



Autorecloser Zone Coordination for a Downstream Fault

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DESCRIPTION

The F60 Feeder Management Relay can be programmed to maintain the coordination of overcurrent elements of a upstream relay with a downstream recloser. If a downstream recloser is programmed to use different protection settings for different reclose shots, it may be necessary to change the protection setpoints of a upstream relay (F60) each time the recloser operates. To ensure that protection coordination is maintained, each the reclosure shot for each relay must be coordinated with each downstream recloser shot. In addition, the F60 reclosure shot counter must always match the recloser shot counter.

When a fault occurs downstream of the recloser and the F60 feeder breaker does not trip and reclose, the F60 reclosure shot counter must still be incremented.

This scheme assumes an external reclose operation has occurred when the feeder phase or neutral current exhibits a step increase in magnitude (as shown by Figure 2), due to fault current, followed by a step decrease in magnitude, due to a recloser opening (as shown by Figure 3), provided there is no trip signal from upstream relay and the upstream breaker is closed. After the first detection of an external reclose, the shot counter is incremented by one, protection setpoints are changed, and the autoreclose scheme reset timer is initiated.

IMPLEMENTATION

The logic discussed above is implemented as follows.

1. The Phase and Neutral Instantaneous Overcurrent (IOC) elements of the upstream relay (F60) are set to pick up for a downstream fault (as shown in the following figure) and asserts a virtual output, PH_OC_INT, or N_OC_INT, if the fault current exists for more than 20 ms (user-programmable setting).

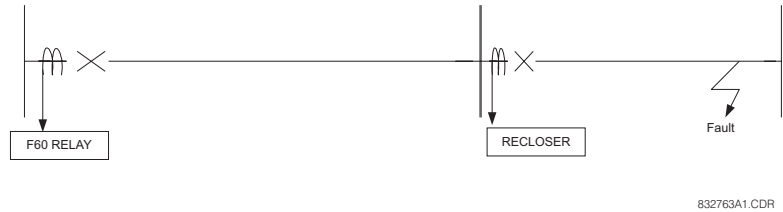


FIGURE 1. Reclosure Coordination Logic for a Downstream Fault

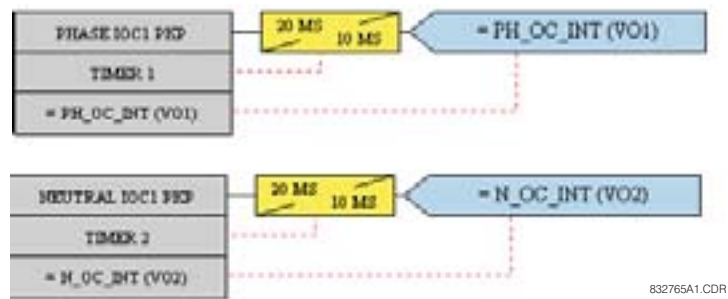


FIGURE 2. Detection Logic for Phase or Neutral Overcurrent Condition

2. If a step increase in magnitude of the fault current is followed by a step decrease in the fault current (**NEUTRAL IOC1 DPO**) while there is no trip signal from the upstream device (F60) and the upstream breaker is closed, the autoreclosure coordination scheme, as shown in the following figure, assumes an external reclose operation has occurred

After the first detection of an external reclose, the shot counter of F60 is decremented by one, protection setpoints are changed, and the autoreclose scheme reset timer is initiated. This is accomplished by using FlexLogic™ operand AR_ZONE_CORD.

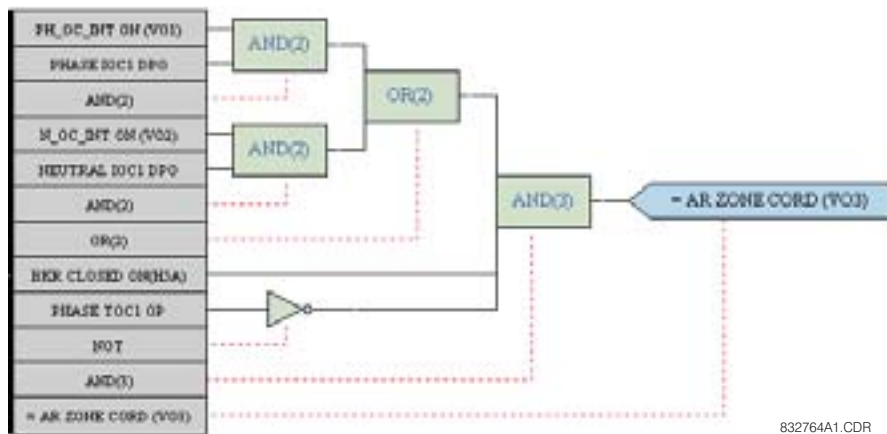


FIGURE 3. Detection of an External Reclose Operation on Downstream Feeder



For correct operation of the coordination scheme, the F60 instantaneous protection elements must be set to have time delays longer than the maximum fault clearing time of the downstream Recloser. In addition, the autoreclose reset timer must be set longer than the maximum time for the Recloser to reach lockout.