

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

December 19, 1989

**NRC INFORMATION NOTICE NO. 89-87: DISABLING OF EMERGENCY DIESEL GENERATORS
BY THEIR NEUTRAL GROUND-FAULT PROTECTION
CIRCUITRY**

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is intended to alert addressees to possible unconsidered failure modes in which emergency diesel generators could be rendered inoperable as a result of their neutral ground-fault protection circuitry. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On May 25, 1989, a plant engineering design review at Perry Unit 1 revealed a design anomaly whereby ground faults on emergency diesel generator loads coincident with loss of offsite power during a seismic event or fire could lead to the inoperability of more than one emergency diesel generator. As a result, the Perry staff declared several of the emergency diesel generators inoperable until temporary modifications could be made to disable the neutral ground-fault relay contacts that were designed to trip the emergency diesel generators.

Discussion:

At Perry Unit 1, each emergency diesel generator was designed with a neutral ground circuit consisting of a high impedance path from the neutral to ground, which limits ground-fault current to no more than 2 amperes (see typical network in Figure 1). The purpose of providing this grounding path (in lieu of an ungrounded system) is to limit the buildup of high voltage stress during certain ground-fault conditions that could ultimately result in the breakdown of the insulation of such components as motors and cables. It also provides a convenient means of detecting a ground in the system so that a search can be made to eliminate the ground before a second ground occurs and causes a phase-to-phase fault.

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Ground faults are detected by sensing the voltage that is developed in the emergency diesel generator grounding circuit whenever a ground fault exists in the electrical distribution system supplied by the emergency diesel generator. In the Perry design, a voltage sensing relay would initiate a trip of the corresponding emergency diesel generator whenever this voltage exceeded the relay's pickup value. This relay's contacts are bypassed by the automatic response to a loss-of-coolant accident. For non-LOCA events, however, a ground fault in any component, including non-Class 1E components, would have the undesirable result of shutting down the emergency diesel generator. This raises the concern that a seismic event or fire could have resulted in simultaneous ground faults in non-safety components supplied by all of the redundant emergency diesel generators. Action by the protection circuitry at Perry could then have shut down all of the emergency diesel generators, preventing them from performing their intended safety functions.

The Perry staff has temporarily disabled the neutral ground-fault relays to prevent them from shutting down the emergency diesel generators. Permanent modifications are planned to replace the ground-fault emergency diesel generator trip function with ground-fault alarms in the control room. These modifications will be supported by alarm response procedures requiring that the operators determine the location and safety significance of ground faults and take appropriate action.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate NRR project manager.


Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: F. Burrows, NRR
(301) 492-0833

Attachments:

1. Figure 1
2. List of Recently Issued NRC Information Notices

TYPICAL HIGH RESISTANCE NEUTRAL GROUNDING SYSTEM

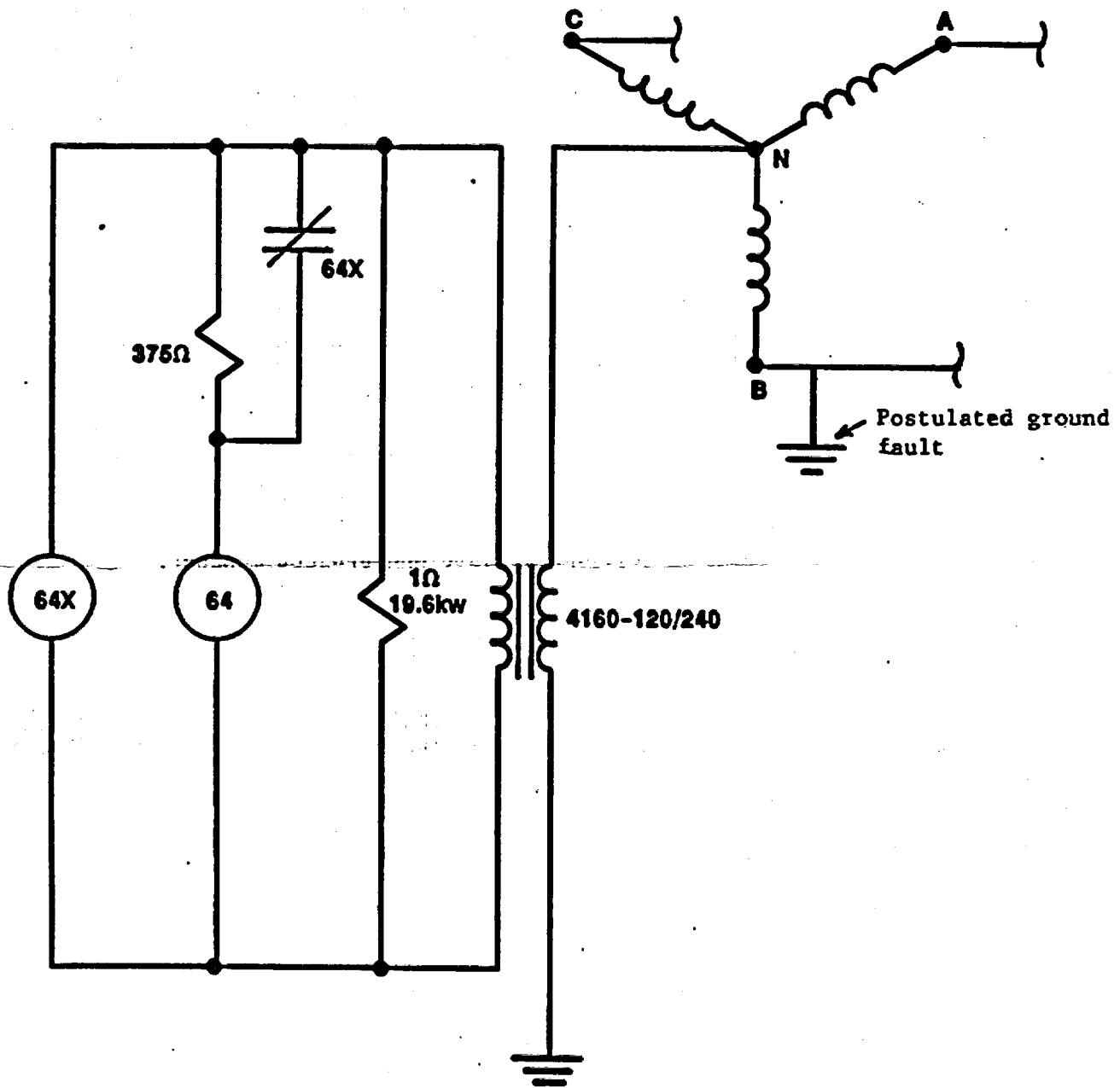


FIGURE 1

LEGEND

- 64 - Voltage sensing relay, provides alarm actuation or trip.
- 64X - Provides overvoltage protection for the 64 relay.

LIST OF RECENTLY ISSUED
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-45, Supp. 2	Metalclad, Low-Voltage Power Circuit Breakers Refurbished with Substandard Parts	12/15/89	All holders of OLs or CPs for nuclear power reactors.
89-86	Type HK Circuit Breakers Missing Close Latch Anti-Shock Springs.	12/15/89	All holders of OLs or CPs for nuclear power reactors.
89-85	EPA's Interim Final Rule on Medical Waste Tracking and Management	12/15/89	All medical, academic, industrial, waste broker, and waste disposal site licensees.
89-84	Failure of Ingersoll Rand Air Start Motors as a Result of Pinion Gear Assembly Fitting Problems	12/12/89	All holders of OLs or CPs for nuclear power reactors.
89-83	Sustained Degraded Voltage on the Offsite Electrical Grid and Loss of Other Generating Stations as a Result of a Plant Trip	12/11/89	All holders of OLs or CPs for nuclear power reactors.
89-82	Recent Safety-Related Incidents at Large Irradiators	12/7/89	All NRC licensees authorized to possess and use sealed sources at large irradiators.
89-59, Supp. 1	Suppliers of Potentially Misrepresented Fasteners	12/6/89	All holders of OLs or CPs for nuclear power reactors.
89-81	Inadequate Control of Temporary Modifications to Safety-Related Systems	12/6/89	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
 CP = Construction Permit

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