

Lesson Learned

Generation Relaying – Overexcitation

Primary Interest Groups

Generation Owners (GOs)

Problem Statement

A newly installed volts/hertz (V/Hz) protective relay tripped a generator. The new relay settings were incorrectly based on the settings of the existing protection and were not coordinated with the generator's overexcitation V/Hz limiter in its excitation control system.

Details

While personnel were conducting a voltamperes reactive (VAR) capability test, the unit tripped on a V/Hz protective function. After the trip, it was found that the protective function was not coordinated with the capability of the unit.

The relay had been set based on the same set points of the existing protection. The new relay (redundant to the original) offered a continuous V/Hz time characteristic protective function rather than the definite time trip points of the existing protection. After review of the trip, two things were found: 1) The regulator V/Hz limiter setting may have drifted so it did not coordinate with the relay setting, and 2) The new relay settings could be relaxed to allow a greater margin between the regulator V/Hz limiter and the relay trip characteristic.

Corrective Actions

The V/Hz relay element was reset to coordinate with the regulator limiter and the unit capability curve. The new relay settings provided more margin between the limiter and relay. The regulator V/Hz limiter was tested and settings confirmed when the unit came down for its scheduled routine maintenance outage.

Lessons Learned

When generator relays are being replaced with new technology digital relays, it should not be assumed that basing the new relay settings on the existing protection's set points is the best practice.

Digital relays allow the user to customize the V/Hz function, but care needs to be taken to ensure that a sufficient margin exists between its characteristic, the unit's overexcitation withstand capability curve, and the V/Hz limiter in the excitation control system of the generator. These settings should account for some characteristic drift of the relay and the regulator limiter.

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For more Information please contact:

[NERC – Lessons Learned](#) (via email)

[Jacquie Smith](#) (via email) or (303) 247-3067

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