Application Note

Substation Automation and Protection Division

IR_ Line of Relays

The following information for the IR line of relays is in addition to the application information in the ABB Protective Relay Theory and Applications, edited by Walt Elmore 1994, Line and Circuit Protection Chapter 12, for Directional Overcurrent Phase and Ground Fault Protection Section 3.

If the energy level at the IR_ relay in terms of Vp Iop (or Ip Iop), is twice the minimum operate value for the particular directional unit (at maximum torque angle) for faults on the protected circuit, there will be no tendency for the directional unit contact to bounce.

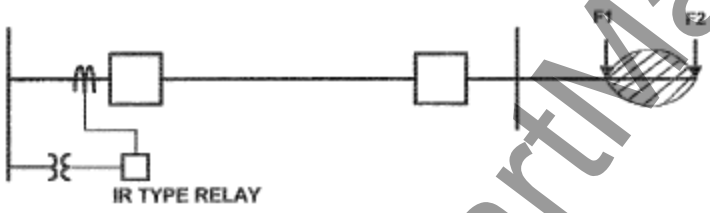

Figure 1

In Figure 1 above, F1 represents the fault location at which the product of Vo and Io is twice the required energy for minimum pickup of the polarized relay at the left. F2 represents the fault location at which the product is at the minimum energy level for pickup and operation is barely possible. Faults to the left of F1 produce enough torque in the directional unit to overcome any tendency for the contacts to bounce. Faults between F1 and F2 are the critical ones that produce marginal torque. In this area, there is a tendency for the directional contacts to weld microscopically, when subjected to prolonged arcing in relays built before April 1988.

In 1988, to avoid even the remote possibility of contact welding, the auxiliary unit was changed from the plunger type CS-1 auxiliary switch to a sensitive telephone relay, designated as TR-1.

Further investigation showed that the addition of the diode alone, type 1N5398, across the CS-1 auxiliary switch coil, would produce sufficient improvement to avoid cylinder-unit contact welding and allow reliable relay operation.

Contributed by:
Kenneth W. Powell
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ABB, Inc.
7036 Snowdrift Road
Allentown, PA 18106
800-634-6005 Fax 610-395-1055
Email: powerful.ideas@us.abb.com
Web: www.abb.com/substationautomation