What are RAS Components?

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RAS components are described in the context of design redundancy and whether the scheme will operate correctly for a single component failure. Typical examples include: [p 40-41]

i. Protective or auxiliary relays used by the RAS.

ii. Communications systems necessary for correct operation of the RAS.

iii. Sensing devices used to measure electrical or other quantities used by the RAS.

iv. Station DC supply associated with RAS functions.

v. Control circuitry associated with RAS functions through the trip coil(s) of the circuit breakers or other interrupting devices.

vi. Logic processing devices that accept system inputs from RAS components or other sources, make decisions based on those inputs, or initiate output signals to take remedial actions.

“Typical” Component Examples?

- **Typical** means that this isn’t an exhaustive list.
- “The RC has the discretion to make the final determination regarding which components should be regarded as RAS components during its review.” [p 23]

“Other” Components?

- The “typical” component list includes trip coils, similar as for protection systems.
- Close coils aren’t listed, but could be important to RAS performance for:
  - Series capacitor or reactor bypass,
  - Shunt capacitor or reactor insertion .
- How should the RC exercise its judgement whether close coils (or other unlisted devices) are RAS “components”?

What is the RAS Objective?

- The object of every RAS is to ensure that the system meets the appropriate performance objectives (usually identified in NERC standards) following the contingency it is designed to mitigate.
- Would the system meet performance objectives if a particular close coil failed as part of an attempted RAS operation?
  - **YES**: The close coil **is not** critical to successful operation of the RAS, so it is not a RAS component.
  - **NO**: The close coil **is** critical to successful operation of the RAS, so it is a RAS component.

Single Close Coil (or other component) Designs

Failure Mitigation

- **Coil monitor**: PRC-012-2 accepts monitoring for single trip coils, when alarmed to the TO/TOP, which assumes that repair action will occur expeditiously. Similar close coil monitoring should also be acceptable.
- **Additional RAS action**: The RAS owner may consider whether some "backup" RAS action may also meet the system performance requirements. Non-exclusive examples include:
  - Trip the series compensated line if the bypass breaker fails to close,
  - Close an alternate shunt capacitor or reactor, and
  - "Backup" actions still need to be accomplished within the RAS operating time budget.

RAS Components

Questions?

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