

# Solid State Protection System Maintenance Services

## Background

Westinghouse now offers a comprehensive Solid State Protection System (SSPS) 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 the service, using Westinghouse-supplied components, and all data are 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, for the first time, whether a board will last through the next outage. The comprehensiveness and consistency of circuit board testing are dramatically expanded and, as a result, the circuit board test capability is dramatically expanded, more reliable and faster than with previous test equipment.

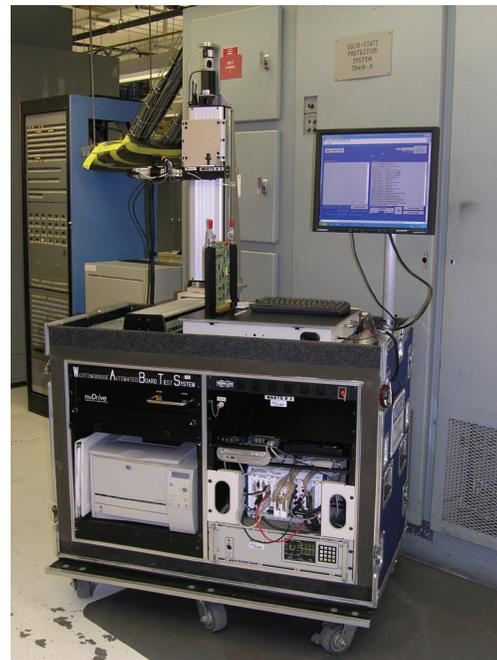
The new, fully automatic system can functionally test all original style cabinet PC cards. PC cards can also be tested in an elevated-temperature environment with the removable heat chamber. Test capabilities have been expanded to include the rod control system and digital rod position indication system PC cards.

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 preventative maintenance combined with trend analysis can help minimize or eliminate forced outages associated with an SSPS system failure.

### Preventative and Corrective Maintenance

Before performing any energized maintenance, Westinghouse verifies system performance by checking and, if necessary, adjusting power supply output



Dynamic PC card tester

voltages and over-voltage protection device trip settings. Dynamic system performance of the logic test switches, permissive test switch and memory switch functions are all checked. Thermography image scans are also performed in each cabinet during energized testing. All system hardware is inspected and serviced, including lamps, fuses, fuse indications, screw terminations, pins and sockets, termination connections, solder connections, fuse holders, and other parts and components. 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 the spot 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 SSPS design, construction and operational knowledge to bear on every maintenance task and service.

### **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 modification, upgrades or additions to enhance the following:

- Enhance or expand the performance of the installed system
- Motor generator set maintenance
- Rod control system maintenance
- Digital rod position indication system maintenance
- Reactor start-up advisory
- Technical support

## **Benefits**

- SSPS incorporates proven board testing technology and preventative maintenance procedures.
- Along with system validation testing, SSPS maintenance service performance helps prevent forced system and/or plant outages.
- As the OEM, Westinghouse has inherent SSPS design, construction and operational experience.
- Westinghouse personnel are uniquely qualified to repair system components and perform system troubleshooting.