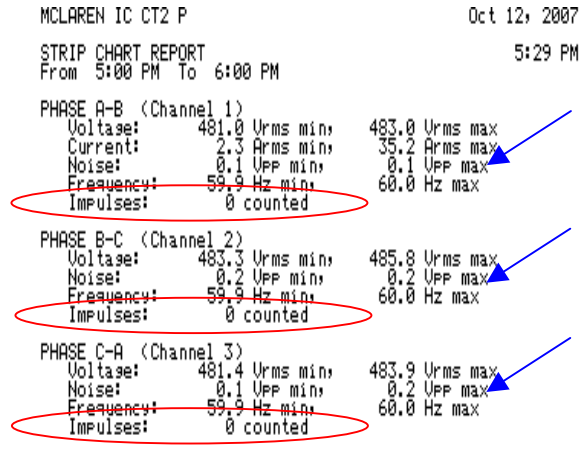


Figure 4