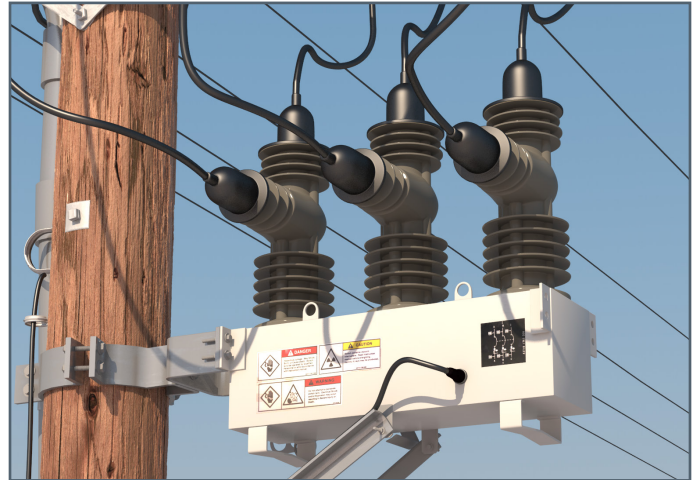


Diamondback Switches Applied as Sectionalizers

SUBJECT: Load Break Switch utilized in Sectionalizing Applications

G&W PRODUCTS: Diamondback Load Break Switch and Viper-ST Recloser



Sectionalizer Definition: A sectionalizer is an automated switching device that is intended to isolate faults, and is typically used in conjunction with an upstream recloser. The sectionalizer counts the number of operations of the upstream recloser to determine if the fault is temporary or permanent. After a predetermined number of counts within a set time-period, the sectionalizer will recognize a permanent fault and open while the recloser is open, thereby isolating the faulted section. Upon the sectionalizer opening, the upstream recloser is enabled to reclose and restore power to the non-faulted section of the circuit.

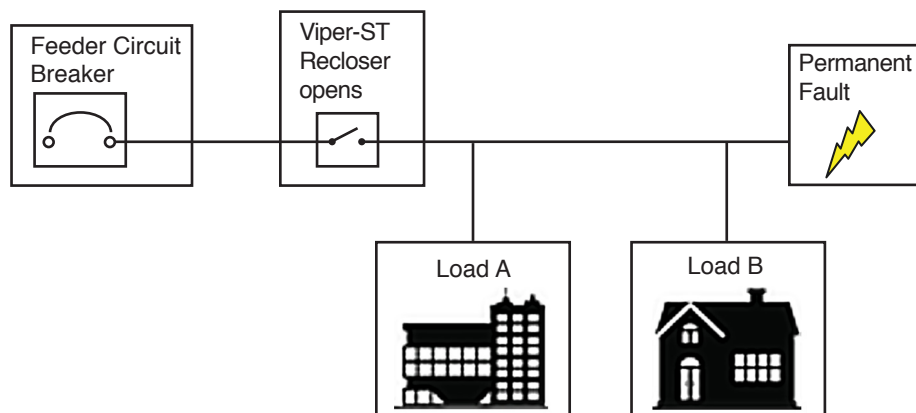
The sectionalizer determines the fault is temporary when the fault clears prior to the predetermined number of counts are met within a set time-period. After this set time-period is met, the sectionalizer will reset to original state.

Key Note: A sectionalizer is not designed or intended to interrupt fault current. A sectionalizer is intended to operate during the time a faulted circuit is de-energized when the recloser is in open status. Sectionalizers also do not have time-current characteristics.

Sectionalizer Advantages:

1. Solution in areas where fuse coordination is difficult due to large available short circuit current (i.e. close to substation)
2. Less specifications to consider: Sectionalizers do not have an interrupting rating.
3. Less system coordination studies needed: Sectionalizers do not have time-current characteristics.
4. Provide an additional point to monitor currents and voltages on the system.
5. Can be applied in distribution automation schemes such as Fault Location, Isolation and Service Restoration (FLISR: loop schemes, network reconfiguration)
6. More economical than a recloser.
7. Improve reliability breaking down circuits into smaller sections to reconfigure.

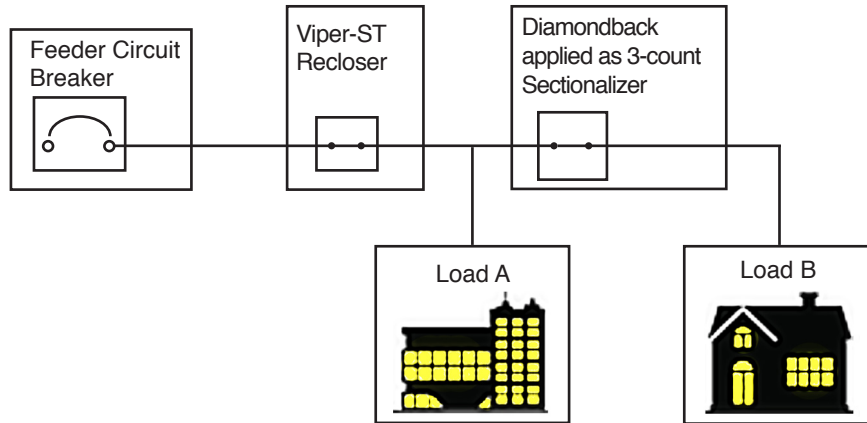
Historical Issue: A fault occurs, the recloser operates to lockout, and causes an outage downstream of the recloser, affecting a large amount of customers.



SOLUTION 1: Adding a Diamondback Load Break Switch with sectionalizing capability, downstream of the recloser. This provides an additional point to monitor currents and voltages on the system.

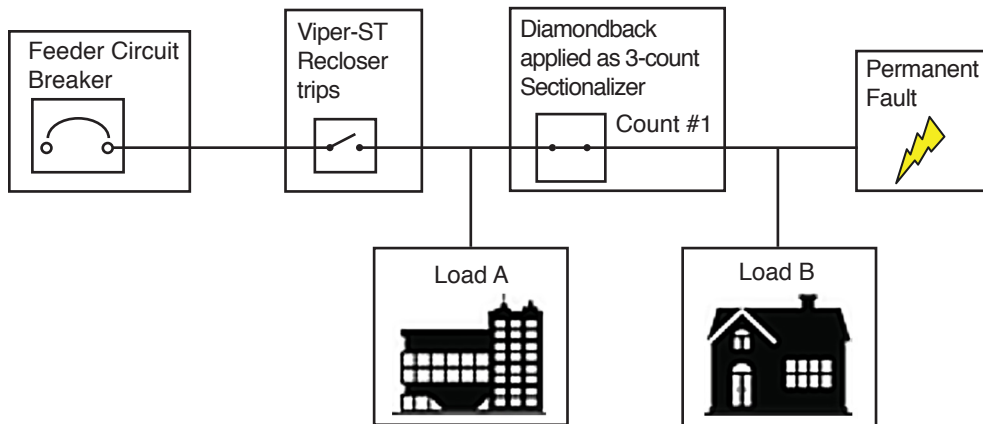
G&W Products:

- Diamondback Load Break Switch (LBS) configured as a 3-count sectionalizer
- An upstream Viper-ST recloser configured for a four shot reclosing sequence*



1. A fault occurs; Fault Count 1:

- Fault current flows through the Viper-ST recloser and Diamondback LBS
- The Diamondback LBS detects the fault current and the sectionalizer functionality arms to count
- The Viper-ST recloser performs a three phase trip
- The Diamondback LBS control counts "one"



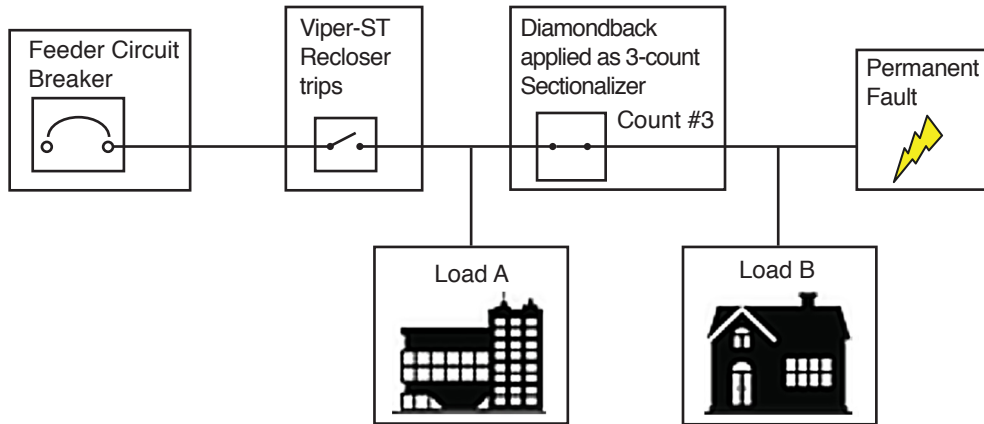
2. Fault Count 2:

- The Viper-ST recloser performs the first close of the reclosing sequence
- The Diamondback LBS detects the fault current
- The Viper-ST recloser performs a second three phase trip
- The Diamondback LBS counts "two"

* The dead open time in the recloser sequence where the sectionalizer is set to open must be equal or greater than 2 seconds.

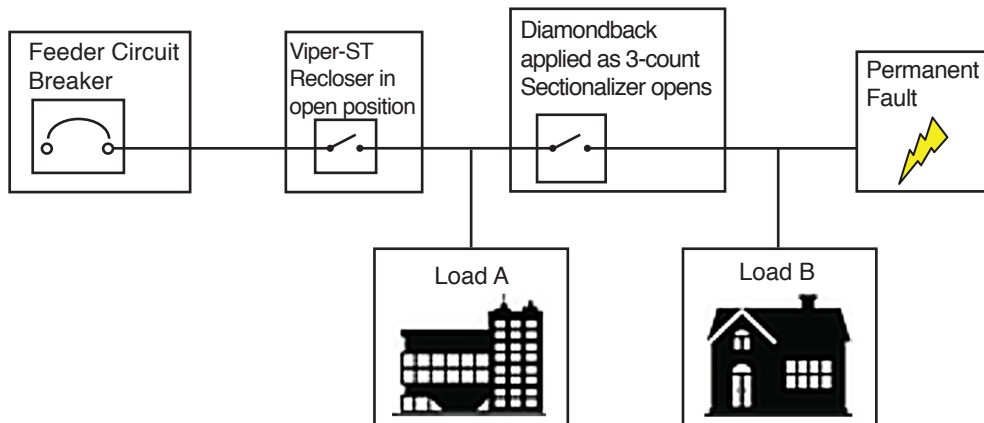
3. Fault Count 3:

- a. The Viper-ST recloser performs the second close of the reclosing sequence
- b. The Diamondback LBS detects the fault current
- c. The Viper-ST recloser performs a third three phase trip*
- d. The Diamondback LBS control counts “three”



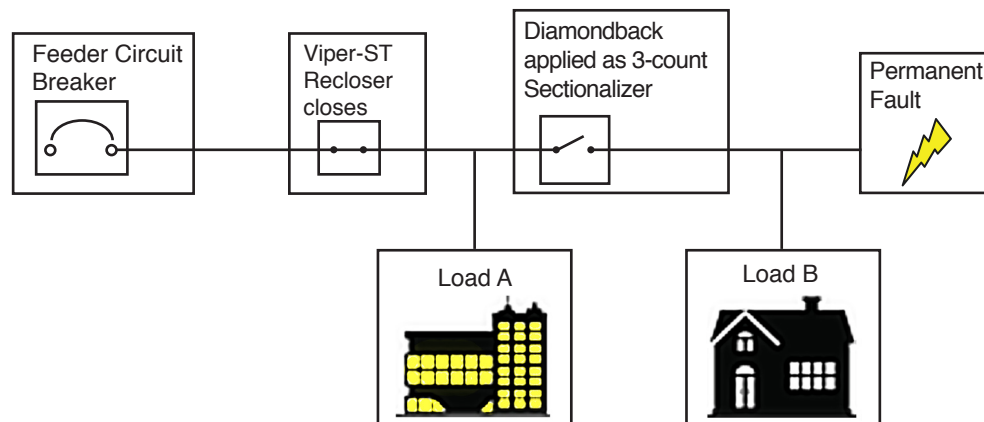
4. Fault Isolated:

- a. While the recloser is open during the 3rd dead open time, the Diamondback LBS performs a three phase open operation, isolating the faulted section.



5. Power Restored:

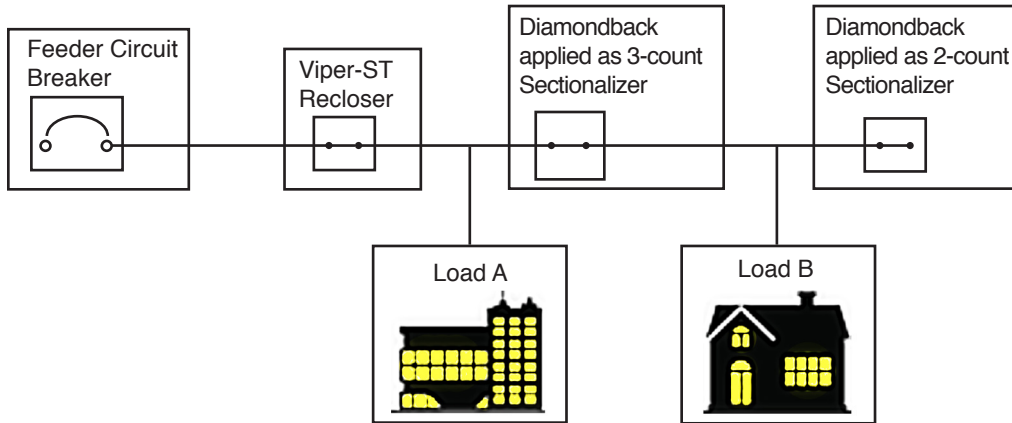
- a. The Viper-ST recloser performs the last close of the reclosing sequence, restoring power to the section between the Viper-ST recloser, Load A, and Diamondback LBS. The Viper-ST recloser doesn't go to lockout and less customers are affected by the outage. Adding a Diamondback LBS is more economical than a recloser.



SOLUTION 2: Apply two Diamondback Load Break Switches (LBS) with sectionalizing capability, downstream of the recloser. Diamondback LBS improve reliability breaking down circuits into smaller sections to reconfigure.

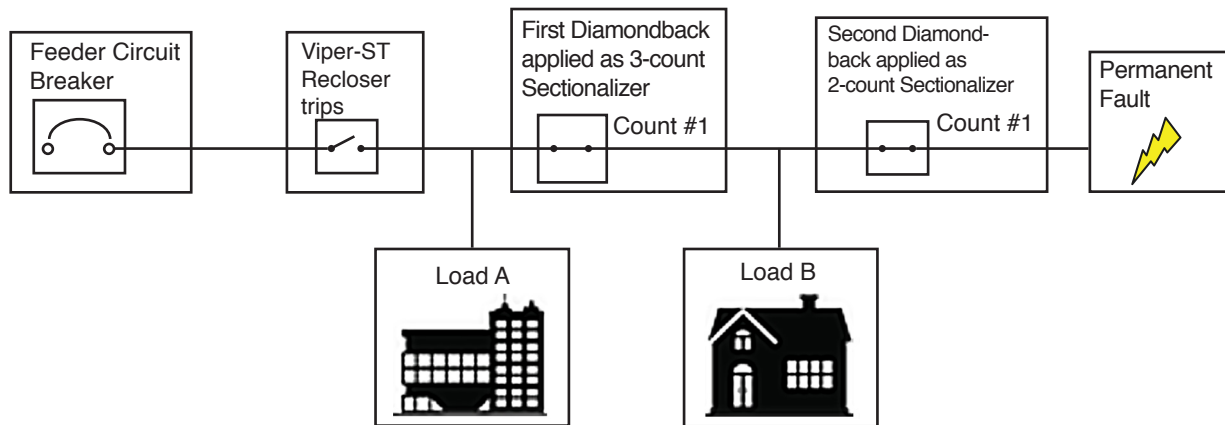
G&W Products:

- Diamondback LBS configured as a 3-count Sectionalizer downstream of Viper-ST recloser
- Diamondback LBS configured as a 2-count Sectionalizer downstream of the 1st Diamondback LBS sectionalizer
- An upstream Viper-ST recloser configured for a four shot reclosing sequence*



1. A fault occurs; Fault Count 1:

- Fault current flows through the Viper-ST recloser, the first Diamondback LBS 3-count sectionalizer, and the second Diamondback LBS 2-count sectionalizer
- Both Diamondback LBS detect the fault current and the sectionalizer functionality arms to count
- The Viper-ST recloser performs a three phase trip
- Both Diamondback LBS controls count “one”



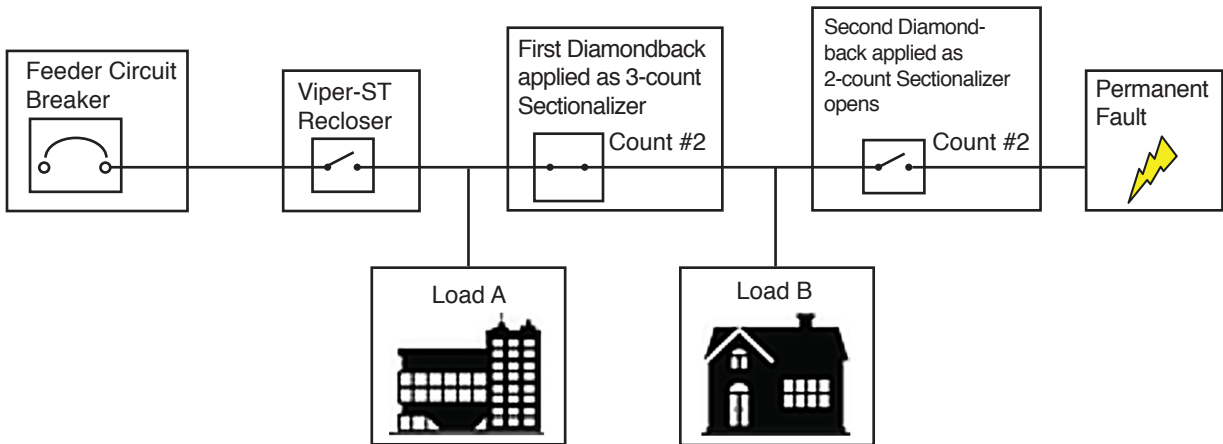
2. Fault Count 2:

- The Viper-ST recloser performs the first close of the reclosing sequence
- Both Diamondback LBS detect the fault current
- The Viper-ST recloser performs the second three phase trip
- Both Diamondback LBS controls count “two”

* The dead open time in the recloser sequence where the sectionalizer is set to open must be equal or greater than 2 seconds.

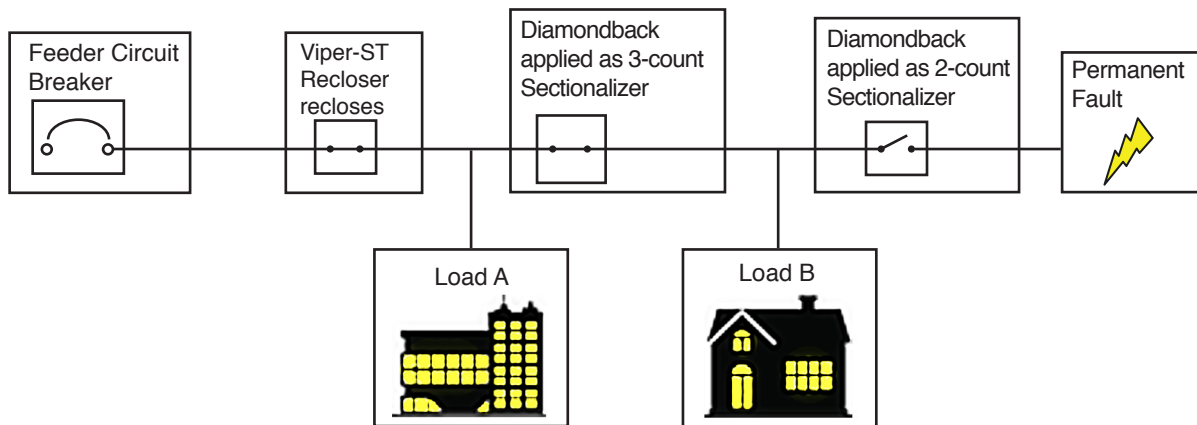
3. Fault Isolated

- a. During the second dead open time, the Diamondback LBS 2-count sectionalizer performs a three-phase open operation, isolating the faulted section



4. Power Restored:

- a. The Viper-ST recloser performs the second close in the reclosing sequence, restoring power to the section between the Viper-ST recloser, Load A, Diamondback LBS 3-count sectionalizer, Load B, and Diamondback LBS 2-count sectionalizer. The Viper-ST recloser doesn't go to lockout and less customers are affected by the outage.



CONCLUSION: Sectionalizing applications, when properly applied, can be an integral part to optimizing the reliability of the distribution protection scheme. The Diamondback Load Break Switch can provide a cost-effective solution where coordination is difficult or impossible with traditional fault interrupting devices or where system monitoring and SCADA reconfiguration is needed.

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