

PDS100 Application Note: LTC problem found by RFI

During an RFI survey in a substation this service company found a suspicious transformer with an uplift of the RFI pattern around one of the bushings on the secondary side, close to the load tap changer (LTC). The transformer LTC was drained from oil and problem located and identified.



A service company was called to do an annual survey of a substation. The service company decided to do an RFI survey of the site to see if any radio frequency interference (RFI) could disclose any problems. The survey was done by obtaining a base line of the ambient RFI footprint which will be used for the survey as a comparison. The sweeps are obtained in a frequency range from 50 to 1000MHz as a default setting on the PDS100.

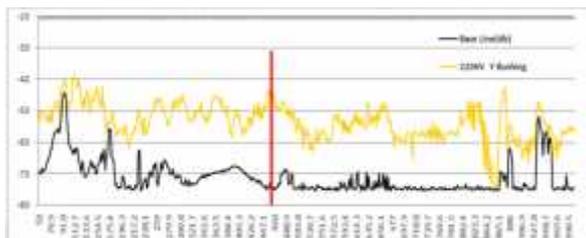


Figure 1

A considerable uplift was found close to the Yellow Phase on the secondary of the transformer (see figure 1).

A time domain sweep was invoked at 462 MHz (red line), which segregates the acquired trace (yellow) by a large difference in value from the background (black trace).

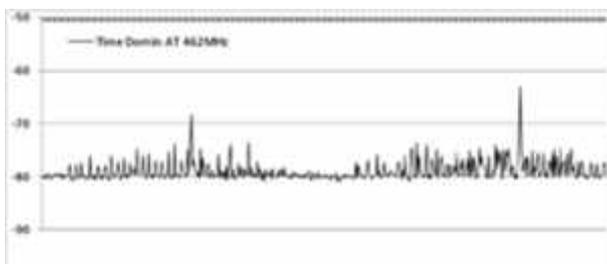


Figure 2

The time domain plot shown in figure 2, spans 20ms. A clear sign of the close between discharges in relation to the power cycle (50Hz).

The pattern of the Time Resolved Mode plot indicated an insulation problem. The LTC was decided put under investigation which included draining the oil.



Figure 3a

Figure 3b

A high voltage connection cable on the yellow phase (see figure 3b) turned out to have less distance from a metallic ground potential, causing the RFI pattern.

The correct distance (shown in figure 3a) were found on red and blue phase. The erratic lead was replaced and the transformer LTC was filled with oil. After this correction the RFI pattern showed normal levels on all phases.

Conclusion:

Even insulation flaws inside transformer tanks are revealed by RFI scans on the outside of the metal tank. One should think that a transformer tank is enclosing any radio frequency radiation from escaping from the almost perfect faraday cage. It turns out that all transformers do have some hatches and apertures which are separated from the tank where radio waves can escape to be detected by the RFI scanner.

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