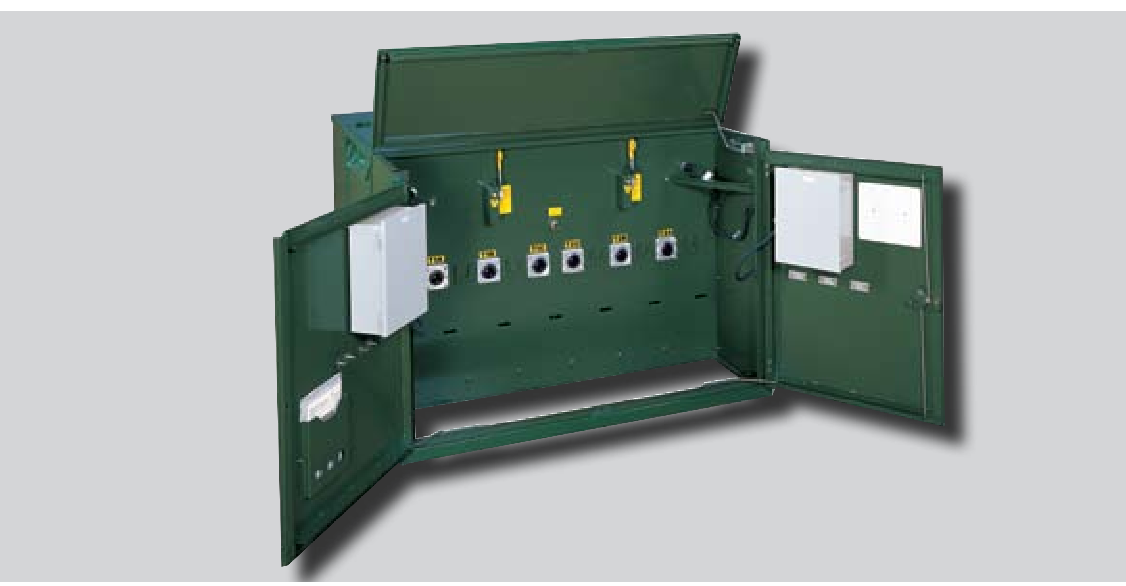
EXHIBIT GEO-22

Energy Delivery Reinvented

VFI Underground Distribution Switchgear

The new environmentally preferred solution for switching and protection applications.

COOPER Power Systems



Flexible Application

Suitable for Industrial, Commercial, and Utility Requirements.

- Lowers system operating costs through increased operating efficiency
- Improves system reliability
- Years of proven field experience
- Fast restoration for reduced downtime
- Vacuum interruption maintains dielectric integrity
- Advanced automation options for Smart Grid applications

Improve Distribution Reliability

VFI switchgear solves many distribution system reliability problems. For three-phase applications that experience single-phase fuse interruptions, the three-phase ganged-trip VFI switchgear eliminates ferroresonance and motor damage due to abnormal system voltage. An overcurrent on any phase simultaneously opens all three phases and reduces the risk of damage to connected equipment from single-phasing and associated down-time. VFI units can also be specified with single-phase trip to provide individual phase protection for true single-phase loads.

The VFI interrupter mechanism allows immediate service restoration, eliminating the expense associated with stocking and changing out fuses. The VFI interrupter also serves as a vacuum load-break switch increasing operability. These features save time and money.

The Cooper VFI control offers overcurrent protection and coordination flexibility including multiple TCCs, variable minimum-trip settings, and instantaneous trip. Options include ground-sensing, minimum-response time adder, and a minimum-trip multiplier to solve the most complex coordination problems.

Underground Distribution System Automation

VFI automation speeds service restoration, system reconfiguration, fault targeting, and system monitoring through remote operation. DC Motor Operators and SCADA accessories are available to provide information without the presence of AC voltage. Cooper Power Systems VFI switchgear can be supplied with advanced automation capabilities or with provisions allowing their addition at a later date.

Field-Proven Dependability

All internal mechanisms and bus work are insulated within a sealed tank with a choice of dielectric media, including Envirotemp 200. Contrasted to air-insulated units that are open to contamination, there is no requirement to regularly clean barriers, insulators, or live parts. Because of this, maintenance costs are greatly decreased. This also allows VFI switchgear to be used in locations where air-insulated switchgear cannot, such as flood-prone areas.

Both load and fault interruption take place within the sealed vacuum interrupter with no arcing by-products to contaminate the insulating medium. The vacuum interrupters do not rely on the insulation medium for proper interruption, this gives the VFI switchgear more flexibility to fit any application by allowing different dielectric mediums to be used. Advanced technology vacuum interrupters are reliable, have long life and require no maintenance. Cooper Power Systems patented design reduces the arc energy — resulting in far less contact erosion and the longest life of any vacuum interrupter in the industry.

Deadfront Padmounted Switchgear

PSE--Manual
ATPSE--Automatic Transfer
SCPSE--Supervisory Control Models
15 kV • 27 kV

Federal Pacific Deadfront PSE Padmounted Switchgear provides isolation of virtually all energized components behind steel barrier panels. A one-piece roof insures environmental integrity at the top. Galvanized steel sheets seal the bottom of the component compartments to prevent the ingress of animals and the environment, including moisture from the cable pit below. Bushings provide the 600-amp interface with the load interrupter switches. Bushing wells provide the 200-amp interface with the fuse terminals.

Cable terminations in the deadfront compartments are made using elbow connectors at both the switch and fuse terminals. The depth of the switch-termination compartment allows connection of dual, piggyback, elbow connectors for two cables per phase. In addition, 600-amp elbows with a 200-amp interface can be installed, allowing use of elbow-encapsulated surge arresters and grounding connectors. Wide viewing windows in the switch-termination compartments allow personnel to verify actual switch position. A ground rod extends the full width of each compartment.

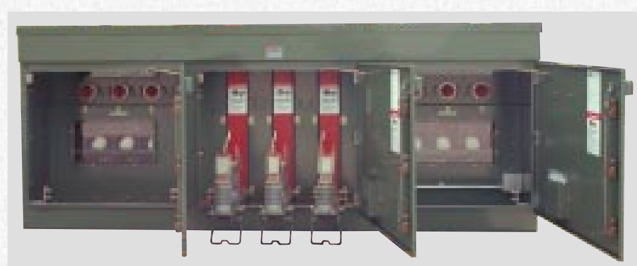
In fuse-termination compartments, a viewing window is appropriately placed on each fuse panel to provide visibility of blown-fuse indicator targets. Parking stands are provided adjacent to each bushing and bushing well.

FP deadfront models are available in a wide variety of circuit configurations and include the broadest choice of fuses. The 6-compartment models extend the application of padmounted switchgear to provide the flexibility to serve concentrated loads. Select from manual, automatic source transfer and remote-supervisory control models matched to the level of load-service continuity demanded by the power consumer.

Deadfront Automatic Source Transfer ATPSE Padmounted Switchgear is the first air-insulated design available in the industry. Low-voltage compartments containing switch operators and controls are weather resistant with gasketed openings and include warming heaters. Conventional voltage transformers (VTs) provide sensing and all control power. VTs include secondary-selective transfer circuitry, making certain adequate power is available to keep both switch operators charged and permitting pushbutton electrical operation of both switches even after one power source is lost.

Deadfront Remote-Supervisory Control SCPSE Padmounted Switchgear utilizes linear operators with either DC control voltage where a reliable back-up source is not available or AC control voltage where an alternate source of power will always be present. Split-core current transformers provide current sensing input to the customer-selected remote-terminal unit. FP remote-supervisory controlled padmounted switchgear has design flexibility allowing selection of control and communication components based on the specific application requirements of each installation.

Features
- Meets all ANSI C37.72 requirements
- Auto-latch 3-point door mechanism
- Enclosure integrity and coating per ANSI C57.12.28
- Cycloaliphatic insulators - 100% X-rayed
- Visible switch-open position
- Class 2 switch
- 3-time fault closing rating of 40000 amp asym for switch
- Full 600 amp continuous and 600 amp loadbreak through 27 kV
- Exceeds ANSI standards on full load and mechanical life operations
- Accommodates expulsion or CL fuses
- Visible blown-fuse targets
- 11 pre-engineered switching configurations
- 2, 4, and 6-compartment units available



Access to fuses in deadfront 6-compartment unit pictured above is equally easy with gripping points for shotgun-clamp sticks readily visible and placed to optimize control. After switching with the elbow to interrupt current in the circuit, the fuse is accessed simply by (1) raising the interlocking latch bar, (2) positioning the clamp-stick hook onto the pull ring and (3) pulling on the ring to lower the fuse panel. A shutter barrier automatically closes over the fuse-panel openings while the panel is being lowered to expose the fuse. A stick-operable latch clamps the panel in position to prevent movement when the fuse is lifted off and replaced.

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AUTOMATED SOLUTIONS for Distribution Feeders

David G. Hart, David Uy,* James Northcote-Green,**
Carl LaPlace, Damir Novosel**

As computers and other electronic equipment become the mainstay of today's businesses, customer awareness and intolerance for power system outages continues to heighten. For these customers, it is important that utilities be able to offer complete solutions to meet their needs. Depending on the customer load requirements, standby generation, uninterruptible power supply, or automatic restoration are possible solutions to improve the system reliability. In addition, utilities are becoming increasingly automated to keep up with the demands of the new business environments. As newly reregulated distribution companies emerge, it is likely that reliability indexes will be one of the key factors for regulators to examine to determine the overall performance of the distribution company. Thus, drivers for distribution automation include:

- Remote control and restoration
- Targeted regions or customers for improved reliability and operation
- Performance based rates (PBR)
- Safety issues for circuit isolation.

Whatever the driver for feeder automation, several key issues must be addressed:

- What automation scheme is required?
- How are communications implemented?

This article addresses these issues with example solutions for overhead feeder automation.

* ABB

What Automation Scheme is Required?

Presently, utilities employ a variety of techniques to improve the reliability of the delivery of electric power. Traditional feeder practices include reclosers, sectionalizers, and load break switches. Reclosers, switches, and feeder restoration are key components to improving the operation of the distribution grid. For

To be able to calculate the exact performance of an individual MV distribution network requires considerable engineering skill and sophisticated software analysis

The 15 kV VR3S poletop recloser is an example of a new generation of automation-ready devices

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Table 1. Feeder without Automation

	Outage Minutes due to Fault 1	Total Outage Minutes
Customer 1	360	360
Customer 2	360	360

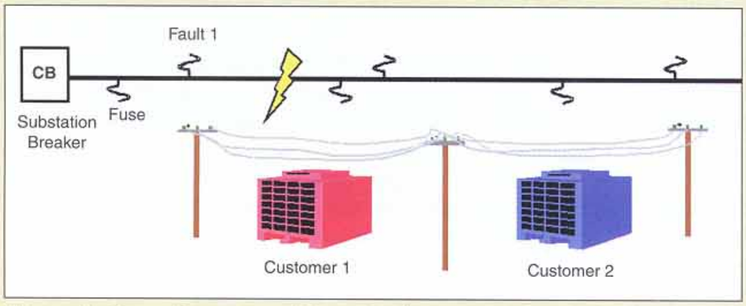

Figure 1. Example system with no feeder automation

Table 2. Feeder with Recloser

	Outage Minutes due to Fault 1	Outage Minutes due to Fault 2	Total Outage Minutes
Customer 1	180	0	180
Customer 2	180	180	360

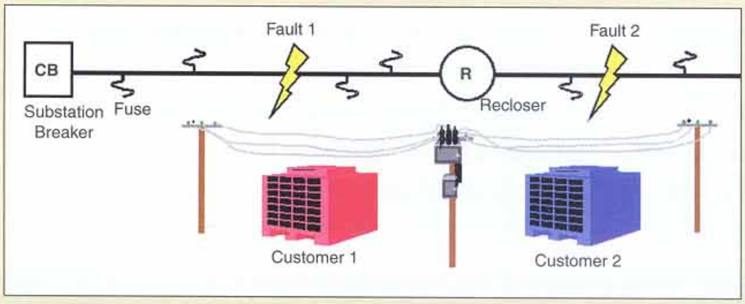

Figure 2. Example system with recloser

Table 3. Feeder with Recloser and Sectionalizer

	Outage Minutes due to Fault 1	Outage Minutes due to Fault 2	Outage Minutes due to Fault 3	Total Outage Minutes
Customer 1	120	0	0	120
Customer 2	120	120	0	240

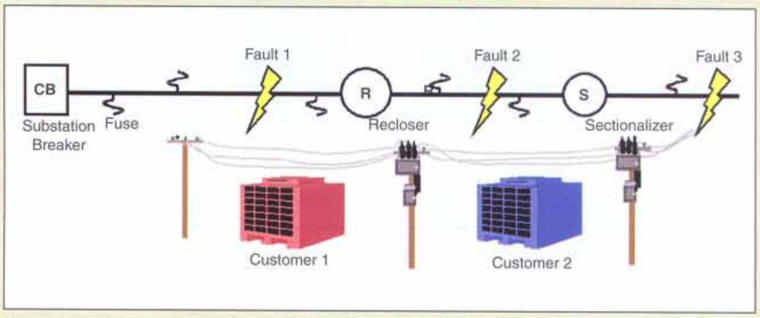

Figure 3. Example system with recloser and sectionalizer

feeder automation, it is important that the equipment be able to operate numerous times without maintenance to minimize maintenance support. Other key factors include standard communications protocols for SCADA integration, sufficient temperature operating range, and standby power to allow for operation while the system is de-energized. By use of several examples, different feeder automation solutions are highlighted. The example system is illustrated in Figure 1. For the examples, we will assume that it is important to minimize outages to customer 1 and customer 2.

For the examples, we will assume that faults occur evenly distributed on the feeder. We will also assume that it takes 1 hour to restore the power following a permanent fault and that the feeder experiences six permanent faults per year. Using this information, we can calculate the outage minutes due to fault 1 and the total outage minutes (Table 1).

Reclosers and the Impact on Outage Minutes

Historically, reclosers have been used as an economic method to improve distribution feeder reliability. Reclosers provide fault-interrupting capability to isolate the faulted line where needed. Reclosers are compact, easily installed, and can be applied in substations as well as on poletops. Reclosers must be coordinated with the upstream device such as the substation circuit breaker and the downstream devices such as line fuses. For line fuses, two schemes are possible.

- Fuse Saving: The fuse-saving scheme allows several operations of the recloser and, thus, allows temporary faults caused by animals or tree limbs to clear before the fuse operates. A successful clearing of a temporary fault prevents a sustained outage and

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saves money by avoiding unnecessary dispatch of line personnel to refuse the cutout. For permanent faults, the recloser operates more slowly, allowing the fuse to operate and isolate the permanent fault.

- Fuse Clearing: For some feeders, it is important to isolate the fault as quickly as possible, even if a lateral fuse must clear the fault. This minimizes the outage for all customers on the feeder. For example, the fuse-clearing scheme is used when a momentary outage is less desirable than dispatching a line crew to refuse a cutout serving a small branch line.

Both schemes are frequently deployed. In choosing which one to use, several economic and operational factors must be considered. For example, the costs of dispatching line personnel vis-à-vis the power quality of the affected customers.

In terms of improvements in system operation, consider the example above. A recloser is now installed on the example distribution feeder, as shown in Figure 2.

Again, assuming six permanent faults evenly distributed results in three faults at fault 1 and three faults at fault 2. Improvements by adding a recloser are illustrated in Table 2.

Note that while permanent faults still result in customer 2 having the same outage minutes, customer 1 sees a 50% reduction in outage minutes per year.

Sectionalizers and the Impact on Outage Minutes

Sectionalizers are used on distribution feeders as a cost-effective means to further reduce the customer impact due to permanent faults. Typically, sectionalizers are used on a line downstream from a recloser or a reclosing relay in the substation. Sectionalizers are not fault-interrupting devices, but operate in a coordinated manner with the reclosing operation. For typical operation, consider Figure 3. In this example, the sectionalizer has a counter setting of 2. For a fault at fault 3 at the end of the feeder, a the sequence of events is:

- Fault 3 is sensed by poletop recloser
- Poletop recloser trips
- Sectionalizer detects fault interruption and increments counter to 1
- Recloser recloses
- Since fault is permanent, recloser trips again
- Sectionalizer increments counter to 2
- While recloser is open, sectionalizer opens
- Recloser recloses and power is restored to customer 2.

Note that, for a fault at fault 1, the sectionalizer would not have detected the fault interruption and would not have incremented the counter.

For the example system shown, the sectionalizer is added to the circuit to further improve the circuit reliability. Again, for our discussion, we will assume that the faults are evenly distributed on the circuit and that the recloser and sectionalizer are equally spaced on the feeder, resulting in two faults at each location. Again, we assume that it takes 1 hour to restore the power following a permanent fault. Using this information, we can calculate the results in Table 3.

Thus, with a recloser and sectionalizer installed on the line, there is a 66.6% improvement for the outage time of customer 1 and a 33.3% improvement in the outage time for customer 2, as compared to Table 1. (33.3% improvement in the outage times for customer 1 and customer 2, as compared to Table 2).

Switches at Normal Open Points and the Impact on Outage Minutes

When increased reliability is required and dual feeders are available, it is possible to place a switch at the nor-

Components are integrated into functional devices and assembled into a system to solve the complete control or automation needs of each distribution network

Table 4. Feeder with Alternate Feeder and Automation

	Outage Minutes due to Fault 1	Outage Minutes due to Fault 2	Outage Minutes due to Fault 3-6	Total Outage Minutes
Customer 1	60	0	0	60
Customer 2	0	60	0	60

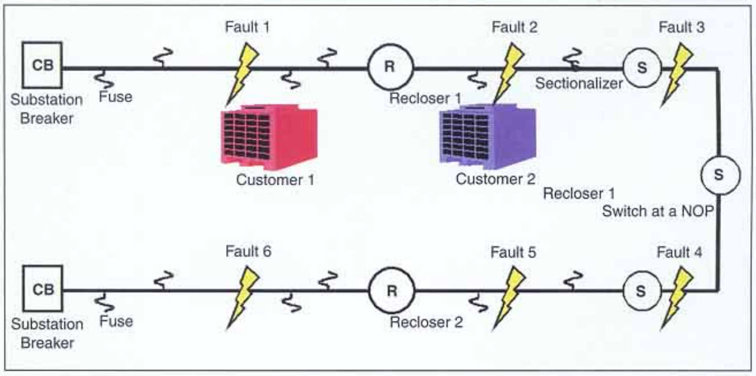

Figure 4. Example system with an alternate feeder