



## Course Information Letter ---- G539

# (GE) EX-2100 VOLTAGE REGULATOR

G539

Excitation System reliability and availability can be a matter of skilled routine maintenance activity and proficient troubleshooting capability. Proficient troubleshooting is greatly aided by a solid operational understanding of the excitation system and its voltage regulator. This course gives technicians and engineers the necessary knowledge to maintain, repair and calibrate an Excitation System with the EX2100 Voltage Regulator:

1. Using effective routine maintenance practices.
2. Knowing what checks may be performed on-line and how to perform these checks without causing an equipment shutdown.
3. Understanding the use of OEM provided toolbox software.
4. Increasing the likelihood of accurate problem diagnosis by thoroughly understanding how the equipment operates.
5. Increasing the likelihood of accurate problem diagnosis by understanding any given circuit's impact upon operations; i.e., quickly linking the symptom(s) to the faulty circuit.
6. Verifying suspected faulty circuit by analyzing voltage levels and/or signal traces.
7. Understanding the necessary calibrations, after the faulty part has been replaced, including how the calibrations are performed.

This course is intended for electrical technicians and engineers.

**OBJECTIVES:** Upon completion of this course, participants will be able to:

1. Identify the major components associated with the EX21k excitation system.
2. Determine the function of each component
3. Introduce the Control Systems Toolbox for the EX21k.
4. Understand the types of troubleshooting that maybe required for the EX21k.
5. Discuss where to get help during troubleshooting.
6. Discuss the major excitation system components, including limit and protective features.
7. Describe how the EX21k interfaces with the Turbine Control
8. Describe how the EX21k protects the generator.
9. Demonstrate familiarity with the startup and operation of the EX21k.
10. Demonstrate knowledge regarding the use of the Control System Toolbox for online and offline troubleshooting and maintenance

## COURSE TOPICAL OUTLINE

1. Generator Fundamentals to include Operation, Design Information Available, Synchronizing, and Performance Curves
2. Electrical One Line Diagram
3. Overview
4. Overview with LCI (For Gas Turbine)
5. Control Cabinets and Hardware
6. Software and Introduction to Tool Box
7. Voltage Regulator Fundamentals
8. Generator OEL, UEL & V/Hz
9. Elementary Diagram
10. How to use Instruction Manuals
11. Troubleshooting

## COURSE DATES/LOCATION/FEE

Presented at client site only.

## WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' power point presentation, (GE) EX-2100
2. A "Certificate of Completion" with 2.3 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

## RECENTLY SATISFIED CLIENTS:

Doosan Heavy Industries, Korea Midland Power Company, Korea East-West Power Company, Korea Western Electric Power Company

## FREQUENTLY ASKED QUESTIONS

- Will HPC Technical Services bring this course to our location for our personnel only? YES, call or email Stephen Parker, [stparker@hpcnet.com](mailto:stparker@hpcnet.com) for a price quotation.
- Will HPC Technical Services customize the presentation at our site to suit our particular needs? Yes.
- Is HPC Technical Services' textbook available for purchase as a reference document? No, this book is not for sale.
- What is the cost for HPC Technical Service to deliver this course at our location? Well, of course that can vary, but generally speaking, if you're planning on having 6+ attend, when considering your T&L, it is to your advantage to perform the course at your plant (office). You gain from the customization and price.
- Can HPC Technical Services provide "Technical Assistance" in the maintenance troubleshooting of your excitation system? Yes we can. Call or contact Harold Parker, [hparker@hpcnet.com](mailto:hparker@hpcnet.com) for our rate sheets and any further information required.

## GENERATOR I&C CERTIFICATION:

Those who attend this course are automatically qualified to take HPC Technical Services' Certification Examination. This examination is offered at no additional expense to the participant. An 80% passing grade is required. The examination length will not exceed 2-hours. Those who complete this examination will receive a revised "certificate of completion" that recognizes this accomplishment along with two-copies of a "To Whom It May Concern" letter that states their accomplishment. (Two copies are provided, one for the participants' employer and one for the participants' personal file.)

Consult HPC's website, [www.hpcnet.com](http://www.hpcnet.com), for detail on this certification program.

## INSTRUCTOR



**John Marshall.** Mr. Marshall, worked for GE 35 years in the power system service and installation business. 25 years of this time was in the international service business. During his career, Mr. Marshall's positions included Field Engineer, Service Supervisor, Technical Training Instructor and Senior Application Engineer. Mr. Marshall's work covered electrical power distribution and control of power generation equipment. His expertise is GE manufactured excitation systems for large and medium size generators used on gas and steam powered turbines. As a Technical Training Instructor for over 20 years, Mr. Marshall developed and presented training programs for GE manufactured excitation systems. As a Senior Application Engineer, Mr. Marshall's work included the upgrading/replacement of older excitation systems with GE's digital excitation system. His Field Service work was worldwide. BSEE degree from Virginia Polytechnic Institute and State University in Blacksburg, Virginia.