



# NERC Lessons Learned

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- Preventing Unwanted Operations during Relay Diagnostic Restarts

## Problem Statement

- Protection relays may experience restarts for various reasons; these can range from diagnostic restarts to settings revisions to setting group changes depending on the type of relay. This lesson learned contains some suggested practices to help prevent unwanted operations during these restarts.

## Details

- An entity experienced an unexpected operation of a breaker failure relay that was protecting a breaker on a Bulk Electric System (BES) main bus.
- After a thorough investigation, the manufacturer determined the relay's memory had become corrupted,

## Corrective Action

- The entity performed diagnostics on the relay without determining the cause of the operation
- The relay manufacturer had not seen this type of event on this particular model before and performed rigorous testing in an attempt to determine the cause. This testing ultimately led to the complete failure of the relay.

## Lessons Learned

- One practice that can be applied to certain relay models is to specify what the relay should do on the first pass through the free form logic. One helpful option is to block operations when a diagnostic restart is performed.
- Another approach is prohibiting any actions within a specified time delay (e.g., relay performs no actions within first 10 cycles after being powered on). This allows the relay to boot up without taking unwanted actions.
- Another identified best practice is to test the relay by applying normal input voltage and load current to the relay and then cycle the power to the relay. This test can be performed during commissioning or during type testing. Testing may identify a relay that is susceptible to closing its output contacts during a diagnostic restart.
- A third identified best practice is to isolate the relay from the system by opening its test switches prior to making any changes to the relay. If an undesired output is issued upon restart, there will be no system impact since the relay is isolated.

- <https://www.nerc.com/pa/rrm/ea/Pages/Lessons-Learned.aspx>

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## NERC Lessons Learned



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