

In the line of fire: Finnish defense forces put new radiosonde to the test

In recent field-testing, Finnish defense forces found the new RS92-D radiosonde to a snap to use.

Accurate meteorological data is vital

A few years back, a NATO working group came to the conclusion that 67% of errors in artillery fire are caused by weather – proof that accurate meteorological data is a must for on-the-mark artillery fire*.

“The firing distances for modern artillery can be tens of kilometers, reaching into the upper atmosphere,” says Senior Lieutenant Reijo Miettinen of the ballistic weather service for Niinisalo Artillery Brigade in Finland. “It is obvious that we need detailed weather information to calculate exact ballistic trajectories.”

Upper-air soundings gather information on pressure, temperature, relative humidity, wind speed and direction. This basic weather information is used to define horizontal wind conditions, air density and elasticity/sonic speed – all factors that can affect trajectory.

Training event an opportunity for field-testing

In May 2009, Finnish defense forces undertook a large-scale training event for national artillery and mortar units in Rovajärvi, Northern Finland. The event brought together some 3,000 conscripts and several hundred trained army personnel to test equipment in the field – a more rigorous challenge than the controlled conditions of a testing facility.



Training events are good opportunities to test new equipment out in the field. The reservists on a refresher course at Rovajärvi mastered the use of RS92-D with little instruction.

Challenge

- 67% of errors in artillery fire are caused by weather
- Upper atmosphere meteorological data is difficult to obtain
- Need to be independent on GPS
- Frequency allocation

Solution

- Field deployment of the Vaisala Radiosonde RS92-D
- Radio direction finding (RDF) measurement delivers wind speed and direction independently from GPS
- Fully digital data transmission

Benefits

- Highly accurate and easy to operate
- A dry cell battery makes the radiosonde ready for immediate use
- Freezing and contamination issues in humidity measurement are eliminated
- Narrow-band reliable data transmission

“This is a very concrete improvement and definitely a step forward in terms of usability. The first time we tested the new radiosonde in the field, the reservists in my group mastered its use with little instruction.”

*Senior Lieutenant Reijo Miettinen,
Ballistic Weather Service, Niinisalo
Artillery Brigade, Finland*

Vaisala’s new radiosonde passed the test with ease. “The Rovajärvi event was the first time we tested the new radiosonde in the field, and we found it to be fully operational,” says Miettinen. “The reservists in my group had no problems performing soundings using the RS92-D and mastered its use with little instruction,” he continues.

Independent from GPS

The RS92-D is a digital radiosonde designed for use with Vaisala’s Radiotheodolite RT20 systems. It

replaces the earlier RS80-67 model and distinguishes itself from earlier RS92 models, in use since 2004, in that it does not rely on GPS, Loran-C or radar for wind data calculation. Instead, wind speed and direction are computed based on radiosonde movement, using the principle of radio direction finding (RDF) to calculate bearing and elevation angle, and atmosphere-based calculation to determine height.

Improvements over the earlier RS80-67 model include:

- A smaller, more reliable silicon-based pressure sensor
- A dry cell battery that makes the radiosonde ready for immediate use
- Capacitive wire is used to reduce time lag and solar radiation error in temperature measurements
- The alternative heating of two sensors eliminates the effects of freezing in humidity measurement

Easy to operate

Operation of the RS92-D is straightforward. Frequency can now be set digitally instead of using a manual tuning screw, and calibration

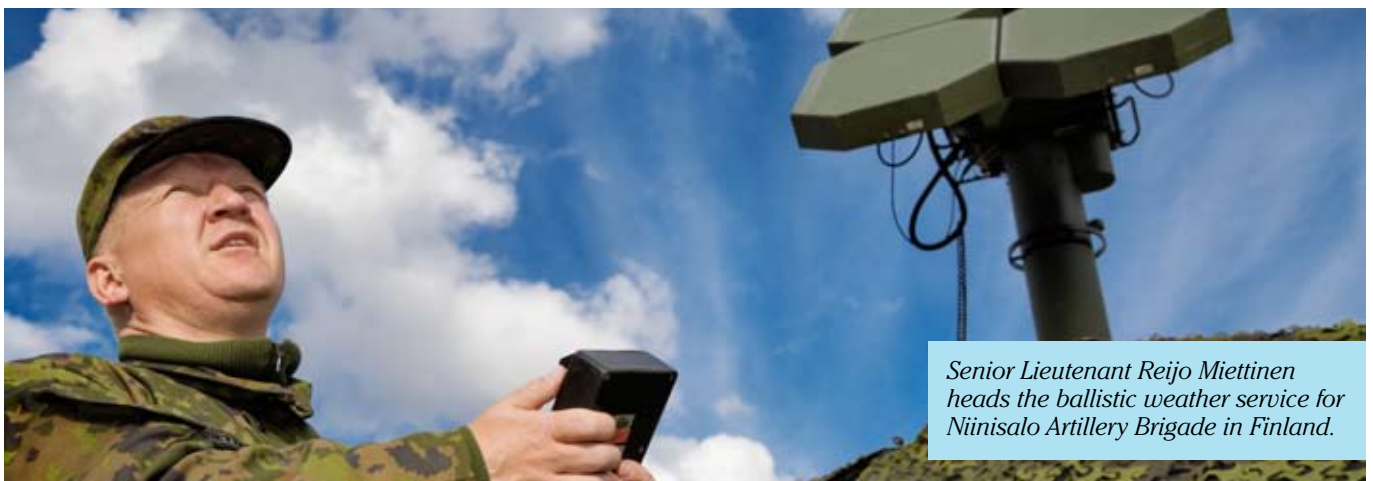
coefficients are read directly from the radiosonde memory via cable or telemetry.

“This is a very concrete improvement and definitely a step forward in terms of usability,” says Miettinen. “Previously, the calibration coefficients were read optically from a paper tape, which was susceptible to moisture. Another improvement is that it is no longer possible to read the same tape twice.”

Fully digital data transmission

The digital data transmission of the RS92-D offers important advantages over analog: data availability during a sounding is excellent and telemetry errors are effectively detected. The digital transmitter also consumes less power and provides more channels in the meteorological frequency band.

The RS92-D is fully compliant with the European ETSI standard, and data is coded into ballistic weather messages, eg. STANAG and general WMO formats.



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