PJM Protection Standards
Manual 07 Revisions
Presented to PJM Planning Committee

Glenn Bray
PJM Relay Subcommittee Chairman
Planning Committee
June 9, 2016
PJM Manual 07: PJM Protection Standards

- New manual 11/16/2011
- Established the minimum design standards and requirements for the protection systems associated with the bulk power facilities within PJM
- Develop from PJM Relay Subcommittee “Protective Relaying Philosophy and Design Guidelines”
- Biannual Review required
Revision 01 (02/27/2014)

- To align with the PJM Relay Subcommittee Protective Relaying Philosophy and Design Guidelines
- Revised Section 7 - Line Protection
  - Potential input not required only if current differential relaying utilized
- Revised Section 8 - Substation Transformer Protection
  - Bulk power transformers fully addressed
Revision 02 (04/29/2016)

- Revisions made to the following Sections:
  - Section 7: Line Protection
  - Section 8: Substation Transformer Protection
  - Appendix B: Direct Transfer Trip
  - Appendix C: Dual Pilot Channels
- Removed Appendix F: Triggered Current Limiters
- Removed version number to reference standards
- Typos were corrected
Section 7: Line Protection

• Reworded to distinguish the two independent protection schemes as “Primary” and “Backup”

• Specified PJM Planning Department to review and approve out-of-step relay and single-phase tripping applications
  – Previously just PJM was listed as the approver
  – out-of-step and single-phase tripping is typically not utilized in the PJM
  – For PRC-026-1, PJM may determine out-of-step relay blocking requirements
Section 8: Substation Transformer Protection

- Revised to better account for practices of all member TOs.
- Dedicated high-side interrupting device is required for a non-bulk-power transformers connected to a bulk-power line.
- Posed problems for retrofits and upgrades at existing facilities
  - Substation footprint does not always permit adequate clearance to add a circuit breaker or circuit switcher
- Revisions mainly to Transformers Tapped to a Line
Section 8.2 Tapped Transformer Revisions

- Distinguished transformers with low-side rating \(\leq 60\text{kV}\), as more prone to animal contact, and require fault interrupting device (FID)
- For FIDs that are not fully rated, alternate means of tripping is required for faults that exceed the device rating (i.e., DTT, or Remote Line Clearing)
- Device failure scheme required when the transformer serves anything other than a radial distribution load
Appendix B: Direct Transfer Trip

- Added requirements for Power Line Carrier based DTT
  - channel integrity continuously monitored
Appendix C: Dual Pilot Channels

- Added Power Line Carrier section
  - DCB and DCUB examples with Phase-to-Ground and Phase-to-Phase Coupling and physical phase arrangements

- Fiber Optic Systems rearranged
  - Order of Dual Pilot examples revised to avoid ambiguity
Appendix F: Triggered Current Limiters

- Section was removed from M07
- Utilized for the mitigation of increased fault current on busses
- Not many in the PJM footprint