



Course Information Letter ---- TG520

(GE-MSTG) MK-III STEAM TURBINE CONTROLS TG520

Control system reliability can be a matter of skilled routine maintenance activity and proficient troubleshooting capability. Although this is true, knowing how to get there from here is complicated. First, it is important to fully appreciate the “big picture” of steam turbine operations, both “on-the-grid” and “islanded”. This course begins with these concepts then proceeds to looking at the development of critical signals: Speed Control, Load Control, Inlet Pressure Control, Extraction Pressure Control and, protective circuits. In each of these circuits we look at operator inputs, equipment feedback, and the development of control signals. Once personnel have a thorough understanding of the “big picture” and how all the primary control signals are developed, then we can begin to look at calibration procedures, routine preventive maintenance issues, and troubleshooting.

Topics include: System Overview • Hydraulics • Mechanical Components • Speed/Load Control • Extraction Pressure • Trip Circuits • Line Up Diagram • Calibration and Troubleshooting

Technical Services is prepared to instruct this course as developed by equipment-experienced instructors. Troubleshooting experience is given. The instructional experience is unmatched. The dedication to our accomplishing stated course objectives are a matter of policy.

OBJECTIVES: It is the overall objective of this course to prepare the participant to better maintain and troubleshoot this (GE-MSTG) EHC Mk-III Steam Turbine Control system.

Upon completion of this course the participant should be able to:

1. Demonstrate conceptual knowledge of how the control system responds to load and/or extraction pressure change.
2. Describe how control room input is processed within the control electronics.
3. Explain, in detail, the signal flow path for the major control parameters: i.e.; flow, load, pressure and speed.
4. State and explain the purpose of all significant interfaces between the control system and the machine (including other power plant equipment).
5. Perform routine circuit calibration using the OEM line up instructions and prints.
6. Demonstrate knowledge necessary to troubleshoot commonly experienced symptoms.

COURSE OUTLINE

- I. **Starting & Loading Instructions:** Manual Starting, Operating & Shutdown Procedures, Automatic Setting of Startup Speed/Load Ramps/Holds
- II. **Turbine Control Mechanisms:** Hydraulic Power Unit, Electrical Trip Device, V1 Operator, V2 Operator, Main Stop Valve
- III. **Control Drawings:** System Architecture, Documentation and Nomenclature, Interconnection Diagram, Wiring Diagram, One-Line Diagram, Elementaries, Connection Diagram
- IV. **Steam Turbine Control System:** Control Functions, Monitoring Functions, Protective Functions, Test Functions, Automation Functions
- V. **Speed/Load Control:** Speed, Primary O/S and Emergency O/S Signals, Development of Speed/Load Control, Normal Control of Speed, Droop Speed Control, Methods of Controlling Speed, Speed Schematic Diagrams, Normal Control of Load, Load Limit, Methods of Controlling Load, Load Schematic Diagrams, Print Reading Exercises, Problem Solving
- VI. **Inlet Pressure Control & Limiting:** Inlet Pressure Control Signal, Control & Limiter Signal, Normal Control of Pressure, Operator Displays, Schematic Diagrams, Problem Solving
- VII. **Sliding Pressure Control:** Development of Signals, Signal Processing, Set point Display, Schematic Diagrams, Problem Solving
- VIII. **V1 Control:** Schematic Diagrams, Servo Output, Valve Linearization, Manual Set point Register, Speed/Load Summer, Valve Operator Exercises
- IX. **V2 Control & Extraction Pressure Control:** Pressure Control Concepts

COURSE DATES/LOCATION/FEE

For current dates / locations / prices, please see HPC's website, www.hpcnet.com.

WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' textbook, [\(GE-MSTG\) EHC Mk-III Steam Turbine Controls](#).
2. A "Certificate of Completion" with 2.6 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

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 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 course is too dependent upon print reading.
- 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 a functional checkout and calibration of your control system during the upcoming outage OR provide troubleshooting support should it be required? Yes we can. Call or contact Harold Parker, hparker@hpcnet.com for our rate sheets and any further information required.

STEAM TURBINE I&C MAINTENANCE 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, for detail on this certification program.

INSTRUCTOR/CONSULTANT(S):

Robert Johndrow. Bob Johndrow has 35+ years experience as a Field Engineer working on steam turbine generators. His experience includes steam turbine generator maintenance and testing, as well as considerable work on the steam turbine controls. His work on the steam turbine Mechanical Hydraulic Controls included work on nuclear (BWR) units, fossil applications, and industrial 3-arm governors. 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 near Hartford, CT.

Harold Parker. Founder & President of H Parker & Company, Inc. 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 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 and ASTD. Harold resides in Bradenton FL.

Mike Whisnant. Mike has 30+ years experience working on steam turbine analog and digital controls. He began his career with Duke Energy at the Oconee Nuclear Power Plant in South Carolina. At this plant, Mike was an I&C Technician and after several years working on the GE Mk-I control systems he began to instruct courses in the training department. His career in the industry grew as he joined HPC Technical Services in 2001. Since then, he has worked on the GE Mk-II, Mk-III, Mk-V and Mk-VI systems. Mike resides near Greenville SC.

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: _____

Student #2: _____

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

Student #3: _____

Enrolled by: _____ **Date:** _____

METHOD OF PAYMENT

Check to Follow: _____

Check Enclosed #: _____

MC/Visa/AMEX #: _____

Expiration Date: _____ CV Code: _____

Purchase Order #: _____

HOW DID YOU FIND THIS COURSE

Past participant of HPC courses

Received a fax

Received an email

Received an update in the mail

Internet search

Other: _____