

Our World is **Magnetic**.

Unmanned Airborne Vehicles are pilot-less aircraft that are flown on military, commercial, and police missions for a variety of applications. They are gaining in popularity as they are inexpensive, collect good quality data from a stable platform, and they can be equipped with many kinds of sensors, ranging from simple cameras to infrared cameras to magnetometers.

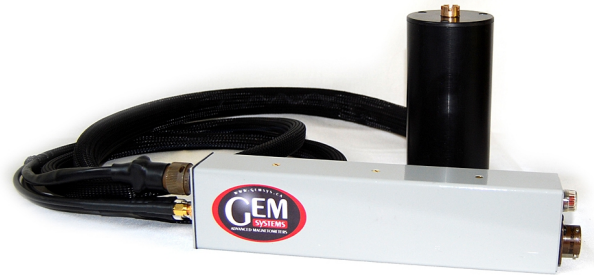
Driven initially by military applications, platforms, such as helicopter and fixed wing, have evolved significantly in the last ten years with new technology improvements, efficiency, range, size, and payload of UAVs. While these developments have been outside the commercial sector, this trend is changing as more and more commercial applications are uncovered.

In commercial applications, UAVs are well-suited for mapping mineral deposits, mapping pipelines and other buried infrastructure, potentially surveying hydro lines for breaks, and police missions involving detection of small firearms or "fresh" graves. The primary commercial use to date has been in mineral exploration but the other fields are developing.

Mineral exploration is a natural fit for a UAV for a number of reasons. Manned flights in remote areas are dangerous and costly to support with significant resources required, including mechanics, fuel dumps and more. UAVs are easier to launch, mobilize, set up and refuel.

Moreover, UAVs can fly at night giving significant productivity gains. Bottom line, these systems require few materials to build, use less fuel to fly, emit less pollution, and are easier to dispose of at the end of their useful lifetime.

UAVs - Pathway to the Future



Unmanned Airborne Vehicle sensor for making ultra-high sensitivity magnetic measurements. GEM's UAV sensor is the most sensitive airborne system available globally and is easily installed in UAV platforms. Data can be stored onboard in an electronics box or transmitted during flight. Multiple day's data may be stored in the large format memory.

State-of-the-Art Components

GEM's airborne technology has been proven on Fixed Wing, Helicopter and UAV platforms. Part of its success is due to its components - specially designed for high resolution, high accuracy, high gradient tolerance and **Noise-free Clean data:**

- High sensitivity Potassium vapour sensor - single unit or multiple units (gradiometer)
- Electronics for optimum detection and processing of its electron precession frequency
- Various hardware for attaching sensors and electronics to UAV
- Optional signal processor / console and cable

All components are backed by GEM's industry leading two-year warranty.

GEM has developed many special units including

Components of an Effective UAV System

An effective UAV system is defined as one that is capable of acquiring ultra-sensitive magnetic data on either a helicopter or fixed wing platform.

In order to be effective, UAV magnetometer systems must acquire data close to the target. Responses of a dipolar target fall off as the inverse cube of distance so the farther from the source – the smaller the signal. This can be compensated for by using an ultra-sensitive magnetometer such as the Potassium optically pumped version.

UAV systems must also record position effectively. With GEM, this is done with accurate GPS positioning – giving reliable positioning information to 0.6 m in a horizontal direction (both x and y coordinates).

Lastly, it is essential to collect low-noise magnetic data. With GEM, this is done by magnetically cleaning the craft. Attention is also paid to rotor noise and propeller noise in UAV's – ensuring that the platform is as magnetically quiet as possible.

Configurations

There are two main configurations possible for UAVs - helicopters and fixed wing.

On helicopters, a Towed Bird, nose boom and horizontal gradiometer attached to the platform.

On fixed wing platforms, one or more sensors is/are housed in wingtip pods Ideally, boom or in the body.

The company can put together a fixed wing solution for your aircraft – including sensors, electronics, cabling, and training. GEM's solutions are comprehensive and affordable.

Fixed wing surveys take advantage of the lack of microphony of the Potassium sensor it's resolution and minimal heading error.

Airborne Base Stations

High quality data are only obtained after reliable, accurate application of base station corrections. With GEM, you have the choice of working with three versions – the Potassium, Overhauser or Proton base stations.

This gives a range of cost-entry points as well as a range of sensitivities that accommodates typical to highest resolution specifications. These implementations share a number of advanced features, including precise time synchronization of field and base station units using a built-in GPS option; flexible scheduling (up to 30 on/off periods); or manual.

UAV Magnetometer Specifications

- **Sensitivity** - 0.0003 nT @ 1 Hz
- **Heading Error** - + / - 0.05 nT 360 degrees full rotation about axis
- **Resolution** - 0.0001 nT
- **Absolute Accuracy** - +/- 0.05 nT
- **Dynamic Range** - 15,000 to 120,000 nT
- **Gradient Tolerance** - 50,000 nT/m
- **Sampling** - 1, 2, 5, 10, 20 Hz (higher optional)
- **Sensor** - 158mm x 64mm; 0.65 kg
- **Electronic Box** - 237mm x 56mm x 39mm; 0.63 kg
- **Power** - 22 to 32 V DC 0.5 amp

Discover More with GEM and its advanced line of airborne products, please contact GEM at info@gemsys.ca. Our World is Magnetic!



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