



Institution of Engineering and Technology

# IET Ottawa

## APRIL 2007 Newsletter

Web Site: [www.iee-ottawa.org](http://www.iee-ottawa.org)

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Secretary: Martyn Delbridge,

### April Technical Meeting:

#### **“Getting Light Rail Back on Track in Ottawa”**

**David Jeanes, P. Eng, President - Transport 2000 Canada &**

**Spokesperson for “Friends of the O-Train”**

**Courtside A Room, RA Centre, 2451 Riverside Drive**

**Thursday 19 April, 2007, 6.30 pm for optional dinner - 8.00 pm for the presentation**

David will talk about the Status and Prospects for Light Rail in Ottawa. The diesel O-Train, which has been running for more than 5 years has met all its objectives and is carrying nearly twice the forecast ridership, with 10-15% growth each year. But the planned Electric Light Rail project by three levels of government is an ongoing controversy. The presentation will include technology and service options, and there will be a display of models and maps. These will show that there is still a future for light rail as the solution for Ottawa's growing transit problems

The presentation is hosted jointly by the Ottawa Branch of the IET and the IEEE VTS Ottawa Chapter.

The presentation is open to all. Please reserve (state if dinner is required) by contacting Hugh Reekie [max-com@allstream.net](mailto:max-com@allstream.net) or phone 613-728-5343.

Social hour & exhibition in Courtside A 6 pm; Dinner 6.30 pm in the Field House Restaurant, presentation in Courtside A at 8 pm. Bar available.

Park in the East lot of the RA Centre and enter by the corner door. Dinner reservations appreciated by 15 April, but walk-in dinners without reservations are acceptable.

#### How to get there:

The RA Centre is located near Bronson and Riverside Drive.

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### **Report on the Presentation by Squadron Leader Alan James, RAF, 15 March, 2007**

**prepared by John Rivenell, Ottawa Branch**

Alan James is “on loan” to Canada from the RAF. He took the opportunity to look back over his career, and share some interesting facts with us, some very much about engineering, some of general interest.

Those who did not attend may never learn how the menthol gets into a menthol cigarette.

Alan took us over his career, starting with his first days in the RAF. He showed how the service has declined in strength since the second war, with many facilities being closed. He talked about his early RAF education, and how a cricket match was spoiled by an engineering error. A pilot instructor, flying in a plane with two engines, intended to switch off one of the two, as a test for the student pilot. Inadvertently he switched off both. Without any means of starting either engine, an unplanned descent, and a spoiled cricket match resulted. The root cause was the close placement of the two engine switches, side by side. A wider separation would have made this particular error impossible. An early case of a poor user interface?

Another interesting story was around the design of the hinge for the air brake of a Buccaneer fighter. Aeronautical stresses called for a certain size of hinge pin. But a deliberately oversized pin meant that the plane was immune from damage during maintenance. Instead of warning the fitter not to stand on the tail assembly, the oversize pin meant that the step could be used, and no damage would result. A wiser design. Better reliability and better maintainability.

But one of the most interesting technical problems (to my taste) was around the problem of getting an aircraft from Ascension Island to Port Stanley in the Falklands (to “deliver” some ordnance), at the time of the South Atlantic conflict. In-flight refueling takes on a new complexity, when the air tankers need to be refueled themselves. Several times. A complex feat of organisation.

The presentation was well supported by a range of props - magazines, photos, examples of equipment, a video, and more. An excellent presentation; much appreciated

### May Technical Meeting:

**“Electronic Controls for Diesel Engines: Performance, Emissions and Economy”**

**Brent Rubeli, NRCan**

**Courtside A Room, RA Centre, 2451 Riverside Drive**

**Wednesday May 2<sup>nd</sup>. 2007, 6.30 pm for optional dinner - 8.00 pm for the presentation**

The integration of electronic control systems to mass production diesel engines began in 1986 with the Detroit Diesel Series 60 engine. This system revolutionized the industry and paved the way for rapid advances in engine calibration. Since that time, the modern diesel engine has become a clean, quiet, smooth-running power plant with impressive flexibility and reliability. This presentation will discuss the historical development of diesel engine electronic controls, modern system elements, the use of control flexibility for emissions compliance and remote monitoring, and future technology developments.

Brent Rubeli has worked for over ten years in diesel engine certification and emission control system development. In addition to new engine type approval, he has designed automatic regeneration systems for diesel particulate filter technology, and recently was part of the team that developed a mining-specific calibration for the Cummins ISB.

Brent is currently employed at the Natural Resources Canada Diesel Emissions Laboratory, Bell's Corners.

The presentation is hosted jointly by the Ottawa Branch of the Institute of Engineering and Technology - the IET - formerly the Institution of Electrical Engineers - IEE and the IEEE VTS Ottawa Chapter.

The presentation is open to all. Please reserve (state if dinner is required) by contacting Hugh Reekie [max-com@allstream.net](mailto:max-com@allstream.net) or phone 613-728-5343.

Social hour & exhibition in Courtside A 6 pm; Dinner 6.30 pm in the Field House Restaurant, presentation in Courtside A at 8 pm. Bar available.

Park in the East lot of the RA Centre and enter by the corner door. Dinner reservations appreciated by 15 April, but walk-in dinners without reservations are acceptable.

#### How to get there:

The RA Centre is located near Bronson and Riverside Drive.

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### **Spring 2007 Program:**

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| <b>April 19<sup>th</sup>. 2007</b> | Light Rail in Ottawa: RA Centre – Exhibition from 6pm; Optional Dinner 6:30 pm, Meeting 8 pm<br>Presentation: David Jeanes, P.Eng. President, Transport 2000 Canada                    |
| <b>May 2<sup>nd</sup>. 2007</b>    | Electronic Controls for Diesel Engines: Performance, Emissions and Economy: RA Centre –<br>Optional Dinner 6:30 pm, Meeting 8 pm, Presentation: Brent Rubeli, Natural Resources Canada |
| <b>May 24<sup>th</sup>. 2007</b>   | Annual General Meeting – Britannia Yacht Club  |

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## **EXECUTIVE COMMITTEE NOMINATIONS**

**The executive committee for the 2007/8 year will be elected at the AGM**

**To nominate a person, or volunteer yourself, please contact:**

**David Boteler (837-2035, [dboteler@nrcan.gc.ca](mailto:dboteler@nrcan.gc.ca)),**

**Edwin Morton (862 5362, [emorton@iee.org](mailto:emorton@iee.org))**

**or Eric Dodman (820-8894, [ericandsylvia@sympatico.ca](mailto:ericandsylvia@sympatico.ca)).**

## Trip Report

### **Site Visit – Joint IEEE–AESS & IET Ottawa tour of Fugro’s Airborne Geophysics Survey Activities**

prepared by Colin Cantlie

Five IET members and three IEEE members were hosted on Thursday 8 March 2007 to tour the facilities of Fugro N.V. at Uplands Airport. This activity is in support of the company’s Outreach Program for the International Year of Planet Earth (IYPE). It has been coordinated by IET’s David Boteler and Hugh Reekie, together with Peter Fernberg of NRCan’s Geomagnetic Laboratory in Ottawa.

Fugro, a worldwide airborne geophysics company headquartered in The Netherlands, has an aircraft and offices in Ottawa. The date of the timing of the tour was selected to look at Fugro’s CASA 212 aircraft during one of its layovers in the city. The aircraft has an active airborne electromagnetic system installed, which was the focal point of the visit to the maintenance hangar where the CASA 212 was undergoing a routine inspection. Also present in the hangar (and serving as an interesting comparison) was a second smaller Fugro aircraft used for passive surveying.

Magnetic measurement was a technical outcome of World War II, where the technique began for submarine detection. Commercially, airborne electromagnetic systems are now used in mineral and water exploration including oil and gas. Airborne magnetometers have also been put to more unusual tasks, such as locating shipwrecks.

Fugro’s CASA 212 is fitted with a custom-designed and built harness that incorporates a big solenoid (wrapped around the edges of the airframe) into the aircraft. This transmits using current pulses of 400-500 Amperes, which trigger eddy currents in any conductive materials in the ground. A separate detector assembly towed behind the aircraft senses these much weaker signals and amplifies them for processing and recording by Fugro’s data acquisition system inside the aircraft. Pulses are generated 90 times per second (selected to avoid harmonics of the 60 Hz power lines) with an 11 ms period comprising a 2 ms pulse, 3 ms ‘listening’ time, then a repeat of both using opposite polarity.

The aircraft modifications needed to consider aerodynamic properties of the solenoid loop and are custom-designed for the CASA 212. These required certification of the aircraft. Certification of the modified 212 was also the first and only certification of a CASA 212 model in Canada. The CASA 212 was selected for its payload capacity and for the ability to fly at low speeds and low height (approx 120 meters during airborne surveys), and the company owns several, all re-using the same design for the airframe modifications and solenoid assembly.

The electronics systems inside the aircraft which generate the transmit pulses and record the collected signals are designed by Fugro. The key design consideration is the reliability of these electronic systems. The next consideration in selection of electronics is weight, since the aircraft in its modified configuration is close to the maximum take-off weight. During surveys, the aircraft has a crew of three: an electronics technician sits in the aircraft cabin to operate the systems, with the pilot and co-pilot up front in the cockpit.

There is an additional display in the cockpit to show how the actual aircraft position compares to the planned survey route. The pilot combines this information with visual sighting to follow the contours of the land at the desired height. The survey systems do not connect to the aircraft’s control systems; the only point of integration is through the pilot.

Despite cold weather outside the aircraft tour in the hangar was comfortable, although a little cool. The hangar is heated by convection from heating pipes embedded in the thick concrete floor. This creates the heat capacity that makes it possible to warm up the air inside the hangar after doors are opened on a winter day.

Back in the main building we gathered in the boardroom to examine several maps, representative of results from data processing. The samples we examined are public-domain maps produced by Fugro from airborne survey of the “Noranda” area undertaken a few years ago with funding from the federal and provincial governments. These were intended to trigger additional exploration in the area, and did in fact lead to discovery of additional mineral deposits.

While one might examine multiple maps side by side (plotting different characteristics) the best way to display and correlate is through use of Geographic Information Systems. The Geologic Survey of Canada has specialized expertise in how to put such information into a GIS for effective visualization and discovery.

Clients will select the types of data processing to be done, based on the physical structures they are seeking to find. Electromagnetic anomalies found through measures of conductivity can show mineral deposits. Variations in the residual magnetic field can reveal the presence of magnetite in rock. Measurement of near-surface conductivity is used to detect ground water. Additional data processing to generate specialized maps, such as plotting the time constant (to reflect the size of the conductor) or the second derivative (useful in oil & gas exploration for fault detection).

Fugro keeps the raw data for clients, in order to be able to re-process the data using revised algorithms and techniques as the state of the art continually improves. In practice a re-examination of older data is not commercially useful much beyond a decade or two of age, because improvements in two other areas (the pulse waveforms used, and the data acquisition system itself) will justify a repeat of the airborne survey.

Three Fugro employees gave up their evening to spend time hosting our visit – Dave O’Ryan (Maintenance Supervisor), Tom Payne P.Eng. (manager of electronics) and Dr Marc Vallée (senior research geophysicist) – and patiently answered our many questions.

In traditional fashion, Hugh Reekie also arranged logistics for those who wished to continue on to a local hostelry for a pub supper after the visit.

## Chairman's Column - Engineering, Education and The Community

Many Engineers with an interest in history will recall the activities of not only Michael Faraday, Thomas Edison and James Maxwell but also Isambard Kingdom Brunel, Robert Stephenson and Thomas Telford; they all made a tremendous difference to people's lives. They were all creative, determined and innovative engineers. Companies run by engineers seem to be successful. There are many of these in Ottawa – and Microsoft also comes to mind; if General Motors had been chaired by engineers for the last 50 years, I am sure their financial position would now be very different from what it is.

There are not enough school students in Ontario taking up Engineering studies at Universities and the PEO has an "Engineer in Residence" programme to address the problem; I am one of the few in Ottawa; too few Principals and Science teachers take up the offered opportunity. But the IET in Ottawa has had various interactions with school students in Ottawa. John Vines arranges for the Faraday Lecture to be

shown to students; and recently, we supplied Judges for a school Science Fair – John Rivenell helped set up arrangements. Support for a Science Project Competition is presently being investigated by Ernie Fanthome.

But if engineers care about their Profession, there are many more opportunities for assisting those students in Ottawa who may wish to follow an Engineering career; giving presentations during Engineering Week or donating a book to the school library are just two possibilities. If you have a student at school and have some time and interest, please consider giving your services on the topic, and offer to be on the IET Ottawa Executive. We need some more thoughtful minds that have the determination and time to serve their community and their profession in this manner.

- - - **Hugh Reekie** Chair

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### YOUR EMAIL ADDRESS

For some time we have been sending notices to members by Email. This is to save the cost of paper and postage, but also provide updates and reminders that you would not receive in time from Canada Post. We send at least one paper mailing to all Ottawa Branch members each year.

You are receiving this paper copy of the newsletter because we do not have your Email address or the address that we do have does not work. If you wish to receive notices and newsletters by Email, please send your Email address to [jvines@iee.org](mailto:jvines@iee.org) and the address will be placed on the list. Thanks

Note: If you change your home address, telephone number or Email address, please inform the IET in London. The change may be made by letter or sending an Email to [membership@theiet.org](mailto:membership@theiet.org), or by entering the change directly via the IET WEB page. Notification to [jvines@iee.org](mailto:jvines@iee.org) will also help locally.

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### The 2006/2007 Ottawa Branch Committee consists of:

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