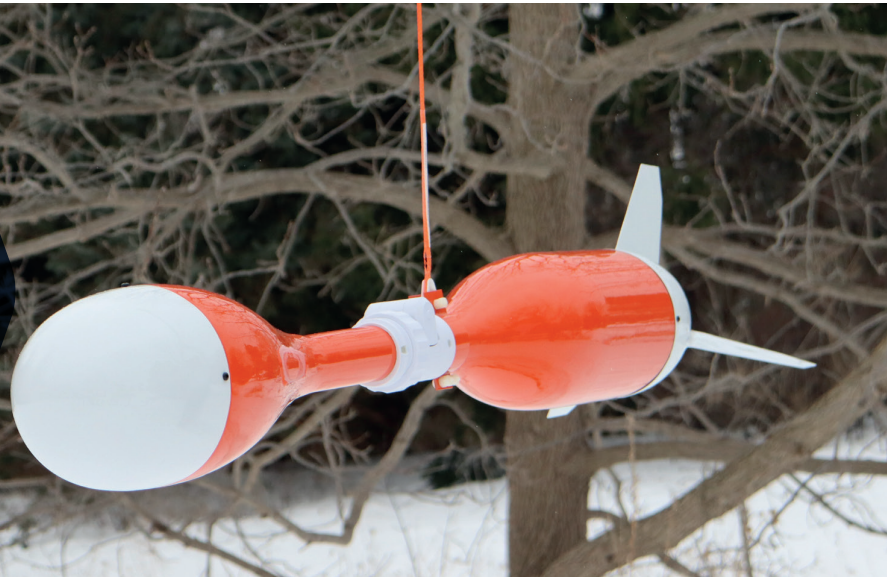


MagVLF

Magnetometer and VLF-EM UAV systems

Major advantages:

- **Complete solution**
- **Compact design**
- **High data quality**



MagVLF integrates the DRONEmag magnetometer and VLF-EM into a single system.

DRONEmag™

GEM's lightweight DRONEmag™ Potassium (K) magnetometer is the preferred choice for Fixed Wing, Helicopter, and Multi-Rotor UAV platforms. This K technology offers several advantages, including the industry's lowest heading error.

The key benefit of DRONEmag™ is its unmatched sensitivity—the highest among UAV magnetometers. Sensitivity is crucial in aerial applications, as the farther the sensor is from the source, the weaker the detected signal. This challenge is effectively addressed by DRONEmag™'s ultra-sensitive, optically pumped Potassium magnetometer, ensuring optimal performance in airborne surveys.

GEM's magnetometers are widely used in geosciences and military applications, including mapping mineral deposits, pipelines, and other buried infrastructure. They also play a critical role in hydro investigations, forensic detection of small concealed weapons, and conducting high-precision UXO, engineering, and environmental surveys.

VLF Theory

The Very Low-Frequency (VLF) Electromagnetic (EM) survey technique is a passive method that leverages distant, globally positioned transmitters operating at frequencies between 15.0 and 40.8 kHz. In VLF investigations, these radio transmitters generate primary horizontal electromagnetic fields, while vertical deviations—caused by local ground conditions—are measured for analysis.

UAV VLF System

The UAV-based VLF system is a powerful mapping tool for environmental and exploration applications.

The GEM Systems UAV VLF provides true measurements of the vertical in-phase and out-of-phase components as a percentage of the total field within the 15.0–40.8 kHz frequency range. Unlike older systems that only capture total field and quadrature components, this advanced system ensures comprehensive data acquisition.

It features one independent sensor, equipped with three lightweight orthogonal air coils. This design minimizes noise and allows for precise in-phase and quadrature data collection from a VLF transmitting station, regardless of sensor orientation. The system records key data parameters, including in-phase and out-of-phase components, horizontal components (x and y), and field strength in picoTesla (pT).



MagVLF – UAV Magnetometer & VLF Sensor

The MagVLF is an innovative UAV-compatible system that combines a high-sensitivity magnetometer and a Very Low Frequency (VLF) electromagnetic sensor in a single lightweight system. Designed for rapid, efficient, and precise geophysical data collection, MagVLF enables simultaneous magnetic and VLF measurements, providing unparalleled insights into subsurface structures. Ideal for mineral exploration, structural mapping, environmental studies, and geotechnical investigations, this system is revolutionizing airborne geophysics.

Compact & UAV-Optimized Design

With a total weight of 5 kg, the MagVLF system is designed for UAV platforms capable of carrying this payload while maintaining stable flight and efficient maneuverability. A suitable drone must support at least 5 kg of payload capacity, offer sufficient flight endurance for long-duration surveys, and ensure smooth operation at survey altitudes. UAVs with high-lift capabilities and extended flight times are recommended to maximize coverage per mission.

The MagVLF "bird" folding mechanism is designed to enhance the portability and deployment efficiency of the system while maintaining structural integrity and

operational reliability. The folding mechanism allows the sensor arms to collapse into a compact form, reducing the overall footprint for transportation and storage. This design ensures quick and effortless assembly in the field, enabling users to transition from transport mode to full operational readiness with minimal effort.



Why Choose MagVLF

• Simultaneous Magnetic & VLF Data Acquisition

Measures total magnetic field, VLF in-phase & out-of-phase components, and horizontal field strength (X, Y) in picoTesla (pT). Operates in the VLF frequency range of 15.0 – 40.8 kHz, detecting conductivity variations with high accuracy.

• Cost-Effective & Safe Alternative to Traditional Methods

Eliminates the need for expensive aircraft operations and associated logistics.

SPECIFICATIONS

Magnetometer

Sensitivity: 0.0002 nT @ 1 Hz (GSMP-35U)
0.022 nT @ 1 Hz (GSMP-25U)

Resolution: 0.0001 nT

Absolute Accuracy: ± 0.1 nT

Dynamic Range: 20,000 nT to 120,000 nT

Low/High Field Options: 3000 to 350,000 nT

Gradient Tolerance: 50,000 nT/m

VLF

User selected station frequency range of 15.0 -40.8kHz (simultaneous measurements). Vertical in-phase and out-of-phase (quadrature) components as % of total field.
2 components of horizontal field amplitude and total field strength in pT.
0.1% of total field (VLF fields >5 pT)

Sampling rate

Sampling Rate: 1, 5, 10

Orientation

Magnetometer:

Sensor Angle: optimum angle 35° between sensor head axis & field vector

Proper Orientation: 10° to 80° & 100° to 170°

Heading Error: ± 0.05 nT between 10° to 80° and 360° full rotation about axis

VLF:

Tilt Correction: ± 20 degrees (off horizontal)

Environmental

Operating Temperature: -40°C to +55°C

Storage Temperature: -70°C to +55°C

Humidity: 0 to 100%, splashproof

Weights

Bird with all components: 5 kg

Power

Power Supply: 22 to 32 V DC

Power Requirements: approx. 50 W at start up, dropping to 12 W after warm-up

Power Consumption: 12 W typical at 20°C

Warm-up Time: <10 minutes at 20°C

Outputs

10Hz RS-232 output with comprehensive Windows Personal Computer (PC) software for data acquisition and display.

Outputs UTC time, magnetic field, lock indication, heater, field reversal, GPS position (latitude, longitude altitude, number of satellites)

VLF TF, IP, OP, P, V, WAY, PITCH, ROLL, LASER

Components

Bird with pickup, GSMP-35U/25U electronics with RS232, Potassium sensor with interface cable, GLV with GPS Option 2, IMU and Laser, Laser Altimeter with interface cable, VLF electronics module, VLF sensor with interface cable., 2 x 25.9V3.650 Ah Li-ion battery with battery box, 2x charger, 10 m tow cable.
OPTIONAL: Radiolink



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