Technical Bits … *of knowledge*

Instrument Transformer Secondary Wiring – TB005

IEEE C57.13.3 provides guidance on grounding of instrument transformer secondary circuits.

"The instrument transformer secondary circuit, irrespective of the number of instrument transformer secondary windings connected to or in that circuit, should be connected to the station ground at only one point. Usually, the common return circuit for two or more transformers in a set are made into a secondary common neutral. This neutral should then be connected to the station ground bus at only one point, so that the station ground bus itself will never serve to complete any part of the instrument transformer secondary circuit."

The main reason for the single ground point is to prevent differences in potential in the instrument transformer secondary circuits as a result of differences in potential in the station ground grid. The single ground connection will prevent ground current (as a result of a system ground fault or disturbance) from entering the instrument transformer secondary circuit. The ground conductor should be equal to or larger than the phase conductor, and if made from copper should not be smaller than #12 AWG (for mechanical reasons). The standard goes on to recommend the location of this ground point.

"The point of grounding in the instrument transformer secondary circuit should be located electrically at one end of the secondary winding of each instrument transformer and physically at the first point of application (switchboard or relay panel) of the instrument transformer secondary circuit."

The main reason for grounding the instrument transformer secondary circuit at this location is to provide maximum protection for personnel and equipment, where the exposure is highest (at the switchboard or relay panel). IEEE C57.13.3 goes on to provide examples of grounding different types of circuits, ground connection isolation test facilities, and exceptions to grounding.

When apparatus is equipped with current transformers (CTs), the CT secondary circuits are terminated in the equipment control cabinet (or j-box) on CT shorting blocks. These blocks provide CT shorting capabilities for unused secondaries (spare CTs not connected to a circuit), and the blocks provide a means to short the CTs at the equipment in the event it is required to remove a CT from service. It is not advisable to have more than one (1) CT shorting block per CT secondary circuit. Multiple CT shorting blocks on a single CT circuit can result in an inadvertent shorted CT. Many times this would go un-noticed until an event that relies on the CT secondary circuit mis-operates during faults or load swings. It is, however, advisable to install CT shorting test switches around devices in the CT circuit such that a single device may be removed from service without affecting the remaining devices.

Never place a CT in service with an open secondary circuit.