

SENSORS & SOFTWARE
from RADIODETECTION



pulseEKKO®

High-performance,
customizable GPR
system designed
for advanced surveys
and research



SPX
TECHNOLOGIES

pulseEKKO[®] Antennas & Transducers Overview

Designed for a variety of advanced applications, ranging from deep mineral exploration and glaciology to high-resolution geotechnical investigations and concrete imaging

FEATURES

Broad range of frequencies
(12.5 MHz to 1000 MHz)

Low-noise, high-accuracy
digital acquisition directly
at receiving antenna

Computer controlled voltage
and temperature-stabilized
time and amplitude

Low power
consumption

Antennas



12.5 MHz - Deep Geology, Glaciology



25 MHz - Deep Geology, Glaciology



50 MHz - Deep Geology, Glaciology, Geology



100 MHz - Geology, Utilities, Geotechnical



200 MHz - Geology, Geotechnical

- Common transmitter and receiver attached to any frequency
- Use Fiber optic cables to eliminate signal interference from metal cables
- Lightweight, flexible and portable with simple assembly and support structures

Resistive Dipole Antennas

Center Frequency	Size	Weight
12.5 MHz	736 × 14 × 5 cm (290 × 5.5 × 2 in)	7.2 kg (15.9 lbs)
25 MHz	368 × 14 × 5 cm (145 × 5.5 × 2 in)	3.6 kg (7.9 lbs)
50 MHz	184 × 14 × 5 cm (72 × 5.5 × 2 in)	1.8 kg (4 lbs)
100 MHz	92 × 14 × 5 cm (36 × 5.5 × 2 in)	1.2 kg (2.6 lbs)
200 MHz	46 × 14 × 5 cm (18 × 5.5 × 2 in)	0.8 kg (1.8 lbs)

Transducers



250 MHz - Utilities, Geotechnical, Archaeology, Forensics, Snow & Ice



500 MHz - Archaeology, Forensics, Snow & Ice



1000 MHz - Mining, Quarrying, Concrete, Roads, Bridges

- Consist of antennas and transmitter/receiver electronics combined into one unit to optimize performance
- Shielded to minimize external radio-frequency noise

Resistive Dipole Transducer

Center Frequency	Size	Weight
250 MHz	38 × 38 × 20 cm (14.5 × 14.5 × 8 in)	3.0 kg (6.6 lbs)
500 MHz	23 × 23 × 17 cm (9 × 9 × 6.5 in)	1.2 kg (2.6 lbs)
1000 MHz	15 × 15 × 12 cm (6 × 6 × 5 in)	0.6 kg (1.3 lbs)

Flexible and efficient data collection

-  **High visibility touch screen display unit**
Free lifetime system software updates
 - User selectable languages
 - US Standard and Metric units
-  **On-site Reports**
 - Produce instant reports from your display unit in the field
-  **USB**
USB for easy data transfer
-  **Integrated GNSS**
Integrated GNSS receiver for geo-referencing data
-  **Optional External GNSS**
 - For high accuracy positioning and mapping
 - GNSS Packages available
-  **Wi-Fi**
Built-in Wi-Fi capability



Color Field Interpretations
Mark targets at depth with the touch of a finger

In-Field Depth Slicing
Flexible grid collection with immediate results

Save Configurations
Setup, save and name multiple configurations to increase efficiency

Map View
Using GNSS with GPR, view a map of the GNSS survey path, grids, field interpretations & flags

DynaQ® – Dynamic Stacking

Don't waste a nanosecond! For odometer-based data collection, DynaQ increases data quality by stacking (averaging). You always collect the highest quality data for your survey speed.

Up to 2048 stacks for Standard Receivers with all frequencies.

Up to 65,536 stacks for Ultra (3200) Receiver with 12.5, 25, 50, 100 & 200 MHz

Number of Stacks	Color Code
0	White
1-3	Yellow
4-7	Blue
8-511	Dark Blue
512-2049	Purple
2050-8191	Light Green
8192-65536	Dark Green

Higher quality



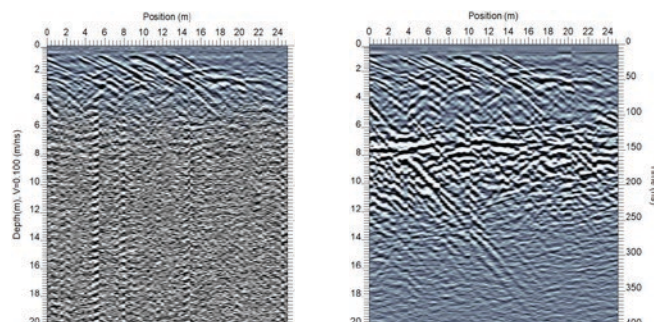
Ultra (3200) Receiver to see deeper

For low-frequency antennas (12.5 to 200 MHz), the pulseEKKO Ultra (3200) Receiver can stack GPR traces up to 65,536 times, reducing the random background noise floor up to 100 times, resulting in deeper GPR penetration than ever before.

See more and achieve more with the pulseEKKO Ultra Receiver.



Case study: Glacial beach deposits



4 Stacks

65,536 Stacks

In this example, increasing stacking from 4 to 65,536 times:

- Decreases the Noise floor 100 times
- Increases the depth of penetration by 220%

Adaptable Configurations

Ergonomic deployment platform.

Quick-release fasteners and interchangeable components enable rapid system reconfiguration. Integrated support for GNSS, odometers and remote triggers provide accurate spatial positioning.



Full Bistatic

Work in rough, poorly accessible areas.



SmartCart®

Fast surveying to cover large flat open areas.



SmartTow™

Rapid GPR profiling over smooth to moderately rough surfaces.



SmartSled™

Vehicle hitch mounted: survey large, rougher areas such as fields, forests, glaciers and ice sheets.



SmartChariot™

Vehicle hitch-mounted; rapidly survey large, flat areas such as roads and golf courses.

pulseEKKO Data Collection Trigger Options:



Odometer

User sets distance interval between data traces



Free run – Speed

User sets distance interval between data traces and towing speed



Free run – Time

User sets time interval between data traces



Manual Button Press

User collects data traces when desired by pressing a button on the DVL or remote trigger

Advanced survey methods

Beyond common-offset reflection surveys, pulseEKKO's bistatic antennas allow for variable antenna separations – ideal for CMP, WARR, multi-fold and transillumination surveys.



CMP

Common mid point (CMP) surveys for subsurface velocity measurements and seismic-style trace stacking.



WARR

Wide angle reflection and refraction (WARR) surveys.



Borehole

Subsurface measurements in boreholes.



Transillumination

Direct one-way transmission through an object to extract travel time, amplitude and dispersion information.



Multi-channel surveys



Multi-Frequency



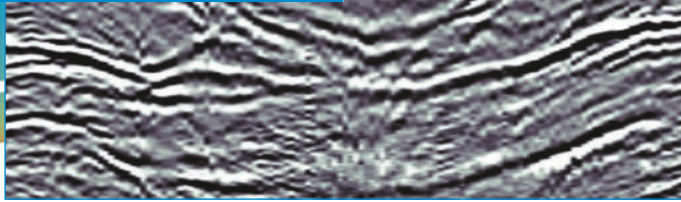
Multi-channel array



Multi-fold survey

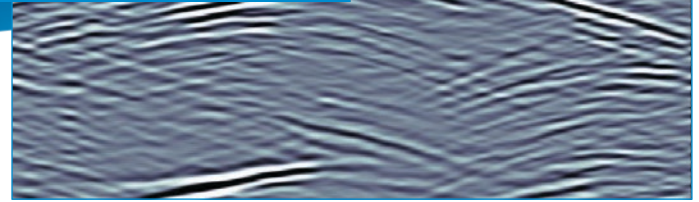
Applications

pulseEKKO applications include



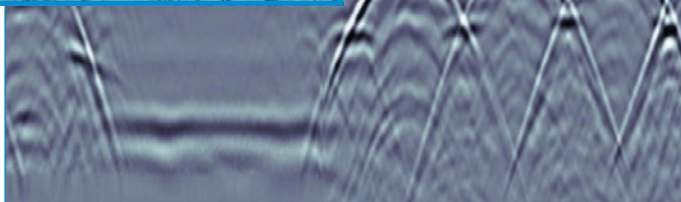
Geological Stratigraphy

Profile subsurface stratigraphy and the bedrock surface.



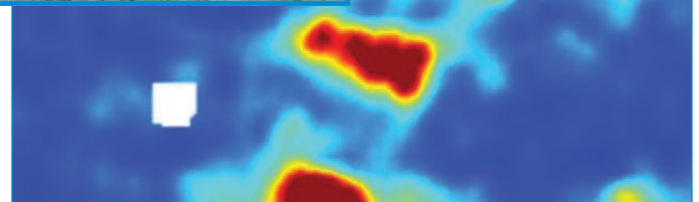
Mining & Quarrying

Detect changes in rock type, fractures, faults and joints for safety and resource development in open-pit and underground mines.



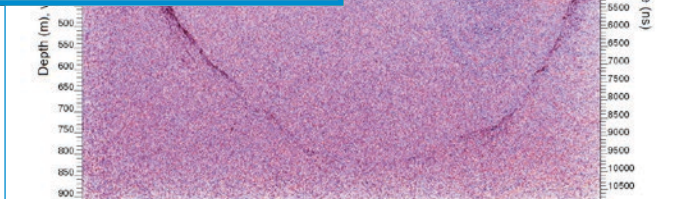
Geotechnical & Environmental

Map depth to bedrock, detect sinkholes and locate underground storage tanks. Drainage systems on golf courses and farms can also be located.



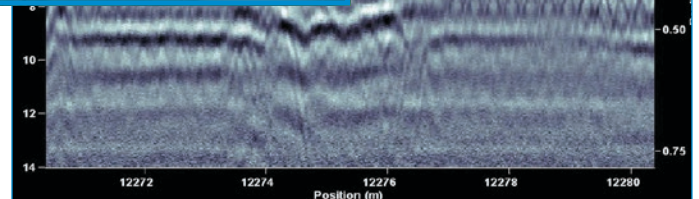
Forensics & Archaeology

Law enforcement uncover buried caches of drugs, money, weapons and clandestine graves. Archaeologists image underground artifacts, tombs and the foundations of ancient structures.



Glaciology, Ice & Snow

Measure ice thickness for winter road safety, snow depth, glaciological and polar ice-cap research.

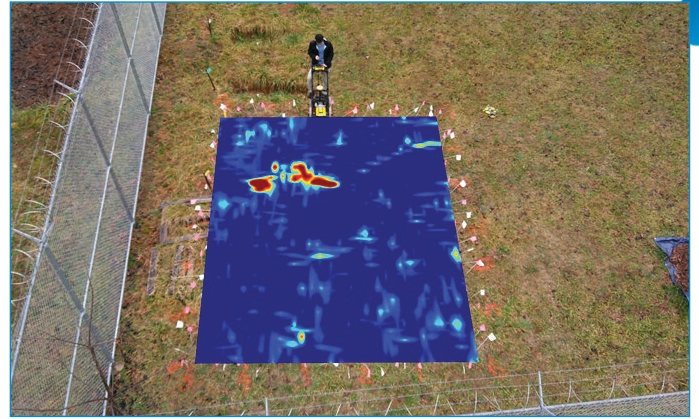
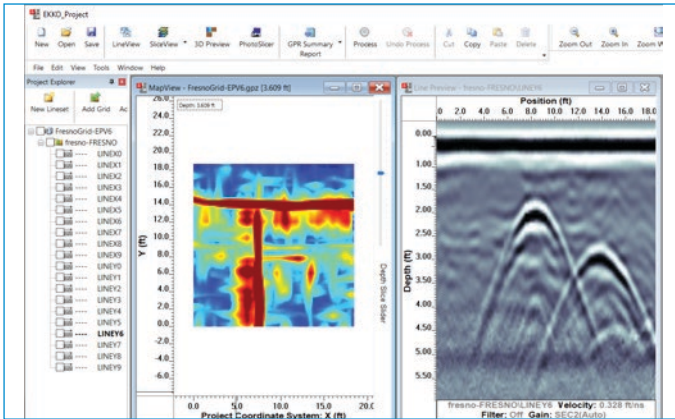


Structure Assessment

Assess the interior of concrete and pavement for asset management and maintenance planning.

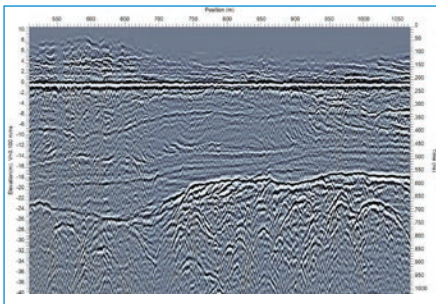
EKKO_Project™ Software

Visualize, Understand and Report your GPR results with the optional EKKO_Project PC Software.

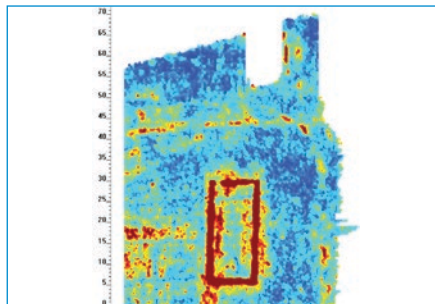


Core

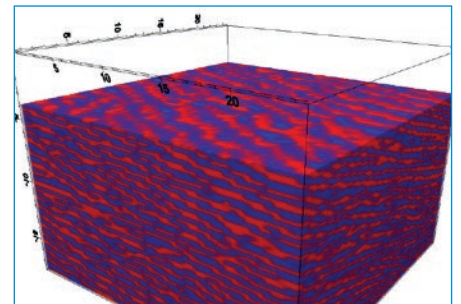
Organize your GPR data, photos and other files and save as a single project file. Easily create PDF reports of your findings.



Examine (Cross-sections)



Reveal (Depth Slices)



3D Reveal (3D Visualization)

Product specifications

Digital Video Logger & Control Module

Time Window:	3.5 to 64,000 ns
Points per Trace:	70 to 30,000
Signal Enhancement:	DynaQ
Hardware Temporal Sampling Increment:	5 ps
Sampling:	Digital Equivalent Time Sampling (DETS)
Pulse Repetition Frequency (PRF):	up to 100 kHz
Data Quality Assurance:	Active temperature and supply voltage compensation
Power Consumption:	1.5 A @ 12V
Temperature Range:	-20 to +50 C

Transmitters

Emission Regulation-Compliant Transmitters:	FCC, ETSI (EU) and Industry Canada
Transmitter for countries with no GPR regulations available	
Power Consumption:	150 mA @ 12V
Temperature Range:	-50 to +50 C

Receivers	Model 1600	Model 3200 (Ultra)
Hardware Stacking	1 to 2048	1 to 65,536
Receiver Sensitivity:	1.5µ V lsb	0.79 to 31.7 µ V lsb (user programmable)
Data Recording:	16 bit	32 bit
Power Consumption:	100 mA @ 12V	500 mA @ 12V
Temperature Range:	-50 C to +50 C	-50 C to +50 C

System

Maximum System Performance:	Standard Rx's : $186 \text{ dB} + 10 \cdot \log_{10}(2048 \text{ stacks}) = 219 \text{ dB}$ 3200 (Ultra) Rx : $186 \text{ dB} + 10 \cdot \log_{10}(65,536 \text{ stacks}) = 234 \text{ dB}$
Environmental:	IP65
Auxiliary Positioning:	GNSS, laser tracking



Our Mission

Provide best in class equipment and solutions, to prevent damage to critical infrastructure, manage assets and protect lives.

Our Vision

To be the world's leader in the management of critical infrastructure and utilities.

Our Locations



USA

Raymond, ME
Kearneysville, WV

Canada

Mississauga, ON



Europe

United Kingdom **HQ**
France
Germany
The Netherlands



Asia Pacific

India
Hong Kong
Australia

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