

Transfer Trip Why Is It Needed?

Steve Bezner

Burns Engineering

Chief Electrical Engineer



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Agenda

- What is transfer trip?
- How does it work?
- Types of transfer trip systems
- Risks associated with not having transfer trip
- Other options
- Conclusion
- Question & answer



Overview

- Fault protection is a major component for the proper operation of traction power substations
- Clearing a fault quickly is paramount for protecting equipment from damage
- Transfer trip can send signals to adjacent circuit breakers to ensure the fault is cleared



History

- The Use of transfer trip goes back about 50 Years
- First used at LIRR and MARTA
- Initial systems were just for Breaker to Breaker for Faults



What is transfer trip?

- A protection system that sends a trip command to remote circuit breakers
- Should Use a *Protected & Dedicated* communication link



How is it triggered?

- Overcurrent relay that senses a fault
- Frame alive or frame leakage (64 device)
- Emergency trip button
- High Rail to ground voltage



How is the signal sent?

- Should use a dedicated communication link
- The link should be protected and supervised
- Signal could be coded for different types of needs
- Use of fiber link makes process immune to distance



How does transfer trip work?

- When a fault occurs on a traction power system, high currents travel from the power substation to the fault location
- Detecting faults from remote locations can be difficult
- Transfer trip systems can enable remote tripping by using a communication link to transmit a trip signal



How does transfer trip work?

- Should the trip signal be delayed?
- Can the delay do any damage?
- Auto-reclosing is better than delay



Transfer trip system Components

- Basic components
 - A device to detect problem (normally a protective relay)
 - Output from device that transmits signal to remote location
 - Communication link
 - Receiving device

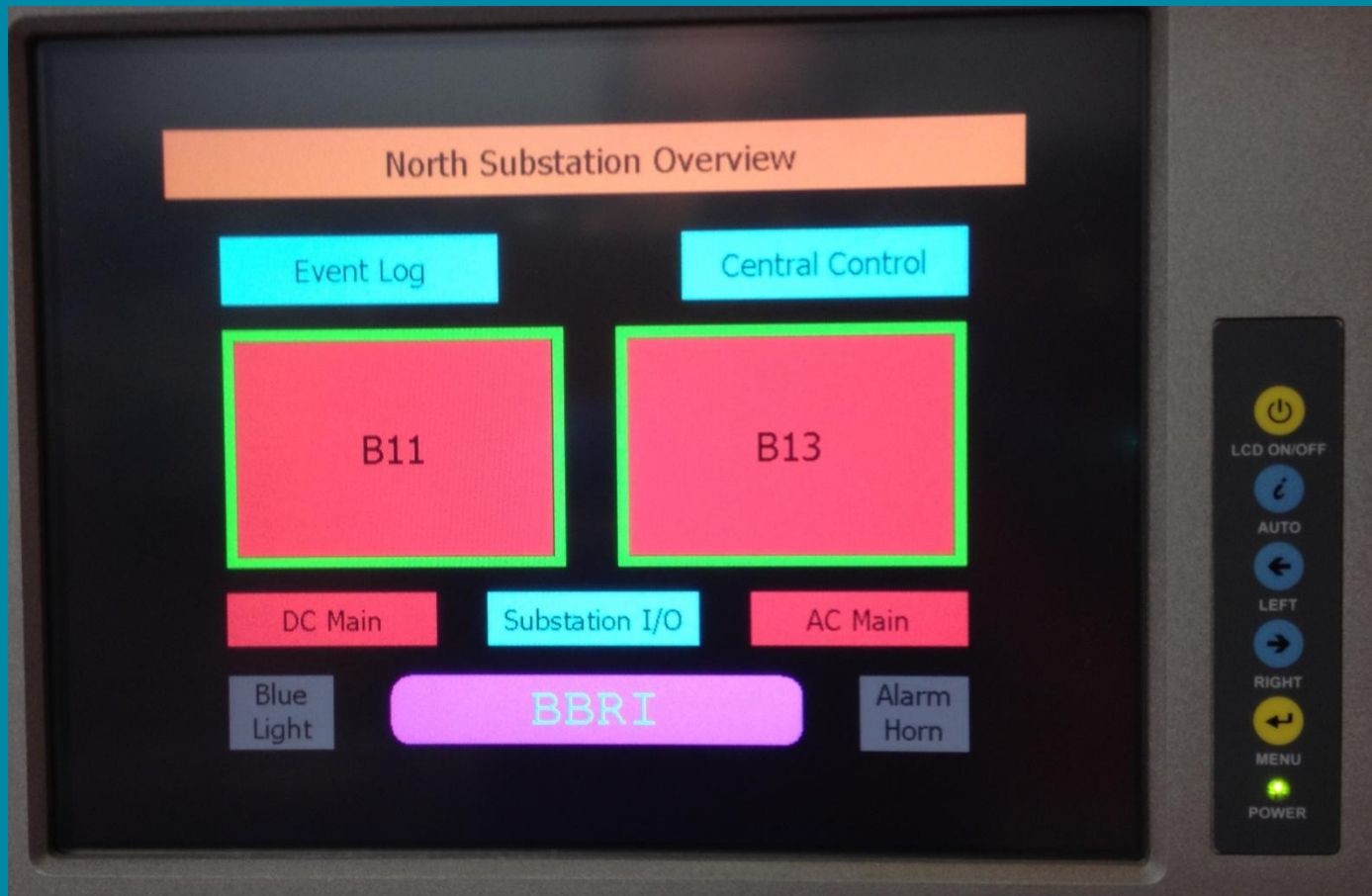


Types of transfer trip systems

- Some transmission media/methods:
 - Polarity reversal
 - Change in current flow
 - Sending a tone
 - Changing the frequency of a constant tone
 - Stopping a constant tone
 - Digital Code
- All methods must be failsafe



Substation Display Screen for HMI



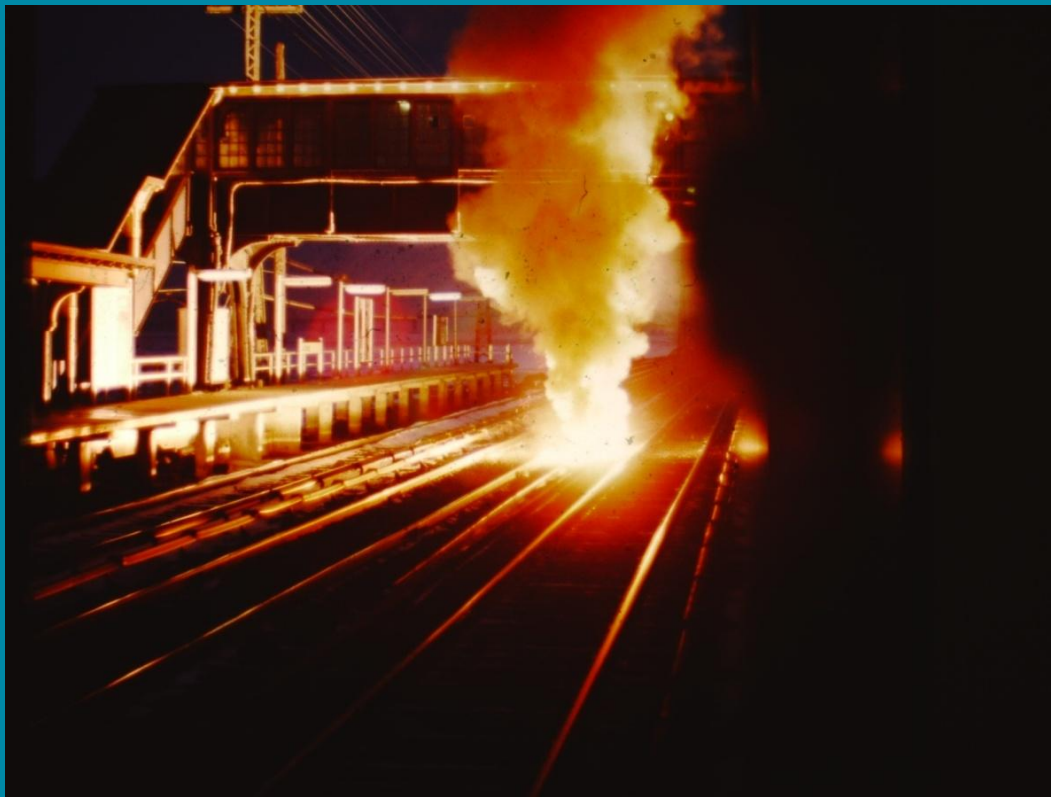
Risks associated with not having transfer trip

- Without a transfer trip system your traction power distribution system may be in jeopardy
- Fault currents may rapidly overheat an OCS or 3rd rail
- Result, possible permanent damage to overhead catenary systems (annealing)
- Annealed trolley wire can sag to the ground.



Risks associated with not having transfer trip

Third rail to rail fault can burst into flames



Risks associated with not having transfer trip

Running rail damage uncontrolled fault



Then sometimes the breaker just fails and burns...



Can I operate without the transfer trip?

- Human monitoring would be required
- There would be the same risks as not having it in the first place
- Stationing personnel in stations to manually perform operation using radios/cell phones to communicate
- As fault currents may rapidly overheat an OCS action must be fast, several seconds might be too long



Are there other valid options?

- Impedance relays that can detect remote faults beyond the next substations
- Frame alive will still need transfer trip
- Emergency shut down will still need transfer trip



Conclusion

- Transfer trip is an important addition to any substation with trolley wire collection system
- It is not necessary to delay transfer trip to avoid nuisance trips
- Transfer trip systems should not be turned off
- The use of transfer trip can increase the reliability and safety in most traction power systems



Question & answer

Thank you!

