High-Reliability Distribution System (HRDS)

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February 12, 2010
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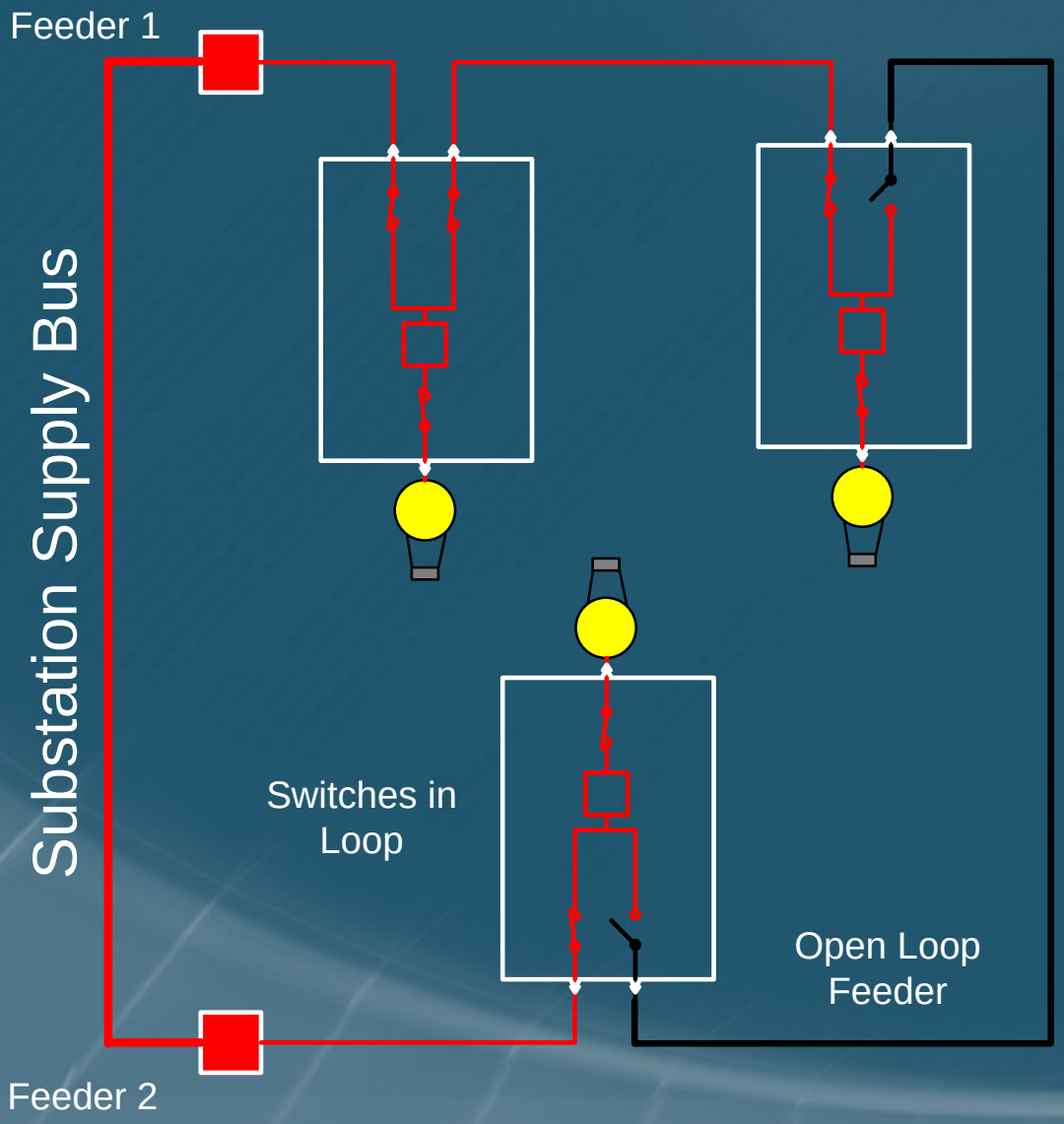
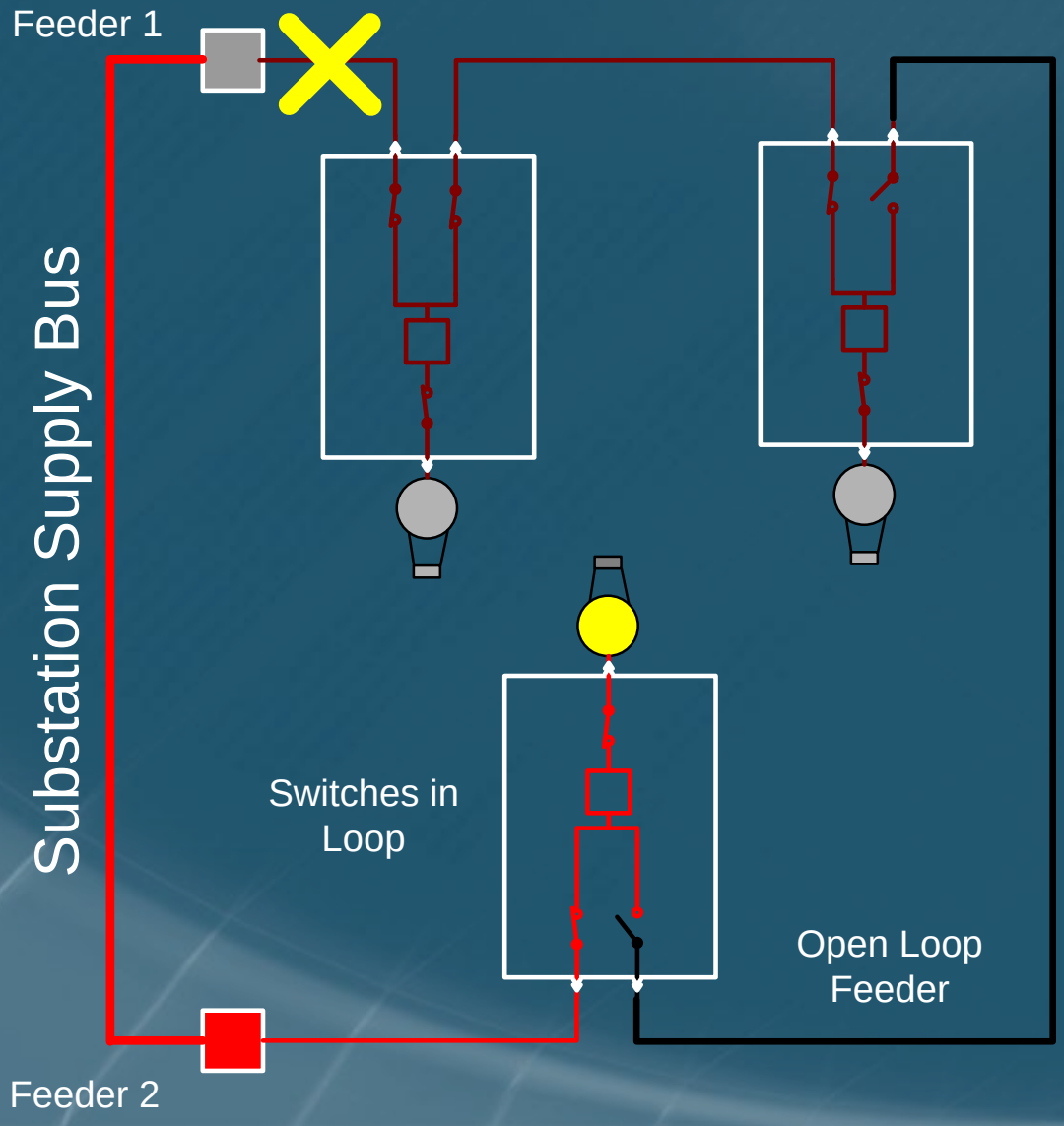
Open-Loop – Manual Switching



- Two Feeders
- Radial Feed
- Alternate Loop Supply
- Manual Switching

Open-Loop – Manual – Fault/Outage

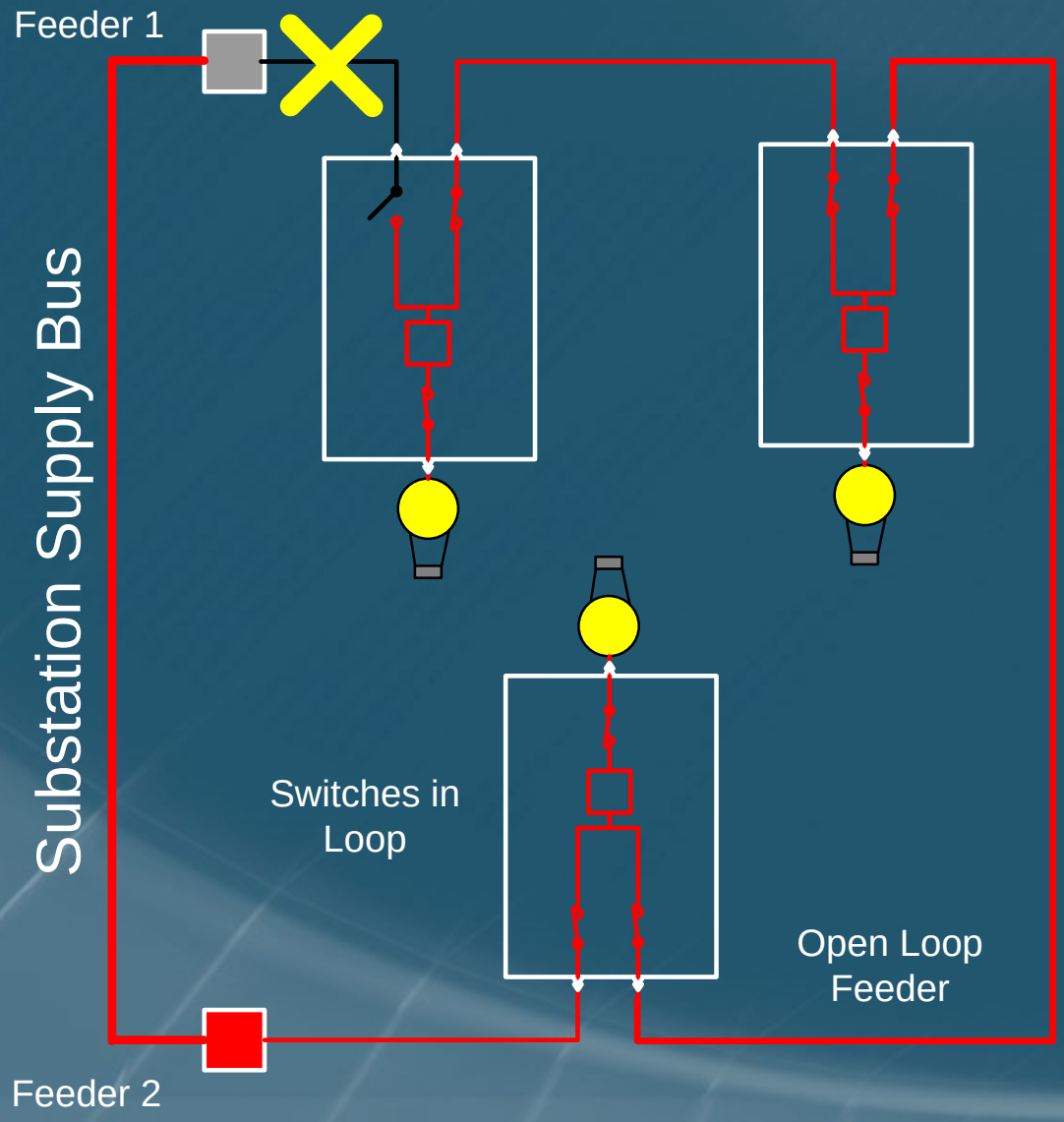


Substation Breaker Clears Fault

Feeder knocked out

Outage to loads

Open-Loop – Manual – Restoration



Respond – 1 to 4 hrs

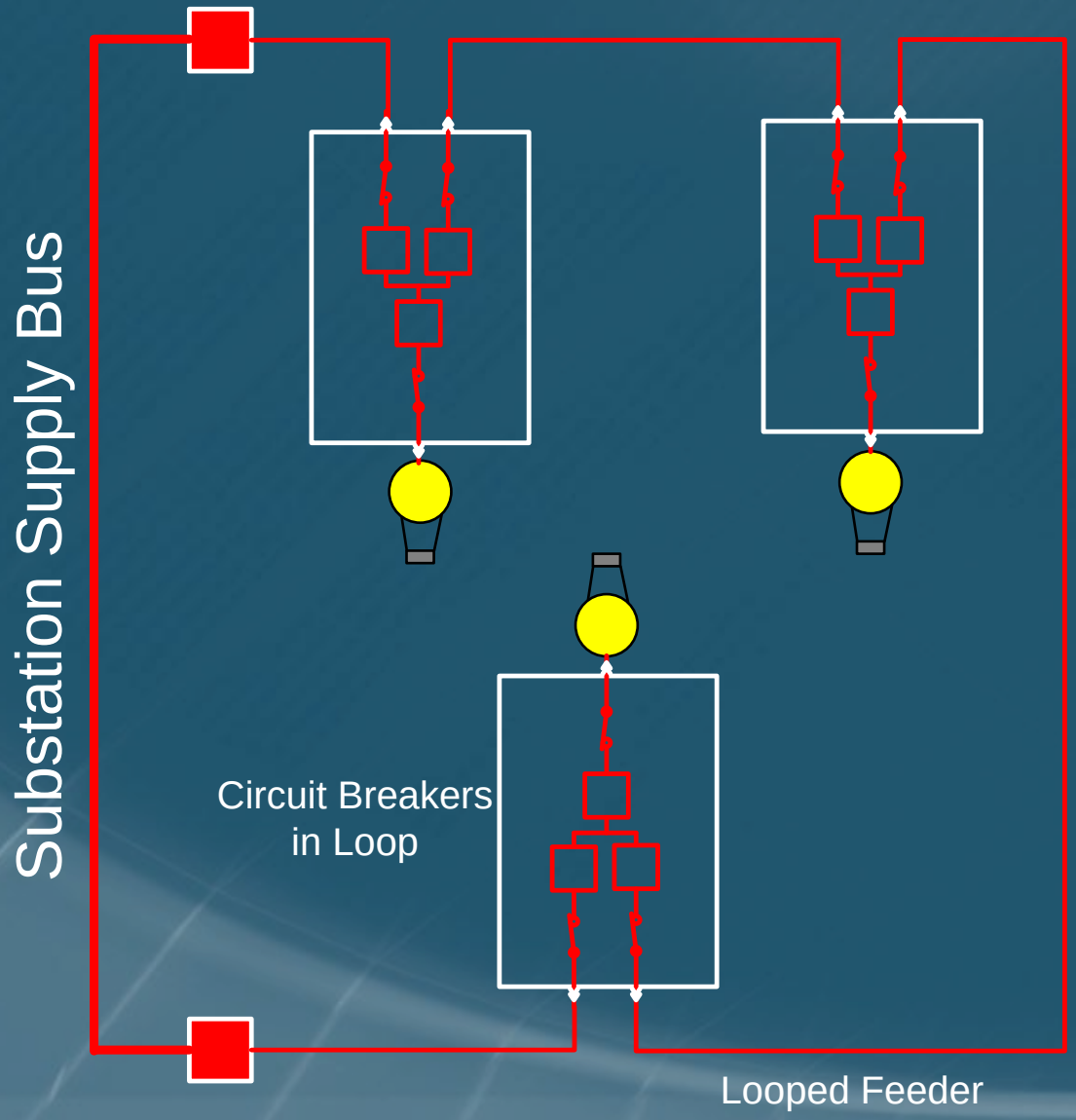
Locate fault – 1 to 4 hrs

Isolate fault – Manual Switching – 1 hr

Close tie – Manual Switching – 1 hr

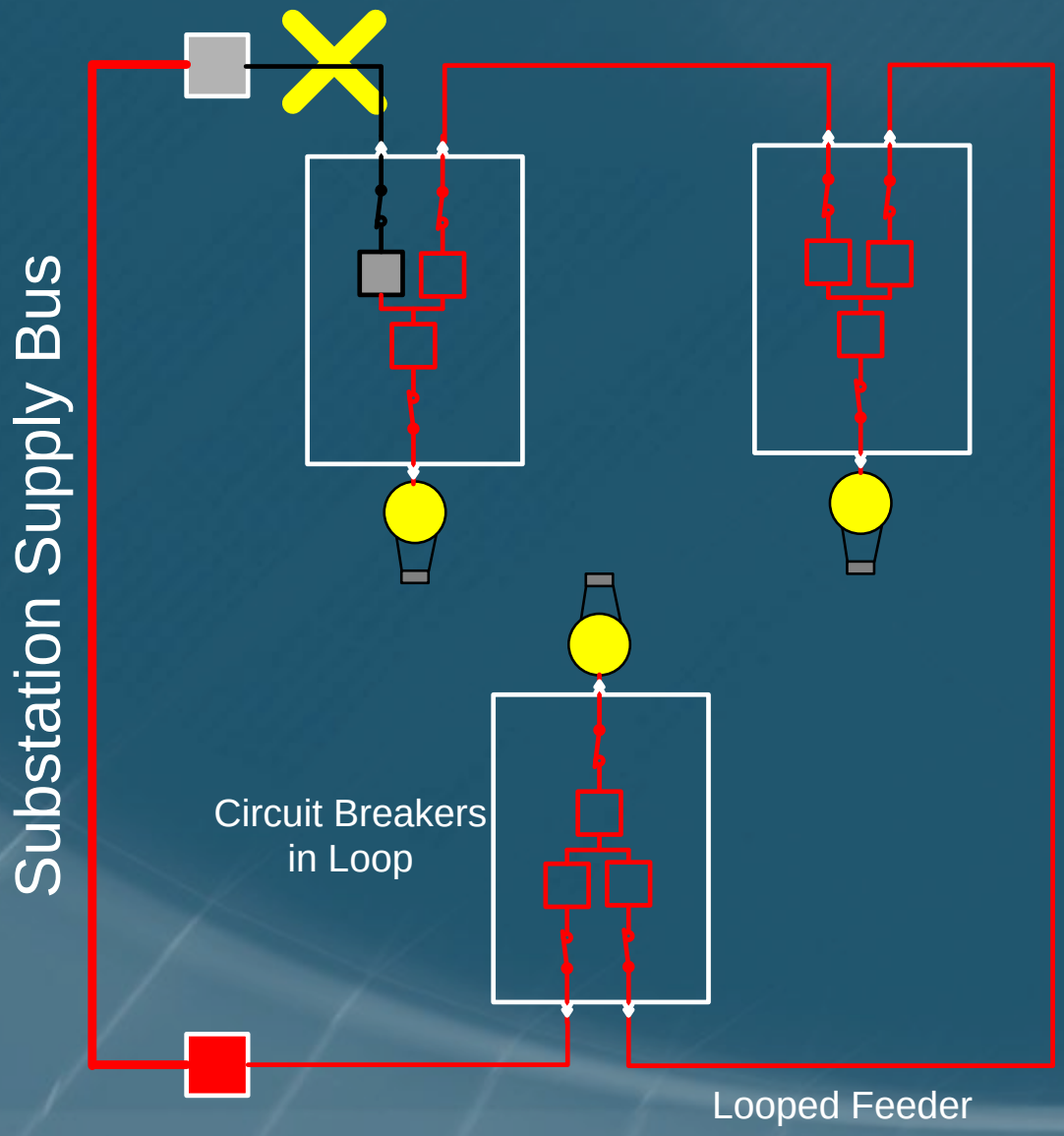
Outage = 4 to 10 hours

High-Reliability Distribution System HRDS



- Closed Loop = Single Feeder
- Simultaneous Dual Feeds to Loads
- Circuit Breaker Protection
- Faults on Main Feeder Cleared Without Outage

HRDS – Fault but NO Outage



Breakers Isolate Fault to Only One Section

Location – Instantaneous

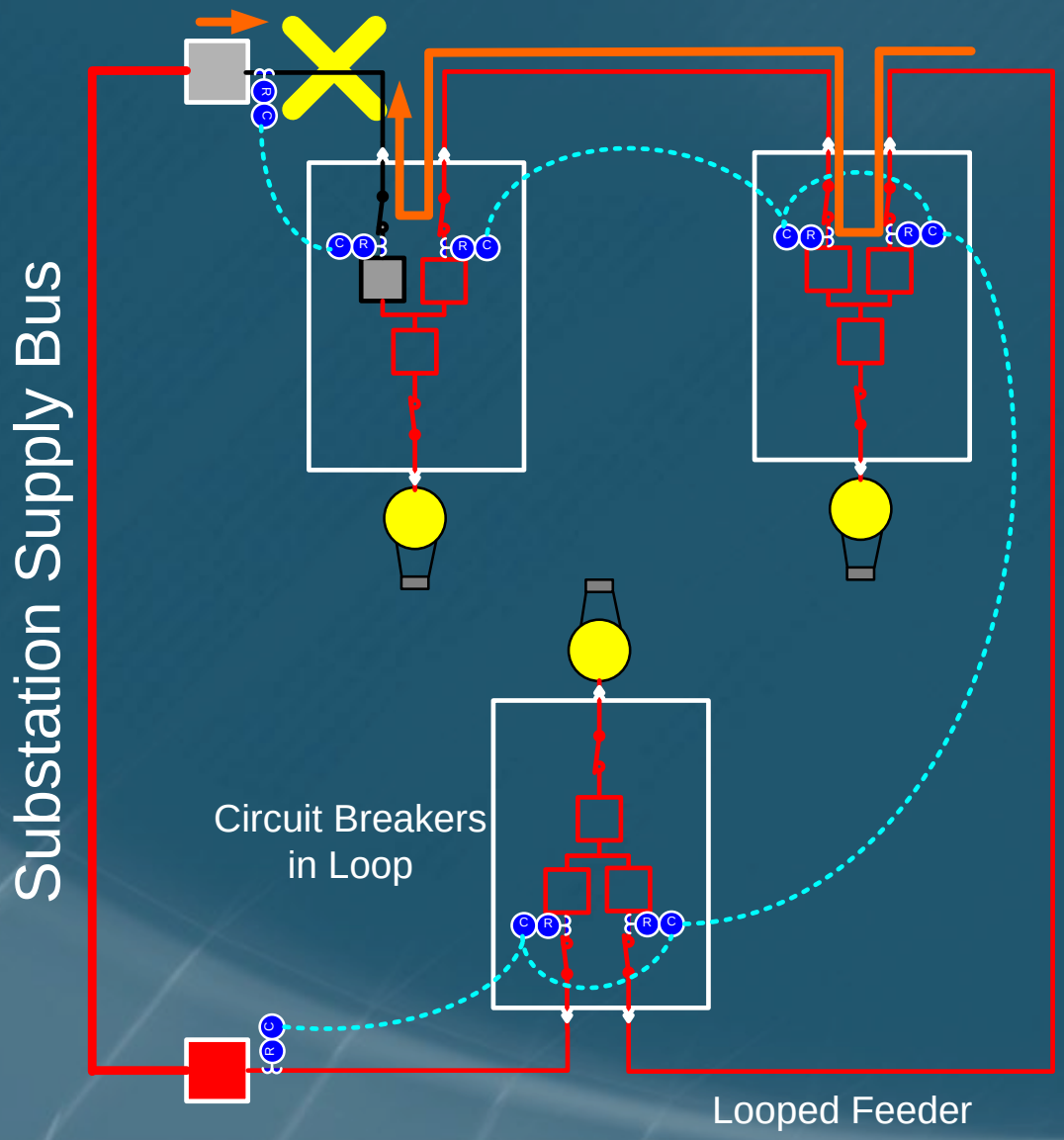
Isolation – 0.1 seconds

Restoration - Instantaneous

Outage = Zero Seconds

Loop Remains Energized

HRDS – Smarts Required



High-Speed Relaying for Fault Detection

High-Speed Communications Between Breakers

Coordinated Operation – the “Right” Breakers Open

High-Speed Interruption – Fault Cleared without Outage

High Reliability Distribution System HRDS

- **The Smart Grid in Action**
  - High-Speed Relaying
  - High-Speed Communications
- **Fault Cleared Without Outage**
  - High-Speed Fault Interrupters
  - Coordinated Protection
  - Zero (0) Outage Time For Any Main Feeder Faults