Hood-Patterson & Dewar, Inc. Electrical Engineering and Testing Fall 2000

Testing Times

A newsletter for the electrical construction and maintenance industry Volume 7 No. 3

Ground Fault Failures

In the last *Testing Times* issue, we discussed spending your testing dollars where they can do the most good, and we made a case for performing ground fault testing. Part of the reason for our recommending ground fault testing is the high failure rate we've seen, on the order of 10-20%.

Why are these failure rates so high? The answers range from original design and wiring at the factory to on-site installation. The failure rate also increases with the complexity of the system (i.e., the failure rate is higher on a main-tie-main ground fault system than a main circuit breaker with integral ground fault).

The simple check would seem to be to use the push-to-test function found on the majority of modern ground fault systems. Unfortunately, this test method will not catch all of the problems in a ground fault scheme. The push-to-test button may seem to properly operate the ground fault system, but when tested by primary injection (actually simulating a ground fault current), the system fails. Failures are often due to the following:

Design and Wiring: The list of problems here includes incorrect wiring of control power and current transformers (CTs) to the ground fault relay. In a main-tie-main setup, we have found neutral CTs on both main breakers installed with the primary polarity sensing in the reverse direction. This configuration uses the neutral CT's test winding for the push-to-test function, and the push-to-test operated properly although the ground fault system would not work. The fix here was to remove the neutral bus and reverse the CTs for correct primary polarity. We have also found several cases where the phase CTs in either the main or tie breaker had two of the phase CTs' secondary wiring terminated on the opposite phase control wiring terminals.

Ground fault problems can be as simple as having the control power turned off

Many times the main bonding jumper is in the wrong location. This is especially common on main-tie-main switchboards where grounding bonds are installed on both sides of the mains. This creates an additional path for ground fault current that during a fault can cause both main breakers to trip.

Installation: Sometimes the problem is as simple as the control power being turned off. A 5-year-old plant in northwest Georgia experienced a ground fault. The

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News you can use!

Contest

We have our first contest winner! In our last *Testing Times* issue, we introduced a contest where you, our readers, give us questions or suggestions for topics you would like to see addressed in future is-

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ground fault system did not trip, and the plant experienced damage to both the switchboard and some downstream equipment. Upon investigation, it was discovered that the ground fault control power had never been turned on when the switchboard was installed.

Also note that ground fault relays are usually shipped set on minimum settings. Ideally, a coordination study should be performed to determine the optimal ground fault setting. Leaving the relay set on minimum often leads to nuisance tripping.

Miscellaneous: Another cause for problems is component failure. We tested a system with primary current injection and found the "A" phase CT had shorted turns internally and could not carry normal load regardless of the setting. In another case, the pick up point was set for 200 amps but did not trip until 550 amps. The controller had to be replaced. (Note that the push-to-test worked properly in this case).

As you can see, ground fault systems fail for many reasons and the chance for failure increases with complexity. To avoid problems, test your ground fault by primary injection.

(Contest, Continued from page 1)

sues. Our first winner is Mr. John Reese of Calhoun Electric & Mechanical Systems in Calhoun, GA. He posed the topic we address in this issue "Why are failure rates so high in ground fault systems?" As promised, Mr. Reese is receiving an Outback Steakhouse gift certificate.

We publish *Testing Times* for your benefit, and our biggest challenge is to come up with articles and topics that we think will be interesting and educational for you. We are going to make this contest open-ended. Send us a suggestion for a topic that you would like to see covered. You will need to be specific, i.e., pose a question or describe a situation that you would like addressed. Winners will receive a gift certificate for $25.00 to Outback Steakhouse. See below for details on how to respond.

Note from the Editor

Thanks to all who have responded to our newsletter topic contest. We will keep your questions on file and if we use your suggestion, we will send you your gift certificate and mention you in our newsletter. This contest is open-ended. If you have a topic suggestion, please fax this page with your topic to Lyn Cosby @ (404) 299-3534 or e-mail Lcosby@hoodpd.com.

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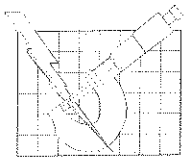

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