The Vista Overcurrent Control 2.0 offers superior overcurrent coordination. Among the features that provide excellent overcurrent coordination are unique "coordinating" speed tap and main time-current characteristic curves, which provide a solution to challenging coordination scenarios. The "coordinating"-speed main and tap curves can also be customized into hundreds of different curves using two definite-time delay settings as well as additional settings, including low-current cutoff and reset time.

"Coordinating"-speed tap curves are used in conjunction with fault interrupters feeding subloop taps, and they have been specifically designed to optimize coordination with load-side weak link/backup current-limiting fuse combinations and source-side relays with low time-dial settings. As such, the curves are faster than "E"- and "K"-speed power fuse TCC curves. "Coordinating"-speed main curves are used in conjunction with fault interrupters on main feeders and have longer minimum response times and different shapes to coordinate with tap-interrupter curves.

Two applications of S&C Vista Underground Distribution Switchgear are described below. Each shows how Vista switchgear, using the "coordinating" speed TCC curves, improves coordination and reliability using the same or fewer units of gear than required with traditional equipment.

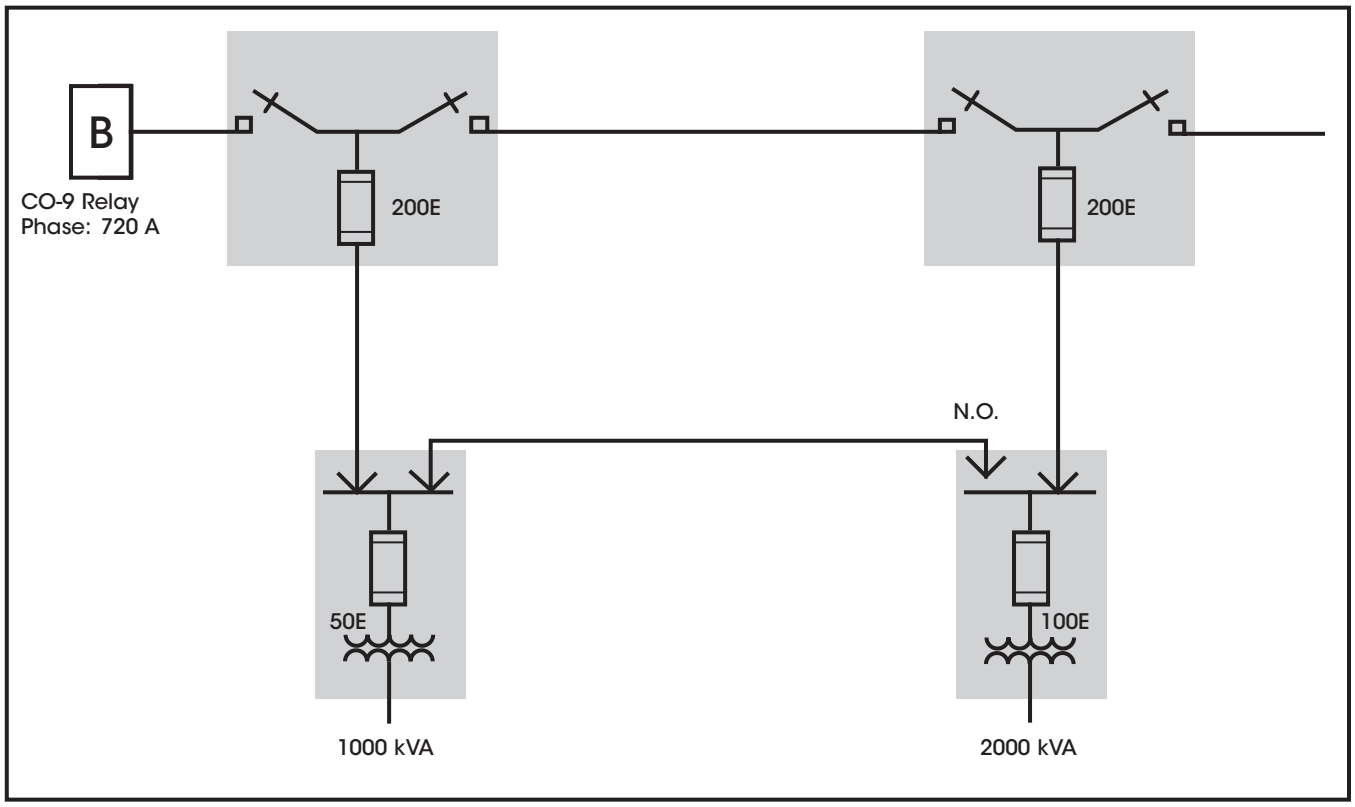

Figure 1. Subloop protection provided by conventional (fused) pad-mounted switchgear.

Increased Load-Carrying Capability and Improved Coordination

As shown in Figure 1, the first application involves an industrial park with 1,000- and 2,000-kVA transformers served by a single loop. Because of the kVA sizes of the transformers, power fuses are used at the transformers. It is necessary to limit the loop to two transformers of this size because of coordination problems between the 100E fuse at the transformer, the 200E fuse in the pad-mounted gear, and the utility's phase relay at the substation that is set to pick up at 720 amperes. The coordination plot in Figure 2 shows how this design will only coordinate through 5,600 amperes, which is not always high enough because many industrial parks are located at the beginning of a circuit where fault currents are high.

When Vista switchgear is applied in the same situation, at least twice as many transformers can be served by two units of gear. See Figure 3 on page 3. Full coordination is also achieved—through 12,500 amperes—by using a 400-ampere coordinating-speed curve. As shown in Figure 4 on page 3, the tap-interrupter curve includes a 4-cycle definite-time delay to coordinate with the 100E standard-speed fuse protecting the 2,000-kVA transformer.

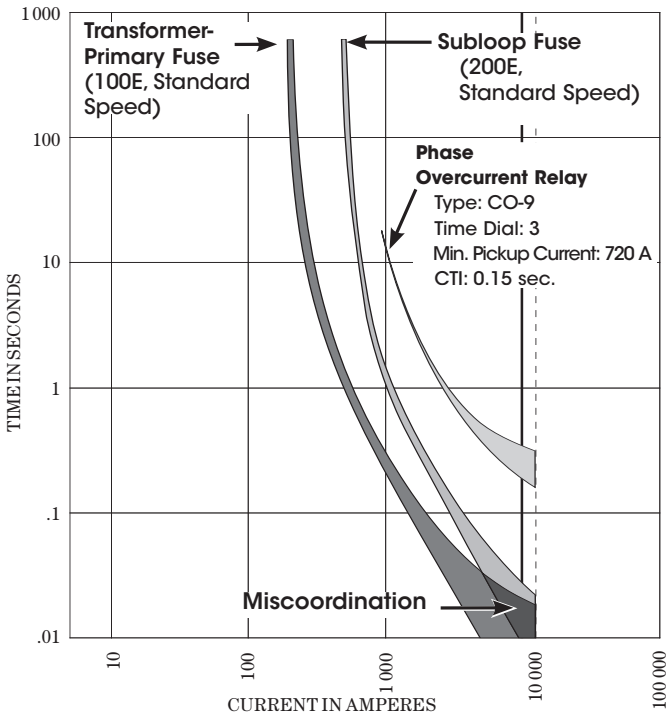

Figure 2. Miscoordination between 100E transformer fuse and 200E subloop fuse.

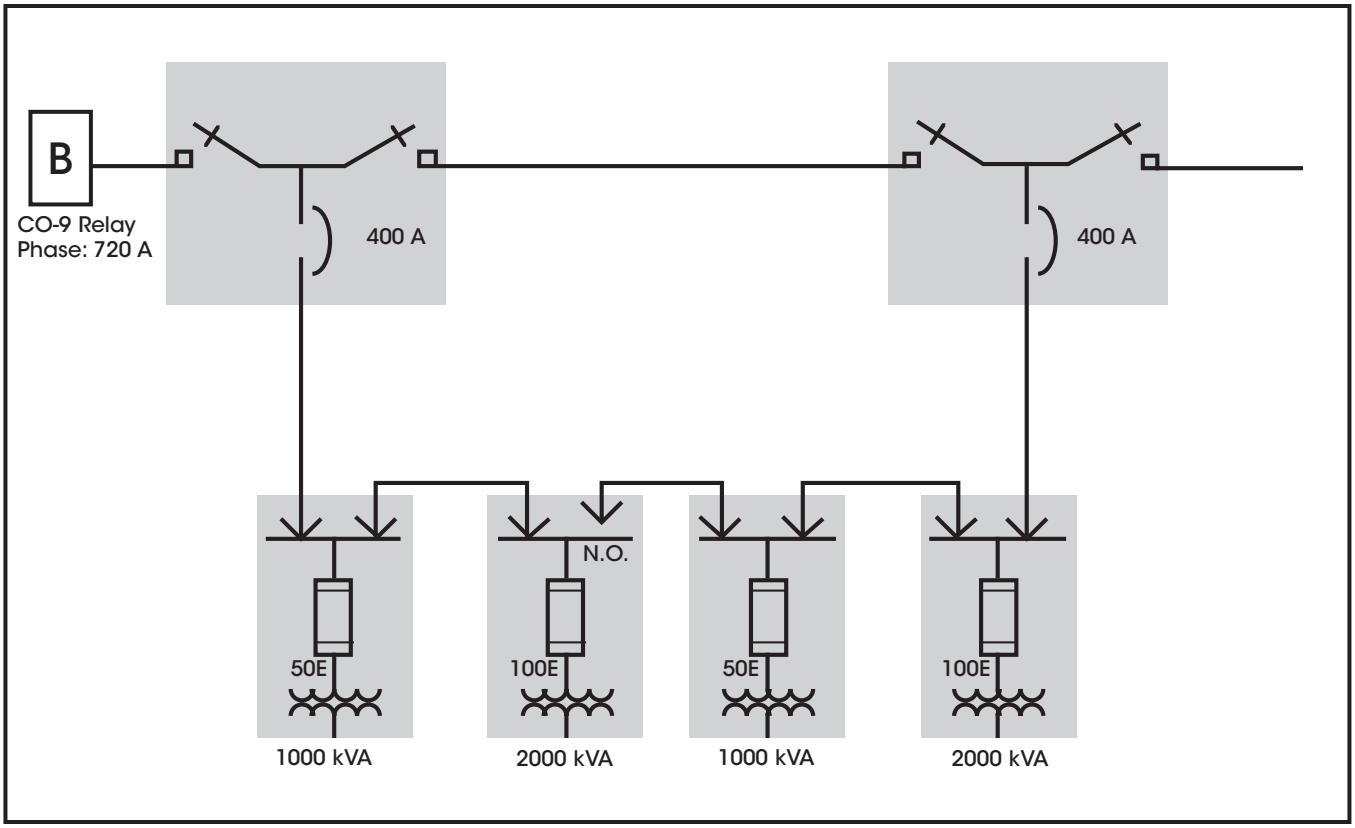

Figure 3. Vista switchgear provides increased load-carrying capability in a single subloop.

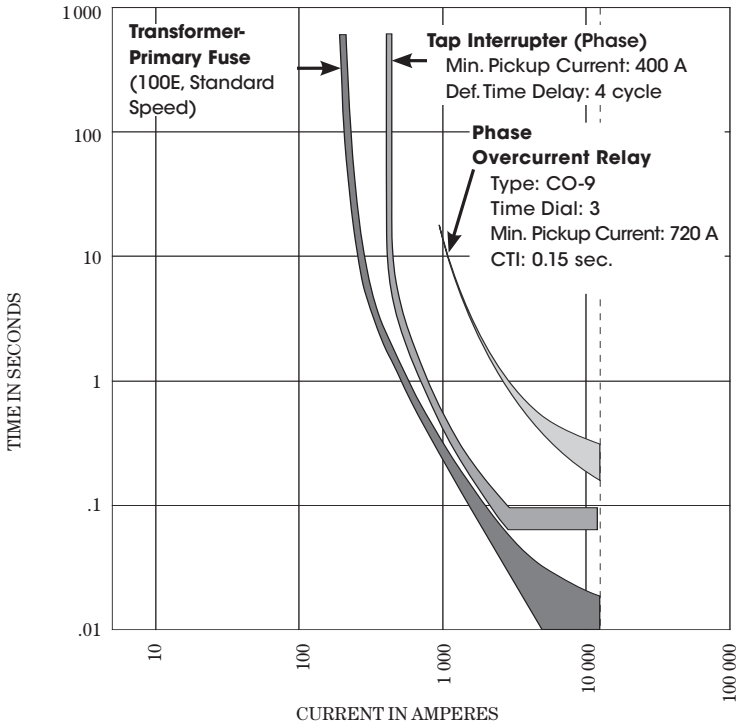

Figure 4. Coordinating-speed tap curve with definite-time delay coordinates completely with 100E transformer fuse.

Improved Circuit Reliability and Reduced Equipment Needs

As shown in Figure 5 on page 4, the second application involves the use of conventional pad-mounted gear to tap a main feeder to serve two commercial parks. The settings of the phase- and ground-overcurrent relays at the utility's substation are 720 amperes and 480 amperes, respectively. Three 1,500-kVA transformers, each protected by an internal current-limiting fuse rated 100C (which is the largest internal fuse available), are used to serve three buildings. The largest tap fuse that will carry the load of two transformers and coordinate with the substation relays is 140K. Refer to Figure 6 on page 4. Thus, it is necessary to establish two loops to serve the load.

The total demand of the commercial park is 3,000 kVA, and three such commercial parks could be connected to one main feeder without exceeding the capacity of a 13.2-kV circuit. However, the reliability of this design may be questionable, depending on the length of the main feeder and the history of cable failures. The solution until now has been to bring a second circuit into the area to serve one of the commercial parks . . . obviously very expensive.

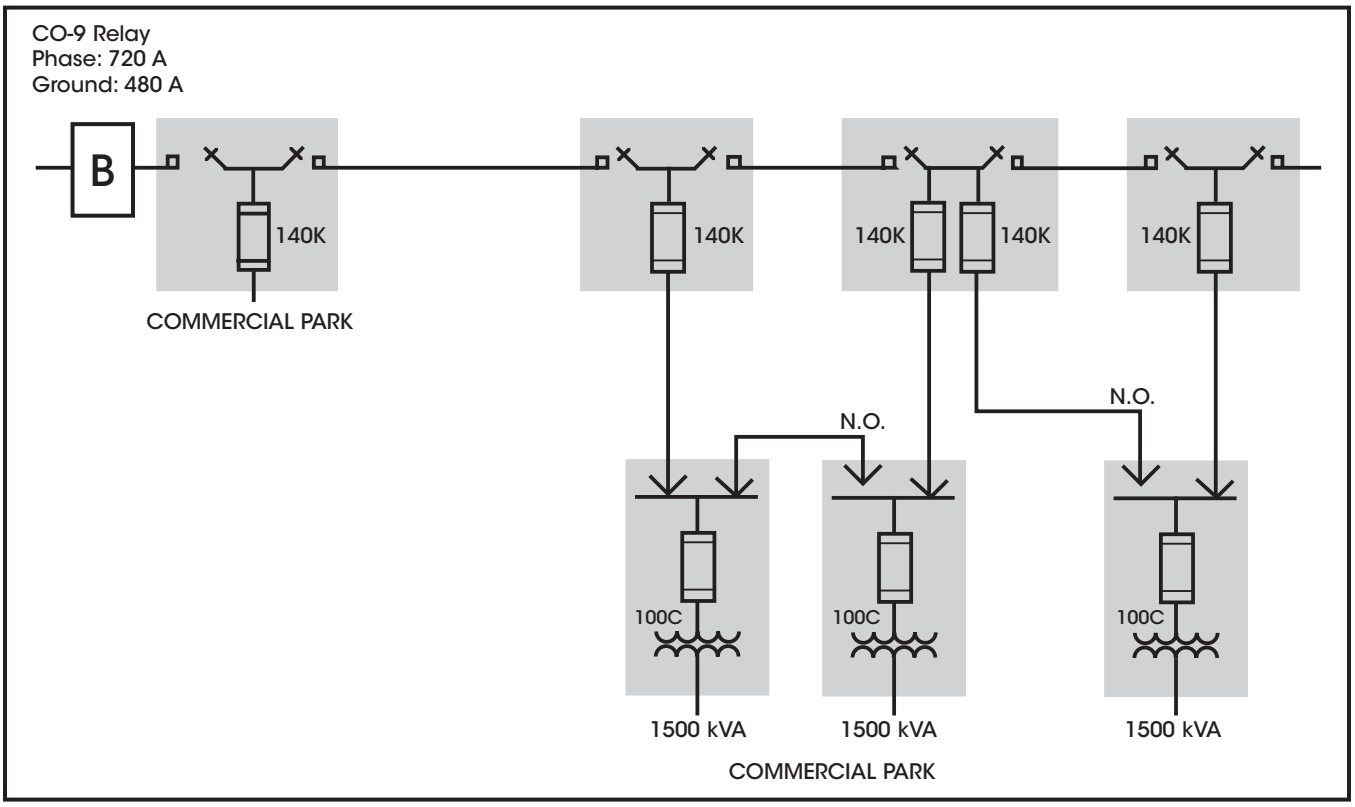

Figure 5. Commercial parks supplied by conventional (fused) pad-mounted switchgear.

With Vista switchgear, there is a better solution involving the installation of a "main" fault interrupter with a phase-overcurrent rating of 450 amperes and a ground-overcurrent rating of 400 amperes. Refer to Figure 7 on page 5. When a main interrupter is used on the main feeder, not only is an additional circuit not required, but the reliability of the system is substantially improved through increased sectionalization. Because of better coordination and the higher continuous-current capability of the switchgear, only two units of gear are required to serve the entire load at each commercial park where previously three units were required. Figures 8 and 9 on page 5 show the improved coordination for the phase current and ground current, respectively.

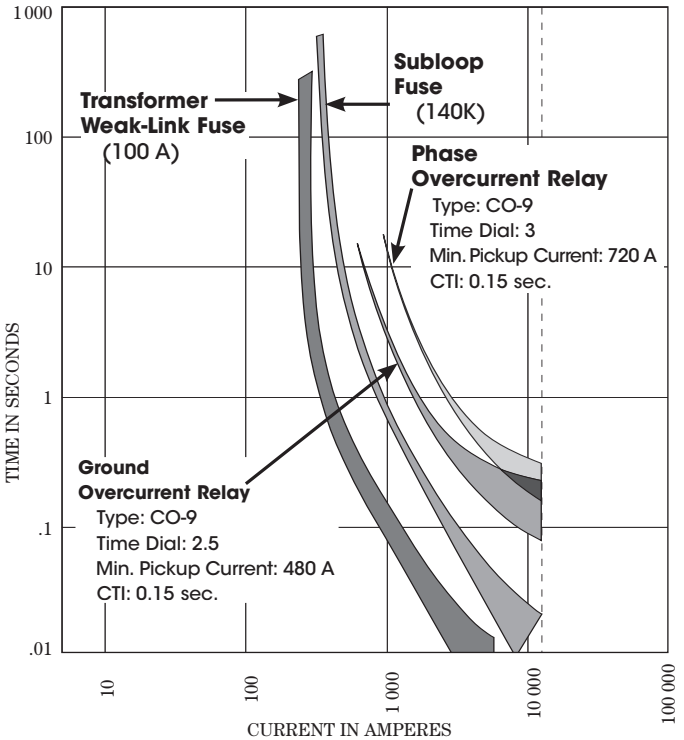

Figure 6. Coordination between 140K subloop fuse, upstream relay, and 100 A (C16) transformer weak-link fuse.

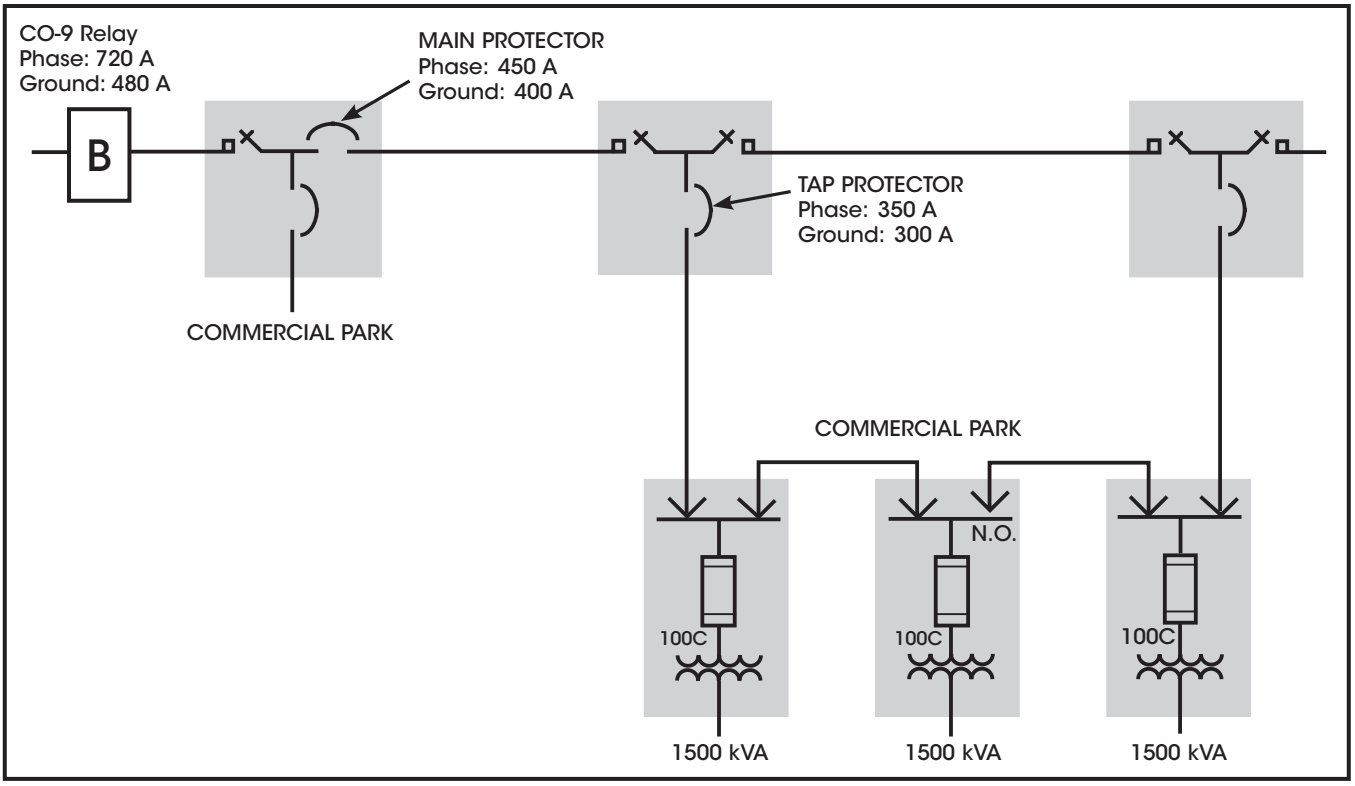

Figure 7. Addition of a fault interrupter on the main feeder provides increased reliability.

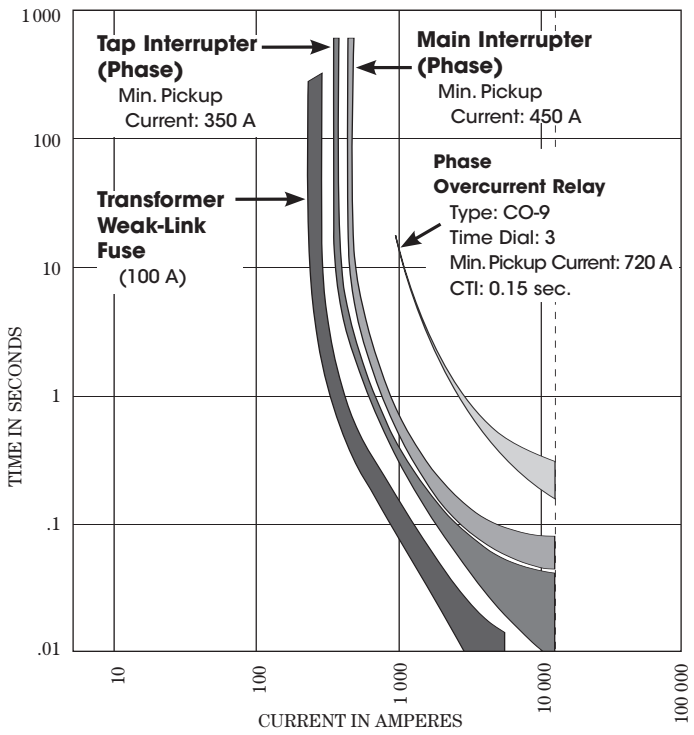

Figure 8. Complete coordination between upstream phase relay, feeder interrupter (phase TCC), and subloop tap interrupter (phase TCC).

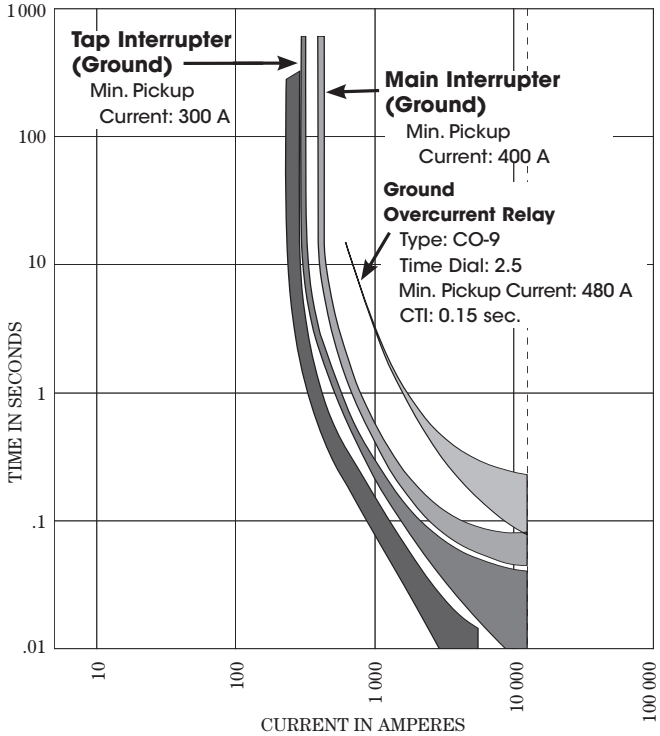

Figure 9. Complete coordination between upstream ground relay, main feeder interrupter (ground TCC), and subloop tap interrupter (ground TCC).