

Protection Coordination

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- PRC-001 Compliance
 - Standard Requirements
 - PJM TO/TOP Matrix entry
 - PJM Compliance Bulletin on PRC-001
 - PJM Coordination of Protection on Shared Facilities process
- PRC-027 Compliance
 - PRC-027 Coordination Document

- R3.2
 - Each Transmission Operator shall coordinate **all new protective systems and all protective system changes** with neighboring Transmission Operators and Balancing Authorities.
- R4
 - Each Transmission Operator shall coordinate Protection Systems **on major transmission lines and interconnections** with neighboring **Generator Operators**, Transmission Operators, and Balancing Authorities.

- R3.2
 - The Member TO shall coordinate new protective systems and protective system changes with neighboring TO, TOP and BA as noted in *PJM Compliance Bulletin on PRC-001*. In general, coordination must occur when a modification is made to a protection system that changes its performance. The list in *Compliance Bulletin on PRC-001* provides general guidance on when coordination must occur.
- R4
 - The Member TO shall coordinate Protective Systems with neighboring TO, GOP, TO, and BA as noted in *PJM Compliance Bulletin on PRC-001*. In general, coordination must occur when a modification is made to a Protection System that changes its performance. The list in *Compliance Bulletin on PRC-001* provides general guidance on when coordination must occur.

PJM Expectations of Members

PJM expects that all member TOs coordinate any new protection system or any modification that changes the performance of the system with neighboring TOs, TOPs and BAs

TOs will coordinate any new or modified protection systems applied on the tie or on adjacent lines if an impact on the performance of the protection systems of other TOs could reasonably be expected

Coordination must occur when a modification is made to a protection system that changes its performance could have an effect on the operation of the protection system(s) of other transmission or generator operators.

- The list below provides general guidance, but is not an all inclusive list of examples:
 - Changes in the reach or pickup of any protection system (e.g. increasing the reach of a distance relay or increasing the pickup of an overcurrent relay)
 - Changes in the clearing time of a protection system
 - Changes in the communication channels (e.g. upgrading from analog phone pairs to fiber optic communication or changing from DCB to POTT communication)
 - Changes in the protection system to incorporate new protective functions (e.g. enabling new tripping functions in a microprocessor relay)
 - Relay software or firmware upgrades

- Mission
 - To develop and maintain an “**auditable**” and “defensible” process where transmission owning or generation owning companies sharing an interconnection line (100 kV and above) will **follow prescribed coordination check points** to ensure that all companies involved **are aware of and agree to any relay setting or relay design related work being performed**. Please note that this process **is to be utilized for relay work on ties between separate companies**, both PJM member and non-PJM member. If the same PJM company relay group is performing the relay work at both ends of the tie, then this process need not be followed.

- PJM and the PJM Relay Subcommittee shall maintain a central repository for coordination information
- If a GO or GOP installs a new system or initiates a change that affects the transmission system, contact the local interconnected TO in addition to notifying PJM at Regional_Compliance@pjm.com
- The Relay Subcommittee will have a standing agenda item to facilitate communications between companies regarding the specific relay work being performed
- Relay Subcommittee meeting minutes will document the coordination and reflect the following checks, which indicate the work progression and agreement between parties:

Phase 1

- Notification of work and agreement of scope. The initiating entity will notify the others affected by the proposed work. The requirement for this Phase to be considered complete is an agreement by all affected parties of the general description of work to be performed and an agreement of the approximate work schedule.

Phase 2

- Agreement on relay setting/design changes. The proposed relay settings should be exchanged for review by all entities affected by the proposed work. The requirement for this phase to be considered complete is an agreement by all affected entities of the adequacy of proposed relay setting modifications and specific design modifications.

Phase 3

- Commissioning complete. The requirement for this phase to be considered complete is an agreement by all affected entities that the final relay settings or design modifications have been agreed to, have been tested by qualified technicians using appropriate testing practices, and have been placed into service.



Tracking Spreadsheet

PROJECT ID	CKT #	kV	STATION	COMPANY	IN SERVICE YEAR	PROJECT DESCRIPTION (ACTIVE) - update for June 2020	PHASE 1	PHASE 2	PHASE 3	ID
1029		345			2020	Revise settings for GE D60 firmware update to v7.26.	Completed			1029
1029		345			2020	Review settings.	Completed			1029
1030		345			2020	Upgrading D60, no protection changes but firmware update to v7.26.	Completed	Completed		1030
1030		345			2020	Review settings.	Completed	Completed		1030
1031		345			2021	Install line to new XXXXX station. Use dual SEL411L current differential line scheme over 1550 nm single mode fiber.	Completed			1031
1031		345			2021	Install new station with connection to XXXX. Use dual SEL411L current differential line scheme over 1550 nm single-mode fiber.	Completed			1031
1036		230			2020	Revise ground overcurrent settings for increased coordination margins and adjust directional settings to new XXstandard	Completed	Completed		1036
1036		230			2020	review settings	Completed	Completed		1036
1037		230			2020	review ground and phase settings for increase coordination margin and improved arc resistance coverage	Completed	Completed		1037
1037		230			2020	review settings	Completed	Completed		1037
1037		230			2020	review settings	Completed	Completed		1037
1040		230			2020	Revise ground overcurrent settings for increased coordination margins	Completed	Completed		1040
1040		230			2020	review settings	Completed	Completed		1040
1043		230			2020	Revise directional settings to new FE Standard	Completed	Completed		1043
1043		230			2020	review settings	Completed	Completed		1043
1048		230			2020	Revise directional settings to new XXX Standard	Completed	Completed		1048
1048		230			2020	review settings	Completed	Completed		1048
1063		138			2020	Revise settings on XXXXX terminal.	Completed	Completed		1063
1063		138			2020	Review backup settings on XXXXX terminal for coordination.	Completed	Completed		1063
1071		230			2020	Updating relay settings on XXXXX line for PRC-026 compliance	Completed	Completed	Completed	1071
1071		230			2020	Review of proposed XXXX settings and coordination with generator protection	Completed	Completed	Completed	1071
1072		230			2020	Updating relay settings on XXXXX line for PRC-026 compliance	Completed	Completed	Completed	1072
1072		230			2020	Review of proposed PPL settings and coordination with generator protection	Completed	Completed	Completed	1072
1073		230			2020	Updating relay settings on XXXXXX line for PRC-026 compliance	Completed	Completed	Completed	1073
1073		230			2020	Review of proposed XXX settings and coordination with XXXXX relay settings	Completed	Completed	Completed	1073

- Gets PJM out of the protection coordination business
- Didn't want to just walk away
- Discussions with the PJM Relay Subcommittee
- Maybe PJM can help with coordination
- PJM does maintain short-circuit cases but they are future planning cases not suited for PRC-027



PRC-027-1 Coordination Form

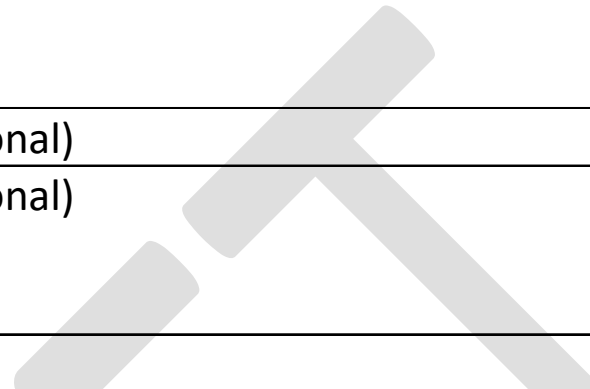
Use one sheet for each electrically joined facility

Instructions for use:

- It is expected that the originator of the form will complete the first table and parts of the second and third and send to owner of remote terminal (s)
- The recipient of the form will provide feedback for possible revisions
- The originator will maintain and document revisions to the form

Companies involved	<i>Example: AEP, Dayton P&L</i>
Originator of form	<i>Example: John Doe</i>
Company contact email	<i>Example: johndoe@aep.com</i>
Is this project due to unforeseen circumstance per PRC-027 section 1.3.4? (yes/no)	Choose an item.
Date that scope was established	<i>Example: May 1, 2019</i>
Expected date to exchange data	<i>Example: May 16, 2019</i>
Expected coordination completion date	<i>Example: August 1, 2019</i>
Expected project in-service date	<i>Example: November 1, 2019</i>
Facility number or name	<i>Examples: Hillsboro-Hutchings 138 kV or Bath County Unit #3-Kammer 500 kV Station</i>

Station A (Name, Voltage, Company)	<i>Examples: Hillsboro, 138 kV, AEP or Bath County Unit #3, Dominion</i>
Detailed description of work being performed (examples: replace relays, add/remove DTT, firmware upgrade, revise settings, etc.)	<i>Examples: Replace primary and backup line relays or Generator protection upgrade</i>
Station B (Name, voltage, Company)	<i>Examples: Hutchings 138 kV, Dayton P&L or Kammer 500 kV, AEP</i>
Detailed description of Coordination Work Performed	<i>Example: Revise settings on existing relays.</i>
Station C (Name, voltage, Company)	(Optional)
Detailed description of Coordination Work Performed	(Optional)



Expected

PRC-027-1 Target coordination schedule (table fields are to be populated with expected dates)

(Note that dates shown in table are examples.)**

	1.3.1 Provide setting	1.3.2 Respond to setting provided, identify issues	1.3.3 Address any coordination issues	1.3.3 Agreement on final settings
Station A	<i>May 16, 2019</i>	<i>n/a</i>	<i>July 7, 2019</i>	<i>August 1, 2019</i>
Station B	<i>n/a</i>	<i>June 16, 2019</i>	<i>July 7, 2019</i>	<i>August 1, 2019</i>
Station C	<i>n/a</i>	<i>June 16, 2019</i>	<i>July 7, 2019</i>	<i>August 1, 2019</i>

Actual

PRC-027-1 Requirement Tracking (table fields are to be populated with actual completion dates)

	1.3.1 or 1.3.4 Provide setting	1.3.2 Respond to setting provided, identify issues	1.3.3 Address any coordination issues	1.3.3 Agreement on final settings	Actual in-service date
Station A					
Station B					
Station C					

Revision History

Revision number	Description	Date of revision
<i>0</i>	<i>Original issue</i>	

- R1.3.1. Provide the proposed Protection System settings to the owner(s) of the electrically joined Facilities.
 - R1.3.2. Respond to any owner(s) that provided its proposed Protection System settings pursuant to Requirement R1, Part 1.3.1 by identifying any coordination issue(s) or affirming that no coordination issue(s) were identified.
 - R1.3.3. Verify that identified coordination issue(s) associated with the proposed Protection System settings for the associated BES Elements are addressed prior to implementation.
 - R1.3.4. Communicate with the other owner(s) of the electrically joined Facilities regarding revised Protection System settings resulting from unforeseen circumstances that arise during implementation or commissioning, Misoperation investigations, maintenance activities, or emergency replacements required as a result of Protection System component failure.
- R3 Each Transmission Owner, Generator Owner, and Distribution Provider shall utilize its process established in Requirement R1 to develop new and revised Protection System settings for BES Elements.

- Change to relay settings on an interconnecting transmission line
- Change to relay settings which impact backup settings on an adjacent facility (not necessarily on the interconnecting line)
- System configuration changes, such as:
 - Transformer replacement
 - Reconductoring of transmission line
 - Installation of new circuit breaker(s) in a station
 - Installation of a new substation which breaks an existing line into two lines
 - Decommissioning of generation
 - Installation of new generation
- Protection system upgrade
- GSU tap change
- Update the generation unit

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Protection Coordination



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