

Global Instrumentation and Control

Nuclear Instrumentation System

Flux Deviation Time Delay Modification

Background

The Westinghouse original ex-core Nuclear Instrumentation System (NIS) has been protecting nuclear plants for over 50 years. Industry experience has proven the design to be robust, reliable and effective.

Westinghouse continues to support the NIS with upgrades such as the flux deviation time delay modification. This modification eliminates nuisance quadrant power tilt ratio (QPTR) alarms, which occur due to short-duration signal spikes. Persistent flux deviations still trigger alarms in compliance with plant technical specifications.

Description

Two time delay cards are installed in existing spare card slots in the flux deviation drawer. One card is for the upper section deviation alarm, and one is for the lower section deviation alarm. A few new wires are added to existing connectors in the bottom of the drawer.

When a flux deviation occurs, the time delay card is triggered. The alarm is suppressed for the duration of the delay period. If the deviation is still present at the end of the delay period, the alarm activates.

The delay period is adjustable from 0.6 seconds to 10 minutes. The cards are equipped with a BNC jack and test points to enable accurate measurement and adjustment of the time delay period.

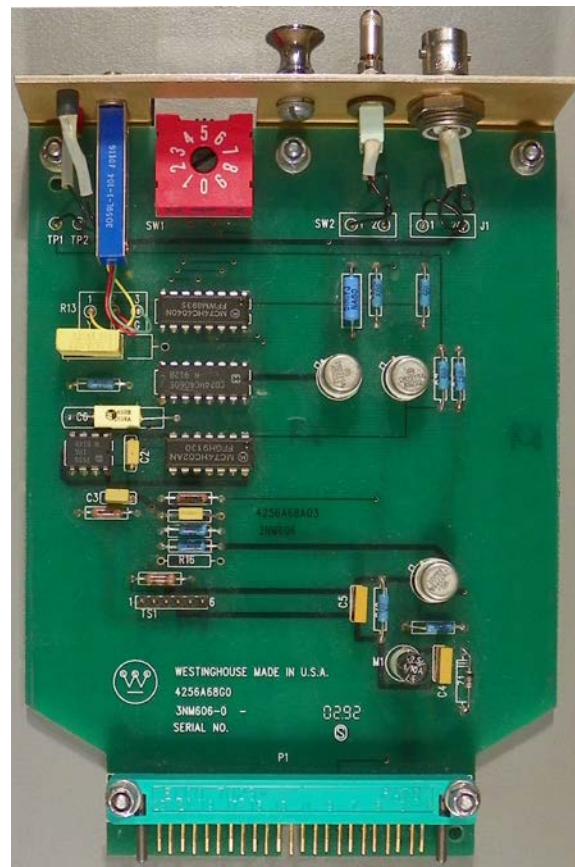
The enable/disable switch turns off the time delay for calibration of the flux deviation averaging circuit and comparator boards. The drawer operates in the original mode (without time delay) if the time delay cards are disabled or removed.

The modification can be provided as a field kit for on-site upgrades or installed by Westinghouse during new NIS drawer builds or refurbishments.

Westinghouse can provide licensing support, field change notices, drawing updates, technical manual updates and installation services.



The time delay card provides an enable/disable switch, adjustable delay, and test connections.



Simple installation consists of plugging in two cards and adding a few wires to the drawer.

new source range drawer build.

Benefits

- Eliminates nuisance QPTR alarms while still annunciating persistent flux deviations
- Minimizes distractions to reactor operators
- Simple installation
- Time delay period can be precisely set
- Time delay can easily be disabled via switch for drawer calibration and testing

Experience

Flux deviation time delay modifications have been installed in 7 reactor units. This proven design has been in use for more than 25 years.



Two cards are installed in spare slots in the flux deviation drawer, one for the upper section deviation alarm and one for the lower deviation alarm.



Nuisance flux deviation alarms due to short duration signal spikes can be eliminated.