A 3-Day Professional Development Seminar on Protection of HV & EHV Transmission Systems
(an advanced level power system protection seminar)

Who Should Attend
Technical personnel who are involved in design, installation, operation and maintenance of protection system for HV & EHV transmission systems, such as

- Power System Consultants
- Power System O&M Engineers
- Power System Managers and Technical Officers
  - Power System Protection Engineers
- Power System Planners
  - Researchers

Organised By:

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Your True Partner in Attaining Professional Excellence
Differential Protection

1.1 High Impedance Differential Protection
- Basic principles
- Principles of relay setting determination
- Voltage and current relay based schemes
- Use of Ratio Correction CTs (RCCTs)
- Use of voltage limiting non-linear shunt elements (Metrosils)
- Determination of primary operating current
- Application of Bus Zone Check schemes
- Back-up requirements
- Application of HZ schemes to other plant

1.2 Biased Differential Protection
- Effects of transformer turns ratio
- Effects of transformer phase shifts
- Effects of transformer zero sequence currents
- Determination of CT connections for older style relays
- Determination of relay configurations for microprocessor based relays
- Basic relay setting principles
- Biased differential protection of transformers including earthing transformers
- Biased differential protection of transformers with earthed delta windings

1.3 Application Of Biased Differential Schemes to Busbars
- Schemes types
- CT requirements
- Special features

1.4 Differential Protection of Feeders - Pilot Wire Schemes
- Application of summation transformers
- Application of pilot wire supervision
- Application of overcurrent and earth fault checking
- Application of unstabilising and intertripping

1.5 Differential Protection of Feeders - Current Differential Schemes
- Synchronisation of relays (ping pong)
- Principles of relay setting selection
- CT supervision
- Scheme applications

2 Distance Protection

2.1 Current Transformers
- Steady state performance
- Transient performance \((1 + X/R)\) factor

2.2 Voltage Transformers
- Steady state performance
- Transient performance
- Electromagnetic VTs
- Capacitor VTs

2.3 Distance Relay Fundamentals
- Basic principles of operation
- Amplitude comparators
- Phase angle comparators
- Impedance and Mho characteristics
- Production of complex characteristics (Quad etc.)
- Load encroachment
- Detection of Multi phase faults
- Detection of Earth Faults (Ko residual compensation)

### 2.4 Protection Signalling
- Direct & Series Intertripping
- Distance acceleration
- Permissive intertripping (Underreaching schemes)
- Permissive intertripping (Overreaching schemes)
- Permissive intertripping (Unblocking schemes)
- Blocking schemes
- Directional earth fault schemes
- Use of Power Line Carrier (PLC systems)

### 2.5 Advanced Aspects of Distance Protection Design
- Mutual Coupling
  - Underreaching effects
  - Overreaching effects
  - Adjacent feeder OOS & Earthed effects
- Distance Relays & Teed Feeders
- Distance Relays & Bridged feeders
- Distance Relays & Fault resistance
- VT supervision
- Polarisation
- Switch On To Fault (SOTF) performance
- Power Swing Blocking (PSB)

### 2.6 Basic Principles of Reach (Setting) Selection
- Zone 1
- Zone 2
- Back-up Zones
- Reverse Zones

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### About the Seminar Leader

**Barrie Moor, B.E (Elec), RPEQ**

Barrie Moor is the Principal Engineer of Power System Protection Training, a provider of professional development training seminars on the topics of power system protection. With over 39 years experience in the Queensland electricity transmission industry, Barrie Moor has been involved in the design, coordination and implementation of protection schemes associated with Queensland's HV and EHV transmission systems since 1981. Barrie also has extensive experience with the protection of large generating plants.

From 2000 to 2007, Barrie filled the role of Senior Engineer Protection Design, with statewide responsibility, leading Powerlink's Protection Design Team. From 2007 to 2012, in the role of Principal Consultant Substation Protection, and then Principal Engineer- Investigations, Barrie provided specialist Protection Design and Fault Analysis services to support the Asset Management and Operational Groups within Powerlink.

Barrie has 20 years experience within Australia and internationally in the provision of university post graduate training on the design and implementation of HV and EHV Transmission Protection Systems. He has presented a number of papers on specialised aspects of protection design at conferences both within Australia and internationally.

Barrie has also represented Powerlink on CIGRE committee APB5, Power System Protection and Automation and has served as a corresponding member of Cigre and IEE working groups on Protection Systems.

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### CPD Recognition

This training program is designed to meet the Continuing Professional Development (CPD) needs of participants. A Certificate of Attendance will be awarded at the end of the program. This serves as evidence of your personal and professional commitment to building your career.

### Customised In-House Course Available

This program can be customised to suit the specific needs of your organisation at significant savings details. Please contact us on (04) 5038 7277 or email: Enquiry@cpdint.com.au for more details.
TWO SIMPLE STEPS TO REGISTER

Step 1 - Complete this form and scan it to register@cpdint.com.au

A Confirmation of Booking together with a Tax Invoice will be sent to you via email upon receipt of registration form.

Step 2 - MAKE APPROPRIATE PAYMENT, AFTER RECEIPT OF INVOICE, BY:

EFT (Electronic Funds Transfer) to
Account Name: CPD International Pty Ltd
BSB No: 182-222
Account No: 1210 77176,
Bank: Macquarie Bank
Reference: please quote our invoice no.

OR

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Name on Card: ______________________________________
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REGISTRATION FORM

Please register the following delegates for the event: ‘Protection of HV & EHV Transmission Systems’ Seminar
(Please tick ✓ the relevant box to indicate your choice of dates and venue, and print clearly in black pen for proper fax transmission)

☐ MELBOURNE, 2-4 December 2019, Rendezvous Hotel Melbourne  ☐ PERTH, 9-11 December 2019, Mercure Perth

DELEGATES:
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Course Registration Fee:
Register before 18 October 2019:
AUD1,450.00 + AUD145.00(GST) = AUD1,595.00 per delegate.
Register after 18 October 2019:
AUD1,550.00 + AUD155.00(GST) = AUD1,705.00 per delegate.
Register 3 or more delegates at the same time for this course:
AUD1,395.00 + AUD139.50(GST) = AUD1,534.50 per delegate

Payment Terms: Payment is required before the event. Delegates may be refused admission if payment is not received prior to the event. Registration Fee includes lunch, refreshments and training documentation/notes.

Cancellation: A substitute or replacement is welcome at no additional charge. However, any cancellation of registration must be made in writing. If you cancel at 14 or more calendar days before the commencement of the event, you will receive a full refund, minus a non-refundable $250 administration fee. If you have not paid for the event, you will still be invoiced for the $250 administration fee. If you cancel within 14 calendar days of the commencement of the event, you will be charged the full fee, even if you have not paid yet.

Accommodation: Arrangements for accommodation are the responsibility of participants and costs are not included in the course fee. Accommodation is available at the venue/close by and information can be made available to interested registrants.

Note: The organizer reserves the right to make changes to the event schedule, contents and venue. The views expressed in the event are not necessarily those of CPD International Pty Ltd.

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