JUPITER PRIME

Consulting • Training • Advisory

جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

Automatic Voltage Regulator Troubleshooting Training Course

19 – 23 July 2027
London

Automatic Voltage Regulator Troubleshooting Training Course

Ref: 1376_51534 **Date:** 19 – 23 July 2027 **Location:** London **Fees:** 5900 GBP

Automatic Voltage Regulator Troubleshooting is a 1-week training course for electrical maintenance engineers and technicians who keep generator excitation healthy, and it ends with an AVR fault-finding playbook for their own machines. Unstable terminal voltage, reactive power swings and nuisance excitation trips now cost plants output and grid goodwill, so fast, evidence-based regulator diagnosis matters. The course is delivered by Jupiter Prime Training.

Why Automatic Voltage Regulator Troubleshooting Matters Now

Digital regulators replace analogue cards, so technicians must read event logs and parameter sets rather than trace potentiometers. Grid operators expect generators to hold voltage and support reactive demand during disturbances, which puts limiter settings under scrutiny. Experienced excitation specialists are retiring. A site that diagnoses quickly avoids forced outages and rotor damage; one that guesses swaps healthy boards and repeats trips. The course rests on maintenance terminology from EN 13306 and on asset life thinking from ISO 55001.

Who Gains Most from Automatic Voltage Regulator Troubleshooting

- Electrical technicians who respond to excitation alarms and voltage deviations on running sets
- Maintenance engineers who plan regulator testing during generator outages
- Commissioning staff who set up replacement regulators and verify step responses
- Shift electricians who restore standby and emergency sets after a trip
- Reliability engineers who track repeat excitation failures across a fleet

The greatest return comes when the technicians and the engineer who own one generator fleet attend together and agree a single fault-finding sequence.

Automatic Voltage Regulator Troubleshooting Capabilities

Participants move from a regulator block diagram to isolating the failed element of a live excitation loop.

- Trace the voltage sensing, comparator, firing and exciter path of a regulator — isolating which stage caused a deviation
- Test rotating diodes, field windings and exciter stators with insulation and resistance readings — deciding repair or replacement
- Calculate droop and reactive current compensation for parallel sets — sharing reactive load between machines
- Apply step response tests to tune gain and stability settings — supporting the commissioning sign-off
- Assess over-excitation, under-excitation and volts-per-hertz limiter behaviour — protecting rotor and transformer
- Communicate root cause and corrective action to operations — returning the generator to service with confidence

Key Automatic Voltage Regulator Troubleshooting Terms

- Automatic voltage regulator AVR — the controller that adjusts exciter field current to hold generator terminal voltage at its setpoint.
- Brushless exciter — a small alternator on the main shaft whose output is rectified by rotating diodes to feed the main field.
- Voltage droop — a deliberate fall in voltage setpoint as reactive load rises, letting parallel generators share reactive power.
- Field flashing — applying an external DC source to build residual magnetism so the generator can self-excite.
- Under-excitation limiter — a function that stops field current falling so low that the machine loses synchronism.
- Step response test — a small sudden setpoint change used to judge regulator gain, overshoot and settling time.

Automatic Voltage Regulator Troubleshooting Day by Day

Day 1: Excitation Principles and Regulator Architecture

- Generator Capability Curve — Where Voltage and Reactive Limits Sit
- Static Versus Brushless Excitation — Choosing the Diagnostic Approach
- Regulator Block Diagram — Mapping Sensing, Comparison and Firing Stages
- Permanent Magnet Pilot Exciter Supply — Effect on Start-Up Reliability
- EN 13306 Failure Modes — Classifying Excitation Faults Consistently

Day 2: Sensing, Power Stage and Exciter Testing

- Potential and Current Transformer Inputs — Detecting Sensing Loss Errors
- Thyristor Bridge Firing Checks — Isolating Power Stage Defects
- Rotating Diode and Surge Suppressor Testing — Repair or Replace Choice
- Field Winding Insulation Resistance — Judging Rotor Fitness for Service
- Residual Magnetism and Field Flashing — Recovering a Set That Will Not Build

Day 3: Control Modes and Protective Limiters

- Voltage, Power Factor and VAr Control Modes — Matching Mode to Duty
- Droop and Cross-Current Compensation — Balancing Reactive Sharing in Parallel
- Over-Excitation and Under-Excitation Limiters — Protecting Rotor and Stability
- Volts-per-Hertz Limiting — Preventing Transformer Overfluxing at Low Speed
- Power System Stabiliser Basics — Damping Electromechanical Oscillations

Day 4: Fault Diagnosis and Regulator Tuning

- Symptom-to-Cause Fault Trees — Hunting, Overvoltage and Collapse Cases
- Digital Regulator Event Logs — Reconstructing the Sequence Before a Trip
- Step Response and Gain Tuning — Setting Stability Without Overshoot
- Secondary Injection Testing — Proving Limiters Before Return to Service
- Case Studies From Power Stations and Offshore Platforms — Lessons on Repeat Trips

Day 5: Practising the AVR Fault-Finding Playbook

- Simulated Sensing Loss Exercise — Applying Day 2 Transformer Checks
- Parallel Set Reactive Swing Exercise — Applying Day 3 Droop Settings
- Post-Trip Log Review Exercise — Applying Day 4 Event Analysis
- ISO 55001 Asset Life Records — Linking Regulator Spares to Criticality
- AVR Fault-Finding Playbook — Assembling Tests, Limits and Escalation Steps

Applying Automatic Voltage Regulator Troubleshooting After the Course

- Run a step response test on one critical generator at its next outage and compare gain and overshoot with commissioning values.
- Build a rotating diode and field insulation test sheet for every brushless set on site and schedule it into the outage work list.

Automatic Voltage Regulator Troubleshooting Questions FAQ

What is automatic voltage regulator troubleshooting and why does it matter now?

It is the structured diagnosis of faults in the generator excitation loop, from sensing inputs to exciter and rotor. Digital regulators and tighter grid expectations make a disciplined method essential to avoid forced outages.

Which roles gain most from automatic voltage regulator troubleshooting?

Electrical technicians and maintenance engineers who respond to excitation alarms gain most. Commissioning staff and reliability engineers tracking repeat failures also benefit.

How does automatic voltage regulator troubleshooting differ from a generator insulation course?

This course concentrates on the control loop: sensing, firing, limiters, droop and tuning. A generator insulation course concentrates on stator and rotor condition testing instead.

What do you bring back from automatic voltage regulator troubleshooting?

You bring back a fault-finding playbook for your own regulators, with test sheets, limiter checks and escalation steps. You also read event logs and tune step response instead of swapping boards.

Automatic Voltage Regulator Troubleshooting: The Way Forward

The AVR fault-finding playbook first informs the decision taken at the next excitation alarm: which stage to test before touching any board. Shift electricians use it at the panel, engineers to plan outage tests. After its first real use, revisit the escalation steps and the limiter settings, because live trips show which checks saved the most time.