

Meteorological Service of Canada (MSC) Digital Barometers at Airport Locations



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Vaisala has been awarded a contract by the Meteorological Service of Canada (MSC). Vaisala supplies electronic station barometers to replace the mercury barometers currently used for weather observations throughout Canada. The new digital barometer is easy to maintain, and is not susceptible to exposure to temperature extremes which may vary from -20 °C to +60 °C.



The key persons involved with the contract at MSC from the left: Harry Lamb, Louise Smith, Dennis Wickiam, Gerie Lynn Lavigne, Dave Dockendorff and Rodica Nitu (Rod Prior and Peter Bowman are missing).

Electronic weather station PTB220 barometers

The Meteorological Service of Canada (formerly known as the Atmospheric Environment Service) is a Service under the Department of Environment located in Toronto, Ontario. The Meteorological Service of Canada (MSC) is the country's source for meteorological information. Vaisala was selected to supply electronic station PTB220 barometers for weather monitoring throughout Canada.

Delivery of the barometers began in the fall of 1999. The project to replace all the mercury barometers will continue through the year 2001. When completed, this project will eliminate the potential health risk to observation personnel and the potential contamination of the environment, as well as helping to ensure the safety

of all passengers flying in and out of Canada for years to come.

For approximately seven years Vaisala's ceilometers and upper air equipment have also been used operationally in MSC's weather networks.

MSC in a nut shell

The MSC traces its history to the very beginnings of Confederation. For over 125 years, the Canadian government has provided its citizens with weather and other atmospheric environmental information and predictions.

The mission of the MSC is to anticipate and respond to the evolving needs and expectations of Canadians and their institutions for meteorological, hydrological and related information

and prediction services. The Meteorological Service helps Canadians adapt to their environment in ways which safeguard their health and safety, optimize economic activity and enhance environmental quality.

It is the goal of Environment Canada to help make sustainable development a reality in the country, and, by doing so, make the country an example to the world.

Need for digital barometers

Vaisala's PTB220 digital barometers will be integrated to AWOS (Automated Weather Observing Systems) and also to PCs used by human weather observers to generate and communicate various types of weather and climate observations. These barometers

will be used at all hourly aviation and synoptic weather observing stations in Canada.

"The new and reliable digital barometers are needed to eliminate human error in reading mercury barometers, transcribing readings and calculating various atmospheric pressure values; specifically, altimeter setting and mean sea level pressure. The use of digital barometers will allow us to automate the barometric monitoring program in Canada," MSC representatives say.

Evaluation process and testing

The PTB220 was one of seven barometers approved for operational use by the Meteorological Service of Canada, and allowed to take part in the bid. The

PTB220 was the only digital barometer which met the stringent requirements of the MSC.

"Laboratory tests were conducted over a period of more than twelve months. They consisted of periodic calibration checks (for evaluation of long term stability), operating environment tests, storage and shipping environment tests, communications tests and power tests. They were designed to simulate the extreme conditions the barometers would be subjected to if used operationally at any of the stations in our observing networks," MSC experts explain.

One reason why Vaisala's barometers were selected was a cost/value ratio. In addition, the unique PTB220 digital barometer design incorporates the three-cell redundancy required to give the necessary level of confidence in the measurements. Multiple redundancies were required by NAV CANADA, MSC's main aviation data recipient/client.

Environmental and safety issues

Mercury barometers pose a risk to both the environment and to personnel using them. The mercury barometers in use at observing stations are up to 70 years old. There is therefore an increasing risk of both human exposure and of environmental contamination to leaking mercury.

The pressure measurements, performed by observing personnel at airport locations are used to compute altimeter settings, which are used by pilots for aircraft landing and take-off purposes. An incorrect altimeter setting could have disastrous consequences. It could mean that the pilot believes the aircraft which he/she is flying is higher above the ground than it actually is. When combined with conditions of poor visibility and/or low cloud cover, this could result in an airplane accident. For this reason, there can be little or no tolerance for altimeter setting errors.

The use of digital barometers should eliminate incorrect altimeter settings due to reading, computational and transcrip-

tion errors associated with mercury barometers and humans. In addition, the multiple redundancy in the Vaisala barometers combined with a special emergency back-up power supply provides an added margin of safety and reliability.

PTB220 barometers with AWOS

MSC representatives explain: "Other than our design processes, we have not had any experience to date. We are designing a new digital pressure instrumentation for our AWOS which will replace older dual pressure analogue technology. The multiple-cell redundancy in the PTB220 version which we are using is expected to provide more reliability and an extra margin for safety than the current module."

It is also planned to add Mean Sea Level (MSL) pressure, pressure tendency and density altitude reporting capability to the AWOS.

Benefits using digital barometers

According to MSC, the benefits using PTB220 barometers include long-term stability, RS232 and RS485 compatibility and three independent transducers.

The back-up power supply will extend the operation of the barometer in the event of a power failure. It also provides better immunity to electromagnetic interference and power fluctuations.

Unlike the mercury barometer it is replacing, a PTB220 barometer is easier to maintain, and is not particularly susceptible to ex-



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One of Vaisala's PTB220 digital barometers installed at London, Ontario, Canada. Vaisala supplies electronic station barometers to replace the mercury barometers currently used for weather observations throughout Canada.

posure to temperature extremes (-20 °C to +60 °C) or damage brought about by routine commercial shipping. When transporting mercury barometers, they require special handling procedures, packaging and permits to comply with Transportation of Dangerous Goods regulations. This is especially significant for remote weather stations which are accessible only by aircraft.

When using digital barometers, the need for periodic

cleaning and calibration of mercury barometers is also eliminated. This is very labor-intensive and these services are becoming very difficult and costly to obtain.

Using PTB220 barometers, MSC will benefit by more timely and accurate atmospheric pressure and altimeter setting values and a reduction in both the time required for training and performing atmospheric observations. ■

Several key persons participated into the contract process at MSC.

- Dave Dockendorff, Manager, National Weather and Climate Operations Division
- Peter Bowman, Barometry Technical Authority
- Rod Prior, Manager, Technical Operations
- Harry Lamb, Electronics Systems Engineer
- Rodica Nitu, Head Operational Engineering
- Dennis Wickiam, Procurement Quality Assurance Auditor
- Louise Smith, Chief, Electronics and Engineering Procurement, Public Works and Government Services Canada
- Gerie Lynn Lavigne, National Meteorological Systems' Technologist