ABB served as the prime contractor for the design and manufacturing of the Fourier Transform Spectrometer aboard the Canadian Space Agency’s SciSat-1 satellite.

**Background**
The Atmospheric Chemistry Experiment (ACE) is the main payload of the Canadian science satellite, SciSat. ACE consists of a suite of instruments in which the primary element is an ABB infrared Fourier Transform Spectrometer (FTS) coupled with imagers in the visible and near-infrared ranges.

**The challenge**
The experiment emphasizes the changes occurring over Canada and the Arctic. Scientific goals include:
- Understanding the chemical and dynamical processes that control the distribution of ozone in the stratosphere and upper troposphere, particularly in the Arctic.
- Exploring the relationship between atmospheric chemistry and climate change.
- Studying the effects of biomass burning on the free troposphere.
- Measuring aerosols and clouds to reduce the uncertainties in their effects on the global energy balance.

Ozone chemistry is considered important because man-made changes in atmospheric ozone have led to an increased amount of ultraviolet radiation reaching the ground, and may affect the climate.

The ACE team includes Canadian scientists as well as those from the United States, Belgium, Japan, France and Sweden. Bristol Aerospace supplied the general production model on which the spacecraft’s design and infrastructure was based.
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**Spectrometer design**

ABB’s Fourier Transform Spectrometer is a high-resolution instrument operating in the 750 to 4100 cm⁻¹ spectral range. A high inclination (74 degrees) and low earth orbit (650 km) allows coverage of tropical, midlatitude and polar regions.

ABB adapted the spectrometer design from the classical Michelson interferometer, using an optimized optical layout. Its highly folded double-pass optical design results in a very high performance instrument with a compact size.

A signal-to-noise ratio better than 100 is achieved, with a field-of-view of 1.25 mrad and an aperture diameter of 100 mm. A semiconductor laser serves as the metrology source of the interferometer sub-system.

The Canadian Space Agency launched the satellite in the summer of 2003. Originally intended to last two years, SciSat-1 is still in orbit and its performance has far exceeded the expectations of the scientific community.

In 2009 the Canadian Aeronautics and Space Institute bestowed the Alouette Award to the ACE team for outstanding contributions to advancement in Canadian space technology, applications, science and engineering.

For more information:

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