NEW!

DRONEmag™ UAV Magnetometer
for Precision Measurement from the Air

Since 1980
Leading the World of Magnetics

GEM Systems is the global leader in the manufacture and delivery of high precision magnetometers. Its proven solutions focus on Potassium (K) technology as well as Overhauser and Proton quantum technologies, and are a standard for UAV, Airborne, UXO, Ground and Monitoring applications.

The advanced DRONEmag™ magnetometer is a standalone or turnkey solution developed specifically for UAV work. With Potassium technology embedded, it enables high-resolution and high-sensitivity data acquisition from drones.

GEM's Airborne platforms also leverage K technology. They offer low heading error combined with high sensitivity to maximize responses from subtle anomalies.

On the ground, GEM has led the industry in magnetometers and gradiometers for decades. With K-Mag, Overhauser and Proton systems, GEM offers a solution for many geoscience and military applications.

For stationary measurements, GEM provides base stations as well as very large K systems for observatories (20 – 50 fT). Systems are installed globally.

With this experience and ongoing R&D, our clients benefit continuously from robust, proven solutions and high precision, quality results.
The difference really is in the data.

DRONEmag™ in Action.

The DRONEmag™ can be integrated into any UAV platform that can withstand the payload.

Driven initially by military work, Unmanned Aerial Vehicles have evolved significantly in the last decade. With improvements in efficiency, range, size, and payload, drone magnetometer platforms have proven effective in many applications. The drone-mounted magnetometer trend is also growing quickly, as the knowledge of its efficiency and high-quality data becomes more well known each day.

GEM's ultra lightweight DRONEmag™ Potassium (K) technology is the magnetometer of choice for Fixed Wing, Helicopter, and Multi-Rotor platforms. K technology has numerous benefits for each of these platforms, including the absolute best heading error in the industry. The single most important benefit is the DRONEmag™'s sensitivity – the highest of any UAV magnetometers. Sensitivity is key in aerial applications as the drone is elevated from the surface and there are the potential field equations to consider. Specifically, the farther the sensor is from the source, the smaller the signal. This can be compensated for by using an ultra-sensitive magnetometer, in the air, such as the Potassium optically pumped DRONEmag.

DRONEmag™ can be delivered as a standalone system for any type of platform from Multi-Rotor to Helicopter to Fixed wing. It can also be provided as a turnkey solution.

With more than 30 years of R&D in magnetic systems, DRONEmag™ components are specially designed for high-sensitivity and noise-free data. Aerial work on platforms, such as GEM's Monarch integrated UAV fixed-wing drone and magnetometer system and work on other platforms such as Multi-Rotors and Helicopter drones, has led to the development of the smallest and most precise UAV magnetometer on the market.

Other reasons for widespread use of DRONEmag™ include the K technology's extreme gradient tolerance of up to 50,000nT/m and fast sampling of 20 Hz (20 samples per second). Fast sampling allows drones moving at high speed to obtain high sensitivity measurements effectively and completely along the line.

GEM's magnetometer and gradiometer applications include the geosciences and military, for instance in mapping mineral deposits, pipelines and other buried infrastructure and hydro; detecting small buried arms in forensics; and flying precision UXO, engineering and environmental missions.

GEM Systems, Inc.
135 Spy Court Markham, ON Canada L3R 5H6
Phone: 1 905 752 2202 • Fax: 1 905 752 2205
Email: info@gemsystems.ca • Web: www.gemsystems.ca

Our World is Magnetics.

DRONEmag™ system with high-resolution magnetometer data obtained from a GEM UAV platform. System components include lightweight high sensitivity magnetometer; electronic cable; and sensor electronics box. System weight is under 1.0 kg for compatibility with GEM and other drone platforms.


DRONEmag™ Surveys -- Replacing Ground & Airborne

With line cutting costs, safety and data quality issues in the forefront, drone magnetometer surveys are fast replacing ground and airborne magnetic surveys under 2000 line km. And, now with DRONEmag™-based surveys, there is a proven solution that leads to lower magnetic data acquisition costs and better data.

In the first instance, drone magnetic surveys are replacing ground surveys and it's easy to see why. While a comparative ground survey would take 10 days of field work and associated costs, a UAV survey with DRONEmag™ can do 100 km of work in a single day. In addition, ground surveys may require cut lines and these services are becoming more expensive; harder to source; and add safety risks to crew.

Moreover, in comparison with airborne surveys, safety is also a significant concern. The number of manned accidents continues to increase. And, the costs of airborne surveys can be significant to support. Costs include salaries for mechanics, fuel, food and lodgings and more.

At the same time, drones are easier to launch, mobilize, set up and re-fuel. Moreover, UAVs can fly at night – giving significant productivity gains over conventional airborne surveys. In practice, UAVs fly lower (100 feet instead of 300 feet) meaning that signal is stronger. And, with a high sensitivity magnetometer, such as DRONEmag™, you can be confident in mapping even subtle target responses.
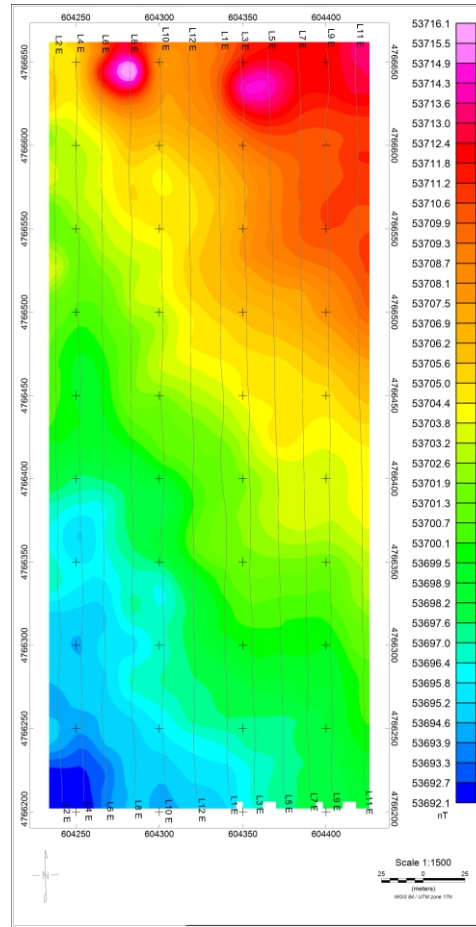
Magnetic data collected with the DRONEmag™ (GSMP-35U) during a test flight of the GEM Hawk UAV in southern Ontario.

Value-Added Sensor Options
(GPS, IMU, Pixhawk & Laser Altimeter)

GEM Systems can offer four options with its drone sensors which include GPS, Inertial Measurement Unit (IMU; to record flight characteristics such as roll, pitch and yaw), laser altimeter (altitude) and Pixhawk-enabled for seamless integration with your own UAV. Note that GEM's altitude data are always measured from the ground surface to the sensor position for optimal modeling and interpretation of data. The options above can be also combined for enhanced functionality. For details, contact GEM today.

Magnetomometer Specifications

Performance
Sensitivity: 0.0002 nT @ 1 Hz
Resolution: 0.0001 nT
Absolute Accuracy: ± 0.1 nT
Dynamic Range: 20,000nT to 120,000 nT
Low/High Field Options: 3000 to 350,000 nT
Gradient Tolerance: 50,000 nT/m
Sampling Rate: 1, 5, 10, 20 Hz

Orientation
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

Environmental
Operating Temperature: -40°C to +55°C
Storage Temperature: -70°C to +55°C
Humidity: 0 to 100%, splashproof

Dimensions & Weights
Sensor: 161mm x 64mm (external dia) with 2m cabling ; 0.43 kg
Electronics Box: 236mm x 56mm x 39mm; 0.46 kg
Option 1 cabling; .125kg
Option 3 light weight battery; .250kg

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
20 Hz 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)

Components
Sensor, pre-amplifier box, 2m sensor / pre-amplifier cable,(optional cable 3-5m) manual & ship case

GEM Systems provide an industry leading 3 year Warranty