

Enhanced Rod Control Maintenance Services

Background

Westinghouse offers a comprehensive enhanced rod control maintenance service designed to test printed circuit (PC) cards, clean system cabinets, provide general hardware maintenance, confirm energized system performance and conduct thermography scans.

Trained and experienced Westinghouse personnel determine that each PC card is of the correct site-specific configuration. Each card is visually inspected, its overall condition determined and all observations are recorded. Functional tests of installed and spare cards are performed utilizing state-of-the-art test equipment and new card acceptance criteria. Cards not meeting the cited criteria are repaired on-site at the time of service using Westinghouse-supplied components. All information is documented.

Description

Dynamic PC Card Tester

The Westinghouse dynamic PC card tester is the signature piece of this maintenance program. This unique device allows field personnel to predict whether a board will last through the next outage. The comprehensiveness and consistency of circuit board testing are dramatically expanded, making the test faster as well as more reliable than with previous test equipment.

The new, fully automatic system can functionally test PC cards for the rod control system logic cabinet, the analog power cabinets and the pulse-to-analog (P/A) converter cabinet. PC cards can also be tested in an elevated-temperature environment with the removable heat chamber. Test capabilities have been expanded to include the digital rod position indication (DRPI) and Solid State Protection (SSPS) system PC cards.



Westinghouse automated board tester

This system automatically performs a preprogrammed test sequence, stimulates boards and measures the full range of electronic responses. Because the tests are run by computer and the results stored, the dynamic board tester enhances reliability and repeatability of test results. The ability to analyze the dynamic responses of circuits dramatically increases the likelihood of detecting degradation before failure; multiple plant data are archived and analyzed for trending. Planned preventive maintenance combined with trend analysis can help minimize or eliminate forced outages associated with rod control system failure.

Preventive and Corrective Maintenance

Before performing any energized maintenance, Westinghouse verifies system performance by checking, and if necessary adjusting, power supply output voltages, over-voltage protection device trip settings and logic cabinet pulser/oscillator settings. Dynamic system performance and forced current regulation tests are conducted using dummy load coils. System alarm and bank overlap control circuitry are examined for proper operation. The P/A converter card offset and span adjust settings are checked. Thermography image scans are also performed in each cabinet during energized testing. All system hardware — down to lamps, fuses, fuse indicators, screw terminations, pins and sockets, termi-point connections, solder connections, volt traps, fuse holders, heat sinks, and other parts and components — is inspected and serviced. All testing is performed off-critical-path during a normal refueling outage.

Repairs and Replacements

When corrective maintenance is needed, Westinghouse will replace power supplies, PC cards and subassemblies on-site from customer inventory, or make repairs as appropriate. Those PC cards that are not repairable on-site can be returned to the Westinghouse facility for further repairs.

Technical Support

The technical support included in this maintenance program is unique. As the original equipment manufacturer, Westinghouse technical personnel bring comprehensive rod control system design, construction and operational knowledge to bear on every maintenance task and service. They have, in fact, already done so on more than 40 rod control systems since 1985.

Records and Documentation

A complete, comprehensive field service package documenting all of the maintenance, repair and replacement work performed is provided to the customer.

Options

Additional program options include modifications, upgrades or additions to enhance or expand the performance of the installed system; motor generator set maintenance; reactor start-up advisory and technical support; reactor trip breaker maintenance; and multiple rod drop testing services.

Benefits

The Westinghouse enhanced rod control maintenance services provide:

- A new, fully automatic system to functionally test PC cards for rod control system logic cabinet, analog power cabinets and pulse-to-analog (P/A) converter cabinet.
- Test capabilities expanded to include the digital rod position indication (DRPI) system PC cards.
- Dynamic board tester to enhance reliability and repeatability of test results.
- The ability to analyze the dynamic responses of circuits to dramatically increase the likelihood of detecting degradation before failure.
- Multiple plant data archived and analyzed for trending.
- Planned preventive maintenance combined with trend analysis to help minimize or eliminate forced outages associated with rod control system failure.

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