



## Course Information Letter ---- TG307

### STEAM TURBINE GENERATOR CONTROLS FOR OPERATORS TG307

Learn (or re-affirm) proper operation of the steam turbine-generator from the perspective of the control room operators. Emphasis is on decision-making regarding safe and effective operation of steam turbine generator equipment: TG Instruments / Controls, Starting and Loading Procedures/Considerations, and those Abnormal Events that occur all too often. Equipment discussed is normally a function of the participants' background. Presentation includes industry events/case studies. This course is intended for Control Room Operators, Shift Supervisors, Operations Superintendents, and Engineers.

Learn how a machine is at risk in service. Learn what the symptoms of abnormal conditions are and what might be proper corrective actions. Learn the purpose and function of the turbine-generator controls, how they are properly operated, how the controls respond to system conditions and what is the type and purpose of various protective circuits.

"I found the class to be immensely helpful and informative as it pertains to my job function and responsibilities. The instructor was enthusiastic, and very helpful with questions and concerns of those participating in the class. Especially helpful with generator operation and protective systems. I enjoyed the instructor's effort and ability to encourage participants to become involved with the overall theme of the class, and the exchange of dialogue as to our specific areas of concern." --- **KJC OPERATIONS**, Kramer Junction, CA

#### OBJECTIVES:

1. Participants will become familiar with those turbine-generator components susceptible to damage in abnormal or fault like conditions, the type of damage that could occur, and what the operator can (or cannot) do to correct for the situation.
2. Participants will be able to draw a simple block - diagram that describes all the elements of steam turbine controls: speed, load, and pressure control, the generation of a servomechanism signal, feedback and regulation.
3. Participants will be able to draw a simple block-diagram that describes all the elements of a generator voltage regulator including the generation of excitation power, manual control, auto voltage regulation, anti-hunt devices, and limiters.
4. Participants will be able to describe in detail, the process of synchronizing, including discussion on the effects of synchronizing errors.
5. Participants will be able to describe normal steam turbine-generator operating procedures as well as the more routine (using that word loosely) abnormal events.

#### COURSE DATES/LOCATION/FEE

For current dates / locations / prices, please see HPC's website, [www.hpcnet.com](http://www.hpcnet.com).

# Steam Turbine Generator Controls for Operators – TG307

www.hpcnet.com

## WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' textbook, Steam Turbine Generator Controls for Operators, a \$195 value, as written by Harold Parker.
2. A "Certificate of Completion" with 2.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

## COURSE OUTLINE

### Monday

**Steam Turbine Fundamental Review:** Theory, Turbine Sections and Component Descriptions

**Turbine Systems:** Lubricating Oil Systems, Gland Steam and Water Seal Systems and Hydraulic Power Unit (where applicable). Emphasis is on abnormal operations as opposed to being a "system description".

### Tuesday

**TSI Interpretations:** Eccentricity (Overview, Component Description, Use of Instrument and Data Interpretation), Speed Detection, Valve Position, Vibration (including discussion of causes within a steam turbine), Shell Expansion, Differential Expansion, Metal Temperatures

**Turbine Controls for the Operators:** Speed Control, Load Control, Limiters, Flow Control, Extraction Turbines, Overspeed and Reset System, Overspeed Trip

### Wednesday

**Turbine Operations:** Thermal Stress, Starting and Loading, Drains, Pre-warming Procedures, Normal Operations.

**Abnormal Conditions:** Oil Whip, Packing Rubs, Mechanical Unbalance, Cracked Rotors, Water Induction, Low Speed Operation, Low Frequency Operation, High Exhaust Hood Temperatures, Vacuum Breaking, Over Pressure, Over Temperature, Feedwater Heater Removal

**Periodic Tests**

### Thursday

**Generator Fundamentals:** Principles of a Simple Generator, Principles of Large Generators, Generator Regulation, Active and Reactive Power, Operation of Paralleled Generators, Power Angle Relation and Instability

**Generator Construction:** Stator Assembly, Rotor Assembly, and Exciters

**Generator Support Systems:** Shaft Sealing System, Hydrogen Control, and Stator Cooling Systems

**Excitation Systems:** Introduction to Voltage Regulators, Transient Response of a Voltage Regulator, Stabilizing Circuits

### Friday

**Generator Operations:** Prior to Startup, Startup, Shutdown, Power Factor Adjustment, Operation of Gas Coolers, Abnormal Operations, Relationship Between Operation, Protection and Alarms, Alarms, Protection when Generator is Off-Line, Tripping Methods, Protective Actions for Generator

## 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? Yes. \$195 + S&H.
- 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 perform an audit of our operating procedures, or an In-Service Inspection? Yes we can. Call or contact Harold Parker, [hparker@hpcnet.com](mailto:hparker@hpcnet.com) for our rate sheets and any further information required.

## STEAM TURBINE GENERATOR OPERATIONS 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/CONSULTANT (S):



**Harold Parker** is the founder & President of H Parker & Company, Inc. Mr. Parker, along with Mr. Douglas Lemmo (see below) were significant contributors to the development of the Steam Turbine Generator Maintenance training program used by GE for the "advanced" training of their field engineering force. Mr. Parker has worked in the "Power Generation" industry for 36 years, 14-years with GE as a Field Engineer, Start-Up Engineer, Technical Training Specialist and Manager. In 1983 Mr. Parker resigned from GE and started a training company, Schenectady Learning Systems, in Schenectady NY, which evolved into H Parker & Company, Inc. today. During this post-GE period, Mr. Parker was briefly employed as Manager Turbine-Generator Services with General Physics (2-years) and as a Field Engineer with Mechanical Dynamics & Analysis (2-years). Mr. Parker is the primary contributor to the development of the text used in this course presentation. Mr. Parker holds a BSME ('69 from Lawrence Institute of Technology), a MBA ('81 from the State University of New York @ Albany) and is a member of ASME. Harold resides in Bradenton FL.



**John Mitchell**. John Mitchell is a multi-talented leader with over 33 years management, engineering, installation and maintenance experience in thermoelectric power plants. He is especially an expert in steam turbines, generators and their controls. Prior to June 2003 (when he accepted an early retirement package from GE), John was a Customer Training Specialist with the GE International Department. Other past responsibilities included being Manager, Engineering Services, Senior Application Engineer, Senior Service Engineer, Lead Training Specialist, Program Support Engineer, Instructor Technical Training, and Field Engineer. All of this on operation & maintenance of steam turbine generator hardware and controls. John resides in Schenectady NY.

**Robert Johndrow**. Bob Johndrow hired into GE as a field engineer on the same day as HPC's founder, Harold Parker. That was 36-years ago. Since that date, Bob Johndrow has been a GE Field Engineer specializing in many disciplines including Generator Maintenance and Testing. Bob completed GE's Generator Specialist Training Program early in his career. Since then he has been involved in the commissioning of several steam turbine generators where he was responsible for the turbine controls, auxiliaries, startup sequence and the generator. Bob earned a BS in Industrial Distribution from Clarkson University in Potsdam NY and also has GE Six Sigma Green Belt Certification. Bob accepted an early retirement package late 2003 and has worked as an independent as well as being associated with HPC Technical Services since then. He resides in Rhode Island.

**Joe Byrd**. Joseph Byrd has over 29 years of experience in the power industry, concentrating in the area of turbine-generator controls and operations. He graduated from North Carolina State University in December 1978 with BS in Mechanical Engineering. He began his career in January 1979 as a Field Engineer, and subsequently a Start-Up Engineer with GE and was lead Start-up Engineer on five turbine-generator installations. He left GE in 1986 to consult directly to utilities on control systems calibration and maintenance with MD&A. In June 2008, he ended his relationship with MD&A and became available to HPC to instruct. His primary areas of expertise are GE manufactured Large Steam and Mechanical Drive Turbine MHC control systems as well as EHC systems. Joe resides near Raleigh NC.

**SATISFIED CLIENTS:** A/C Power, AES, Alberta Power, ALCAN Aluminum, Alstom Power, Arizona PSC, ATCO Electric, Baltimore Gas & Electric, Boise Cascade Paper, Calpine Gilroy Cogeneration, Cardinal Cogen of Canada, Carolina Power & Light, Central Illinois Light Company, Central Maine Power, Cinergy, Cogentrix, Colorado Springs Utilities, Commonwealth Edison, Consumers Energy, Cory Cogen, Crawfordsville (IN) Electric Light & Power, Crestbrook Forest Industries (Canada), Daishowa-Marubeni (Canada), Delmarva P&L, Detroit Edison, Doosan Heavy Industries, Duquesne Light, Edmonton Power, Entergy, EPCOR, Florida Power & Light, Georgia Power, GPU/Genco, Great River Energy, Gulf States Paper, Inland Steel, Intermountain Power, International Paper, Kansas City BPU, KJC Operations Company, Korea East West Power, Korea Western Power, Lakeland (FL) Electric Department, LGE Power Systems, Louisville Gas & Electric, Manitowoc (WI) Public Utilities, Metropolitan Edison, MidAmerican Energy, MidWest Generation, New York Power Authority, New York State Electric & Gas, Northern California Power Agency, Northland Power (Canada), Ocean State Power, Ogden Martin Systems, Omaha Public Power District, Ontario Hydro, PG&E, Pennsylvania Electric, Pennsylvania Power & Light, Phosphate Corporation of Saskatchewan, PS New Mexico, Puerto Rico Electric Power Authority, Rochester (MN) Public Utilities, Salt River Project, SaskPower, SaskPower International, Southeast Public Service Authority, Southern Indiana Gas & Electric, Tallahassee (FL) Electric Department, Trans Canada Power, Triconex, United Power Association, UtiliCorp, Virginia Power, Western Resources, Weyerhaeuser Canada, Wheelabrator Environmental Systems.

**HPC TECHNICAL SERVICES**  
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**REGISTRATION FORM**

Company: \_\_\_\_\_  
Plant: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Telephone: \_\_\_\_\_ FAX: \_\_\_\_\_  
Course Number/Title: \_\_\_\_\_  
Course Dates: \_\_\_\_/\_\_\_\_/\_\_\_\_ Thru \_\_\_\_/\_\_\_\_/\_\_\_\_  
Course Location: \_\_\_\_\_ Course Fee: \_\_\_\_\_

**PLEASE ENROLL THE FOLLOWING INDIVIDUAL(S) LISTED BELOW:**

Student #1: \_\_\_\_\_ Email: \_\_\_\_\_  
Student #2: \_\_\_\_\_ Email: \_\_\_\_\_

**Taking advantage of HPC's 3-4-2 Policy: Send 3, Pay for 2 when paying in advance.**

Student #3: \_\_\_\_\_ Email: \_\_\_\_\_

**ENROLLED BY:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**METHOD OF PAYMENT**

- Check to Follow: \_\_\_\_\_
- Check Enclosed #: \_\_\_\_\_
- MC/Visa/AMEX #: \_\_\_\_\_  
Expiration Date: \_\_\_\_\_ CV Code: \_\_\_\_\_
- Purchase Order #: \_\_\_\_\_

**Please advise how you found out about this course initially.**

- Website search
- Fax advertisement
- Magazine advertisement
- Familiar with HPC
- HPC mailing
- Other: \_\_\_\_\_