

Red Book Seminars: Tops in Overhead Transmission Line Training Success Story



Aiming for engineering excellence, a Red Book Seminar attendee pinpoints the location of corona on a high voltage conductor by listening to the audible noise it produces. Seminars include field activities that complement classroom training to give attendees hands-on, real-life experience with high-voltage phenomena.

Classroom instruction and field activities complement EPRI's landmark reference on transmission line design to transfer the knowledge of the world's top transmission line experts to today's engineers.

"The Red Book contains advanced information and tools that provide the next level of understanding to address engineering problems, and there is no other single location where this much information has been collected. The value of the Training Seminars is in exposing engineers to the diverse topics in the book and broadening their understanding of the principles and fundamentals that guide the development of the transmission system they are helping engineer."

—Eric Engdahl, Principal Engineer, American Electric Power

The Challenge

Utilities bracing for a new era of transmission line expansion face a harsh demographic reality. Veteran transmission engineers—many of whom helped design and build today's grid in the boom years of the 1960s and 70s—are retiring and taking their decades of experience with them. The loss of institutional knowledge extends beyond utilities. Many of the transmission experts at research institutions, universities, and consulting firms are also approaching the sunset of their careers.

This accumulated knowledge must be captured and transferred to new generations of engineers so they can develop the expertise needed to design and build new transmission infrastructure for the future.

The Solution

For decades, EPRI has developed comprehensive reference books and training seminars that document and distill the knowledge and experience of the world's top transmission experts. The texts and training complement each other to help engineers efficiently acquire a theoretical and practical understanding of transmission system fundamentals.

The Essential Reference: The worldwide industry standard reference for transmission line design, EPRI's *Transmission Line Reference Book, 345 kV and Above (EL-2500)*, was originally printed in 1975 with a red cover and quickly became known as the "Red Book." The reference was updated twice during the 1980s. In 2001, EPRI assembled a global team of experts to upgrade and expand the guidebook. EPRI reissued the Red Book in 2005 with the new title, *EPRI AC Transmission Line Reference Book: 200 kV and Above, Third Edition* (EPRI Product 1011974). The editorial team extensively updated eleven chapters and added four new chapters, while preserving the style and depth of the previous editions. Also added are more than 50 software programs that enable the reader to implement the concepts and theories presented in the reference. The Red Book is available in hardcover together with the software on CD-ROM as well as an electronic PDF file.

The Seminars: EPRI's Red Book Training Seminars introduce attendees to the diverse subjects between the covers of the Red Book—with material presented by some of the very experts who wrote sections of the book. These experts include Drs. Andrew Phillips, Bernie Clairmont, and George Gela of EPRI; and Luciano Zaffanella, Dale Douglas, Jim Stewart, Vern Chartier and Chris Engelbrecht, among others.

The week-long seminars are offered at EPRI's Lenox High Voltage Test Facility, at regional centers, and on-site at individual utilities, where course content is tailored to a utility's specific needs and transmission system.

In 2006 American Electric Power (AEP) was the first utility to host an on-site seminar since the release of the new edition of the Red Book. The utility is preparing for a substantial expansion of its transmission system and wants to provide engineering staff and associated personnel with the best knowledge and techniques to increase reliability and reduce costs.

Seminar Topics

Classroom instruction is structured around the Red Book's three general themes:

- **Insulation Selection and Coordination**, including general insulation coordination, power frequency insulation, switching, and lightning and grounding.
- **Corona and Field Effects**, including corona loss, audible noise, high-frequency electromagnetic interference, and the effects of power frequency electric and magnetic fields.
- **Application**, including right-of-way management, designing for inspection and maintenance, voltage upgrading, and the field performance of lines designed to operate above 700 kV.

Attendees also learn to use the most popular feature of the new Red Book: built-in software. Fifty small software programs—called applets—enable users to exercise and implement calculations based on the theories and principles described in the Red Book. The applets reduce the effort necessary to implement the knowledge in the reference and increase the reader's understanding of principles and the effects of changes in transmission line parameters on the line's performance.

Field Day

A high point of the seminar is the field day, when attendees in small groups participate in hands-on training, and demonstrations to obtain real-life experience with high-voltage phenomena, tools, and techniques. For example, at one field day station attendees not only measure electric and magnetic fields using a variety of meters, they can experience the physical sensations associated with electric fields—skin tingling and sparks—bringing the previous day's classroom lecture to life. At another station, attendees can view corona using EPRI's Daytime Corona Camera or listen to the phenomenon using ultraprobes that amplify audible signals.

Valuable for All Transmission Professionals

Although the training seminars are targeted at practicing transmission engineers, AEP and other utilities use the course to expand the knowledge of civil and mechanical engineers, and even non-engineering personnel. At a recent seminar held at AEP facilities, attendees included staff involved in asset management, planning, and station engineering—who gained valuable understanding of transmission fundamentals that will benefit the company as it expands its transmission network.

Future Seminars

EPRI plans to continue to offer the popular Red Book Seminars at its Lenox facility in Massachusetts, and in other locations at both EPRI and utility facilities.

Contact Information

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