



500 Tallevast Road • Suite 101
Sarasota, FL 34243 USA
Tel: 941-747-7733 • Fax: 941-746-5374
www.hpcnet.com

Course Information Letter ---- TG523

(GE) MK-VI STEAM TURBINE CONTROLS TG523

This course targets the need for technicians/engineers to operate, maintain, calibrate and troubleshoot control systems such that availability and reliability can be maximized. It has been HPC's experience that when plant personnel have a control system problem and they seek help (for example, using HPC services) that the reason plant personnel had this problem troubleshooting was one of two explanations:

1. Lack of understanding of the "big picture", that is how the various control functions relate to one another.
2. Lack of understanding of how to use the tools that are available to troubleshoot the problem.

The overall benefit of this course is that the participant will walk away with this knowledge. This is accomplished by thoroughly understanding concepts of steam turbine control systems and how to use maintenance screens to quickly determine problems.

We are reminded that the steam turbine is the important asset. The Mk-VI control system is the human-machine-interface (HMI). This control system must be calibrated and maintained with the steam turbine-generator kept in mind. HPC approaches this course in this manner. As seen by the course objectives, particular attention is given to the development of control systems important to the operation of a steam turbine.

Topical Outline includes: Turbine Control Concepts, Mk-VI Fundamentals and Hardware, Software Installation, HMI Documentation, Mk-VI Architecture, Blockware Concepts and Architecture, Blockware Functions, Introduction to the Toolbox Software, Speed/Load Control, Protection Systems, Alarm Troubleshooting, Valve Position Control & LVDT Calibration, Sequencing Editing Validation / Build / Download, Adding Analog I/O, Adding Contact I/O, Forcing Signals, Changing Control Constants, Data Historian, Trending, Trip History. For BWR participants we add Pressure and Bypass Valve Control I/O and Algorithms

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) Mk-VI Steam Turbine Controls, drafted by Michael Whisnant and Harold Parker.
2. A "Certificate of Completion" with 2.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training. A "Certificate of Certified Completion", including a signed letter describing accomplishments, with 5.3 CEU, provided participants complete an examination.

OBJECTIVES: Upon completion of this course the participant will be able to:

1. Demonstrate an understanding of the concepts of steam turbine controls.
2. Demonstrate the ability to use OEM provided documentation that will include the Control Specifications, Programming, I/O Configuration, Application Manual, and P&IDs.
3. Demonstrate the understanding of the Mk-VI hardware components, the component function, how they are accessed, and how they communicate.
4. Demonstrate the ability to use “Toolbox” software.
5. Demonstrate the ability to trace steam turbine specific control signals, using the “Toolbox” software.
6. Demonstrate the ability to troubleshoot an equipment alarm from the Mk-VI panel to the field device.
7. Demonstrate the ability to interpret the more routine diagnostic alarms and recognize appropriate actions.
8. Demonstrate the ability to trace the derivation of a command signal to the servomechanisms.
9. Demonstrate the knowledge necessary to calibrate turbine valve mechanisms.
10. Demonstrate the ability (or knowledge -- based upon equipment availability) to more efficiently use the Mk-VI screens for evaluating/calibrating systems.
11. Demonstrate the ability (or knowledge -- based upon equipment availability) to force logic to facilitate calibration.
12. Describe how to change constants or re-program ladder logic such as to add contact input/outputs, add alarms, and/or alter sequencing.
13. Given plant drawings, trace a signal to/from a field device through appropriate terminal boards, through circuit boards, to a digital "signal name".
14. Demonstrate an understanding of how a trip signal is derived and applied.
15. Demonstrate an understanding of the protective systems' purpose, operation and test functions.
16. Demonstrate knowledge necessary to implement OEM recommended on-line and off-line tests.

STEAM TURBINE I&C CERTIFICATION:

There are two levels of certification (Both levels require this course):

1. Engineer
2. I&C Technician

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.

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.
- 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 conducting functional checkouts or troubleshooting problems? Yes we can. Call or contact Harold Parker, hparker@hpcnet.com for our rate sheets and any further information required.

COURSE OUTLINE

Monday

Introduction
Steam Turbine Control Concepts
Mk-VI Fundamentals and Hardware

Tuesday

Software Installation
HMI Documentation
Mk-VI Architecture

Wednesday

Blockware Concepts and Architecture
Blockware Functions
Introduction to the Toolbox Software
Browsing Turbine Using Simulator

Thursday

Protection Systems
Alarm Troubleshooting – Process and Diagnostic

Friday

Alarm Troubleshooting (Continued)
Speed / Load Control

Monday

Brief Review of Week-1
Valve Position Control & LVDT Calibration
Sequencing Editing
Validation / Build / Download

Tuesday

Adding Analog Inputs
Adding Contact Outputs
Adding Analog Outputs
Forcing Signals
Changing Control Constants

Wednesday

Data Historian
Trending
Trip History
NOV Ram
Examination (if applicable)
Conclusion

Thursday (BWR Only)

Pressure Control I/O
Pressure Control Signal Development

Friday (BWR Only)

Bypass Valve Control Signal Development
Examination (If applicable)

(GE) Mk-VI Steam Turbine Controls – TG523

www.hpcnet.com

INSTRUCTOR (S):



Harold Parker is the 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, IEEE, and ASTD.

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. He has worked on Mk-II, Mk-III, Mk-III+, Mk-IV, Mk-V and Mk-VI units as well as some of the Woodward controls. 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.

RECENT SATISFIED CLIENTS:

Alabama Power, Doosan Heavy Industries, DeJong LTD, EPCOR Generation, Jacksonville Electric Authority, Korea East-West Power, Korea Southern Power, Korea Western Power, Southern Company, Wood Group (UK and Netherlands)

** Multiple conducts.

HPC TECHNICAL SERVICES
500 Tallevast Road, Suite 101, Sarasota, FL 34243
Telephone: 941-747-7733 FAX: 941-746-5374
Website: www.hpcnet.com

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 LEARN OF THIS COURSE

Attended other HPC courses.
 Internet Search
 Received a fax.
 Received an email.
 Other: _____