

Our World is **Magnetic**.

**GEM's unique Overhauser & Potassium magnetometer/ gradiometer systems combine data quality, survey efficiency and options that deliver significant benefits for archaeology applications.**

**The latest technology upgrades provide even more value:**

New Archaeology Mode for high sampling rate, available in mobile and gradiometer modes

Data export in XYZ (line-oriented) format for easy use in standard commercial soft-ware programs

Programmable export format for full control over output  
GPS elevation values provide input for geophysical modeling

Enhanced GPS positioning  
Standard GPS:  
<1.5m SBAS (WAAS, EGNOS, MSAS)  
High resolution CDGPS Option:  
<0.6m SBAS (WAAS, EGNOS, MSAS)  
<0.6m CDGPS (Canada, USA, Mexico)  
<0.7m OmniStar (VBS2 subscription)

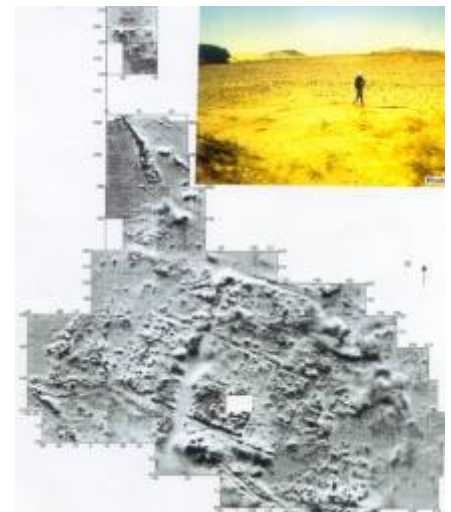
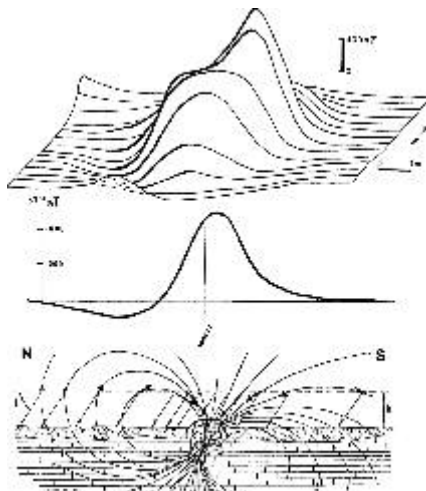
Multi-sensor capability for advanced surveys to resolve target geometry

Picket and line marking / annotation for capturing related surveying information on-the-go



The **GSM-19GW** magnetometer / gradiometer offers very high sensitivity plus fast sampling rate for walking unit as shown.

Magnetics are an increasingly key method for archaeology. Main benefits lie in the ability to resolve details non-invasively, the wide range of artifacts and cultural affects that are detectable, and the low-cost of magnetics in comparison to other geophysical methods.



Old Kingdom site, Ein El-Gazareen, Egypt. Image shows mud brick enclosures (weakly magnetized) and kilns, fireplaces, etc. (strongly magnetized).

Having detailed knowledge of a site prior to investigation reduces excavation costs while ensuring that no part of the site is missed. In addition, as many projects are time-sensitive, availability of a rapid, effective method, such as magnetics, may mean the difference between recovery and non-recovery.

**An Effective Non-Invasive Method**

The method is based on the physical phenomenon that many cultural artifacts are magnetic, or that cultural activities

lead to disturbances in soils, etc. that can be detected using magnetic methods.

### Magnetometer Requirements

The effectiveness of magnetics for archaeology is based on the wide range of magnetic susceptibilities for cultural objects ranging from very weakly magnetic items such as limestone walls to strongly magnetic fired materials or iron such as is used in implements.

A key requirement is the availability of instrumentation with a very high sensitivity for detecting a full range of contrasts. GSM-19 Overhauser and GSMP-40 Potassium instruments meet the criteria for a full range of sensitivity.

### About GEM Advanced Magnetometers

GEM Systems delivers magnetometers and gradiometers with built-in GPS for accurately positioned ground, airborne and stationary data acquisition. The company serves customers in many fields including mineral exploration, hydrocarbon exploration, environmental and engineering, Unexploded Ordnance Detection, archeology, earthquake hazard prediction and observatory research.

Key products include the QuickTracker Proton Precession, Overhauser and SuperSensor Optically-Pumped Potassium instruments. Each system offers unique benefits in terms of sensitivity, sampling, and acquisition of high-quality data. These core benefits are complemented by GPS technologies that provide metre to submetre positioning.

With customers in more than 100 countries and 30 years of continuous technology R&D, GEM is known as geophysical instrument manufacturer focuses on magnetic technology advancement.

**"Our World is Magnetic"**



GSM-19 system in use in Denmark. This system provides a light weight, low cost solution for walking use. It also includes a "Walking" mode that enables nearly continuous coverage with resulting high productivity surveys.



Options for non-invasive archaeological work include:

- Multiple high resolution sensor configurations for optimizing the detection and characterization of near surface objects
- Simple console-to-computer data downloading for rapid generation of results
- Optional, professional quality control and presentation software for easy 2D and 3D confirmation and visualization of results.



Maps and photos courtesy of Dr. Tatiana Smekalova, St. Petersburg State University.

## Specifications

### Overhauser Performance

Sensitivity: 0.022 nT / $\sqrt{\text{Hz}}$   
Resolution: 0.01 nT  
Absolute Accuracy: +/- 0.1 nT  
Range: 20,000 to 120,000 nT  
Gradient Tolerance: > 10,000 nT/m  
Samples at: 60+, 5, 3, 2, 1, 0.5, 0.2 sec.  
Operating Temperature: -40°C to +55°C

### Dimensions & Weights:

Console: 223 x 69 x 240 mm, 2.1 kg  
Sensor: 175 x 75 mm dia. cylinder, 1.0 kg

### Potassium Performance

Sensitivity: 0.0025 nT @ 1 Hz  
Resolution: 0.0001 nT  
Absolute Accuracy: +/- 0.1 nT  
Range: 20,000 to 100,000 nT\*  
Gradient Tolerance: > 30,000 nT/m  
Samples at: 1, 5, 10, 20 Hz  
Operating Temperature: -20°C to +55°C\*\*

### Dimensions & Weights:

Electronics box: 229 x 56 x 39 mm; 0.63 kg  
Sensor: 112 x 64 mm external dia., 0.9 kg  
\* Low/High Field Options Available: 10,000 to 350,000 nT  
\*\* Optional to - 40°C

## Overhauser and Potassium

### Operating Modes

Manual: coordinates, time, date and reading stored automatically at min. 1 sec. interval  
Base Station: time, date and reading stored at 1 to 60 second intervals  
Walking Mode: ASCII format via an RS-232 COM port  
Remote Control (optional): RS-232 interface  
Input / Output: 6-pin weatherproof connector

### Storage - 32 MB (# of Readings)

Mobile: 1,465,623  
Base Station: 5,373,951  
Gradiometer: 1,240,142  
Walking Mag: 2,686,975

### Optional VLF

Frequency Range: Up to 3 stations 15 to 30.0 kHz  
Resolution: 0.1% of total field

**GEM**  
SYSTEMS  
ADVANCED MAGNETOMETERS

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