GEM Systems is the number one global leader in the manufacture and sale of high precision magnetometers. GEM is the only commercial manufacturer of Overhauser magnetometers, that are accepted and used at Magnetic Observatories over the world.

Our Potassium Magnetometers are the most precise magnetometers in the world.

Our Proton sensors are considered the most practical and robust magnetometers for general field use.

Proven reliability based on 35 years of R&D

We deliver fully integrated systems with GPS and additional survey capability with VLF-EM for convenience and high productivity

Today we are creating the absolute best in airborne sensors and are leading the way in super sensitive potassium sensors specially designed for highly sensitive studies with super large sensors for research of Natural Hazards globally and now smaller and lighter sensors for practical UAV applications.

Our Leadership and Success in the World of Magnetics is Your key to success in applications from Archeology, Volcanology and UXO detection to Exploration and Magnetic Observation Globally.

GEM - Airborne VLF System

The GEM GSM-90AV airborne VLF system is an excellent mapping tool for environmental and exploration purposes.

Technically Superior

This GSM-90AV VLF System provides true measurements of the Vertical in-phase & Out-of-phase components as % of total field within the VLF frequency range of 15 - 30kHz. Many older systems only measure the total field and quadrature components of the field. The airborne system features two 3-coil sensors that acquire data from 2 VLF transmitting stations simultaneously without sensor orientation. Data include in-phase, out-of-phase, horizontal components in x and y and field strength in picoTesla (pT).

2 separate sensors with 3 light weight Orthogonal Air Coils each provide reduced noise and allow true in-phase and quadrature data to be gathered rapidly from 2 stations simultaneously

The GSM - 90AV also has a correction for the tilt level of the VLF sensor for up to 10° from the horizontal plane.

ABOUT - VLF

The VLF-EM survey method is a passive electromagnetic system that utilizes distant, globally positioned, transmitters broadcasting at frequencies in the range of 15kHz and 30kHz. (in some cases a private/custom transmitter may be utilised in regions with sparse transmitters) In a VLF investigation, the magnetic field components of the transmitted signal, which are effected by local ground conditions, are measured.

Applications are many:

• Resistivity imaging and bedrock mapping
• Delineate contrasts in conductivity at depth
• Map geological contacts, faults
• Search for mineralized bodies
• Water exploration

Lightweight standalone system for easy installations measures True In-phase and quadrature VLF data

Global VLF frequency transmitter stations

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GEM/EMTOMO - VLF Resistivity

GEM uses the VLF2DMF Software platform created by EMTOMO. This program provides 2D inversion of multi-frequency VLF-EM data.

The package includes a module for display of the survey, the selection of profiles for inversion and displays the survey results. The program can also be used for modeling studies. The user can build a complex resistivity model and calculate its VLF-EM response. Features include:

- 2D resistivity sections
- Resistivity depth plan slices
- Forward Modeling
- Fraser Filter
- Karous-Hjelt Filter (current density sections)

The inversion procedure used in VLF2DMF is two-dimensional (2-D) and is based on the Occam technique (e.g. DeGroot and Constable 1990, Sasaki 1989, Sasaki 2001). The forward modelling of VLF2DMF program is based on the finite-element method.

Advances in both technology to collect VLF data properly and advances in computer technology and mathematical inversion techniques have provided the industry with a new cost-effective means for imaging the top 100 metres of the earth.

The robust GEM multi frequency GSM 90AV VLF system, provides the user with a practical way to collect meaningful resistivity information in a very cost effective manner. In addition, the VLF system can be easily combined with GEM magnetometers for additional subsurface insight.

WHY USE VLF

VLF surveying has been utilised since 1964 as a rapid means to find large linear conductive features to provide information about the subsurface for geological mapping. Large area surveys have provided regional structural information but due to a lack of quantitative information such as depth to structure information the method had been marginalised until quite recently. In 2007, the Geological Survey of Sweden demonstrated that not only could VLF data be rapidly and efficiently collected it could provide excellent structure and resistivity information to depths of 100 m and theoretically to over 200 m. (Ref. L. Pedersen, 2007, Airborne VLF measurements and mapping of ground conductivity in Sweden.)

Specifications

**VLF Frequency**
2 user selected stations in a frequency range of 15 & 30.0 kHz with simultaneous reading.

**Parameters**
Vertical in-phase and out-of-phase components as % of total field. 2 components of horizontal field amplitude and total field strength in pT.

**Resolution**
0.1% of total field for VLF fields of 5 pT or stronger

**Tilt Correction**
+/- 10 degrees of horizontal

**Digital Compass**
Heading, pitch and roll at 10Hz

**Performance**
Operating Temperature : -20°C to +50°C

**Dimensions**
Sensor : 14 x 15 x 11 cm. (5.5 x 6 x 5 inches)  
Console: 22.3 x 6.9cm x 2.4 cm

**Weights**
Sensor : 1.0 kg (2.2 lb.)
Console : 2.1 kg (4.63lb.)
Towed Bird : 2.1 kg (4.63lb.)

**Power Source**
External 22-32V, 18 Ah @24V  
12V for VLF Console

**Storage**
Automatic with: time, coordinates, slope, EM field, frequency, in- and out-of-phase vertical, and both horizontal components for each selected station

**Sampling and Data Output**
10, 5, 2, 1 Hz with RS-232 output

Data export in standard XYZ (i.e. line-oriented) format for easy use in standard commercial software programs

**Options**
VLF2DMF software by EMTOMO

The GSM 90AV VLF system comes complete with an industry leading three year warranty