



IEEE Power Engineering Society / Power Electronics Society WA Chapter

Technical Meeting

Lightning Protection of People Outdoors, Including in Exposed Vehicles

Mat Darveniza

The University of Queensland
Lightning and Transient Protection Pty Ltd

Date: **Tuesday 6 September 2005**
Time: 6pm for 6:15pm start
Venue: **Rydges Hotel Perth**
Hay Street Room
Cnr of Hay and King Street, Perth WA 6805
Admission: **Free and RSVP by 5 September, non-members are welcome!**
RSVP/Enquires: Karyne Wong at Western Power Corporation, Tel: (08) 9326 6495
Email: Karyne.Wong@westernpower.com.au

Abstract - After a brief historical introduction to lightning and lightning protection, this talk gives some background information on lightning strikes and lists the circumstances when lightning can be hazardous to people who are outdoors, including those riding on exposed vehicles – a vehicle is exposed if its occupants are not enclosed in a metal-skinned body. Conventional guides for personal safety against lightning hazards advise people to seek shelter in a safe place during a thunderstorm, and if on an un-protected vehicle, to dismount and go to a safe place.

The theory, design and testing of a lightning protection system (LPS)* for people outdoors, including occupants of tents, and in exposed vehicles are then described. The simplest LPS has an air terminal and two- to four-down-conductors, and is portable. The LPS for a vehicle comprises an air terminal, four down-conductors and two trailing connections to earth. These are arranged symmetrically to minimise the internal electric and magnetic fields in the protected space. Also, careful attention is given to the air clearances and insulation required to prevent side-flash from a down-conductor to the protected person(s). The effectiveness of the LPS has been demonstrated using lightning impulse voltages to 1800kV and impulse currents to 32kA.

Implementation of the LPS on agricultural, commercial and recreational vehicles should make full use of existing features on such vehicles, including an overhead canopy (if present) usually supported on metal posts, metal components in the lower body of the vehicle including the chassis, and the front and rear axles. An important feature of the LPS is that its upper components (the air terminal and the connections to the down-conductors) and its trailing earth connections can be removed easily and stored conveniently. These components need only be installed on the vehicle if there is a threat of a thunderstorm during its use outdoors.

* United States Patent No 6703556, "Mobile Lightning Protection",
Inventor : Mat Darveniza, Filing Date : May 7, 2001, Issued 9 March 2004 .

Speaker: Emeritus Professor Mat DARVENIZA AO, FTSE

BE, PhD, DEng, Hon DSc (Eng),
FIEAust (Hon), FIEEE (life), FTSE, LIVA

Mat Darveniza, born in 1932 at Innisfail, Australia, is a graduate of the Universities of Queensland (BE 1953, DEng 1980), London (PhD 1959) and Chalmers University (Hon DSc Eng 1990). He has worked in the electricity supply industry, and has been visiting professor at overseas universities, including Florida (USA), Munich (Germany), La Plata (Argentina), Southampton and Imperial College (England), and Chalmers (Sweden). He has held visiting appointments at Westinghouse Research Laboratories (1966) and ABB Corporate Research in Sweden (1993, 1996, 1998).

He joined the University of Queensland in 1959, and between 1980 and 1997 was Professor (Personal Chair) in Electrical Engineering and Head of Department 1983 to 1987. In 1998, he was appointed Professorial Research Fellow (fractional) and Emeritus Professor. His research interests include lightning protection, high voltage and insulation engineering, electrical overstress protection of electrical and electronic equipment, health aspects of low frequency electric and magnetic fields, and engineering education. He has published over 250 papers on these topics in scientific and engineering publications, including two books "The Electrical Properties of Wood and Line Design" (UQ Press, 1980) and "Lightning Injuries: Electrical, Medical and Legal Aspects" (CRC Press 1992), and is currently working on a third book on "Lightning Protection for Power Systems with special reference to Sub-Transmission and Distribution Equipment". His publications also include 3 patents, 11 book chapters, 92 refereed journal papers (32 in IEEE Trans.), 100 international conference papers and 81 conference papers. His IEAust papers have won 2 Institution Awards, 3 Electrical Engineering Prizes and 2 Madsen Medals (1991, 1993). He is active in Standards Australia, IEC, CIGRE and IEEE expert committees on lightning protection, and high voltage and insulation engineering.

Professor Darveniza has extensive national and international experience as a consultant and in continuing education in his areas of expertise, including lightning protection (power system equipment, telecommunication and electronic equipment, and buildings), high voltage and insulation technology, power systems and electromagnetic fields.

Professor Darveniza is a Fellow (1979) of IEEE (citation - "*for contributions to the engineering analysis of lightning effects on electric power transmission systems*"), and in 1998 was elected Life Fellow. In 1982, he was elected a Fellow of the Australian Academy of Technological Sciences and Engineering (ATSE). In 1993, Professor Darveniza was awarded the IEEE Herman Halperin Electric Transmission and Distribution Award, and was elected a Foreign Fellow of the Royal Swedish Academy of Engineering Sciences. He was awarded the IEEE Education Activities Board Meritorious Services Citation in 1995 and the Meritorious Achievement Award in Continuing Education in 1997.

In 1994, he formed Lightning and Transients Protection Pty Ltd and is Principal Executive Officer and Senior Consultant. Together with Dr David Mackerras, LTP operates as a consulting company with wide experience in the areas associated with its partners' expertise. In 1995, Professor Darveniza was appointed by Standards Australia as Chairman of Committee EL24 "Lightning Protection" and he represents Australia on IEC TC81.

On Australia Day 2003, Emeritus Professor Darveniza was appointed an Officer of the General Division of the Order of Australia (AO citation – "*for service to electrical engineering, particularly through research on lightning protection of electrical equipment and as Chairman of Standards Australia committee on lightning protection of structures and to professional education*"). In 2003, he also received the Centenary Medal awarded by the Governor-General in the category of the General List (citation – "*for service to Australian society in electrical engineering and education*").

In December 2004, the Queensland Government appointed him to the ENERGEX Board of Directors.

Mat Darveniza is married (Irene) and has three children (Elsbeth, Anne and Martin) and nine grand-children.