

# IEEE EMC Society Outreach Visit: Adelaide June 4-5, 2009

by Paul Kay



Elya Joffe, IEEE EMC Society President, and Prof. Takeo Yoshino, IEEE EMC Society Board Member, spent two days of their Australian visit in Adelaide, South Australia. The schedule was packed, with two presentations at DSTO, where approximately 40 people attended each presentation, one presentation at the University of Adelaide and one presentation at the University of South Australia, each attracting about 18 attendees. Regrettably, there was no time to take in any of the local wineries, but we did make it out to the pub.

The visit started a little behind schedule due to fog at Sydney airport – an example of the butterfly effect: fog in Sydney delays a flight out of Melbourne, so an Adelaide airport coffee shop sells more coffee...

The first presentation was Elya's discussion on how EMC has evolved from a "black art", the "garbage of electronics", practiced by a "collection of freaks", to a formal engineering discipline in its own right... no longer practiced by a freaks of any kind, we hasten to add. Elya's first talk was full of interesting EMC ephemera: 45% of the IEEE EMC Society membership is outside the United States, the rocket that destroyed the HMS Sheffield in the Falklands conflict was not armed (it struck a fuel tank – otherwise, the damage would have been much less), and MIL STD 461G is in development already (it is likely to include ESD and lightning effects).



*EMC practitioners and theoreticians (not a freak among them...)*

*L to R: Paul Kay, Dr. Franz Schlagenhauser, Dr. Andrew Piotrowski, Dr. Tan Doan, Kevin Goldsmith, Prof. Takeo Yoshino, Elya Joffe, Dr. Christophe Fumeaux*

Elya's second talk at DSTO was well attended by a wide cross-section of people, including researchers, designers and operators of various defence systems. The topic was "Some EMC anomalies in aircraft and their solutions"; this was an excellent presentation, well coloured by Elya's wide experience with various air forces around the globe. It included some examples of compliant equipment that caused system integration problems, driving home the point that "compliance" is not the same as "compatibility". The presentation was a worthwhile reminder that equipment level standards are a first cut at achieving overall compatibility at the system level, but they are by no means a guarantee. As Elya said during the presentation, an equipment level test can tell you if there is going to be a problem during integration... but it cannot tell you if there is not going to be a problem.

The second day started in the Physics building at the beautiful Adelaide University campus, with Prof. Yoshino's fascinating talk on EMC problems in Antarctica. This was an excellent presentation, during which Prof. Yoshino described his innovative approach to providing a partitioned grounding scheme on snow, ice and rock (surfaces with conductivities much lower than  $1 \times 10^{-6}$  S/m). In 1959, when he first solved these problems by persistence, trial and error, there were no textbooks on EMC and the idea of a "partitioned" grounding scheme was unheard of. The EMC challenges were of a mindboggling scale: a 10kW HF transmitter operating at the same small Antarctic base as a 0.5 – 17 MHz bottom sounding ionosonde. Takeo's solutions involved separation of conductors and grounds and provision of two separate grounding counterpoises immersed in sea water (signal ground counterpoise 400m from the power ground counterpoise). Today, the base has been substantially re-built, but Takeo's 1959 grounding methodology remains.



The final presentation was given by Elya Joffe at the University of South Australia's Mawson lakes campus. The audience was presented with a thorough treatment of grounding methods and principles at circuit and system level. This detailed discussion gave real-world case studies on system integration where the optimal EMC approach could not be followed because of other functional or safety considerations. This presentation included some practical design tips, including the idea that partitioning of grounds can be achieved even with a single plane by considering the circuit trace layout, and ensuring that the partitioned areas do not cause return currents to flow from one section of the plane to another. The talk was well attended by a mixture of academic and industry members, and provided a fitting conclusion to the visit. EMC