GEM Hawk

NEW!

Since 1980
Leading the World of Magnetics

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 R+D since 1980

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 Airborne sensors with smaller and lighter sensors for practical UAV applications. We are also making very large sensors with the best sensitivity (30-50 fT) for use in natural hazard research and global ionospheric studies.

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.**

The lightweight GEM Hawk (Helicopter) is well suited to lift the GEM AirBIRD for robust UAV aerial magnetic surveying.

Easy to Fly UAV

Helicopters can be just as easy to fly as multirotors. The addition of drone flight control computers means that they are easy to fly, with the same features of self-stabilization, GPS guidance, automatic RTL, and even Waypoint capability.

In some ways, helicopters are actually easier to fly than multi rotors, as they are more stable in wind and at high speed. And any VTOL is easier to take-off and land than a conventional airplane, because the operator does not need to plan for often complicated take-off procedures and landing zones.

UAVs can be used to perform airborne geophysical surveys, in particular aeromagnetic surveys where mapping the spatial variations in the Earth's magnetic field can be used to further the understanding of the geology in areas where the mineral potential is being explored.

UAV borne magnetic surveys are less expensive than both airborne and ground surveys. They can be carried out in areas that are too dangerous, too remote, or too expensive to carry out with manned aircraft. UAV borne magnetic surveys can deliver better data quality in environments where topography and safety standards prohibit manned aircrafts from acquiring data at optimum terrain clearances.

Light Weight - Heavy Lift

It has a minimum of moving parts. Not only does this make it more reliable and easy to maintain, but it is also more compact and light-weight.

One other benefit of the compactness of the powertrain unit, is that it results in very flexible payload and battery areas.

Autopilot Inside

GEM Hawk is controlled by Autopilot software, which is the most advanced, full-featured and reliable autopilot software available. The helicopter software is 90% the same as the multirotor software, meaning that helicopters benefit from all the same functionality developed for other drones. An additional benefit is that this allows an organization to combine helicopter drones in their fleet, with minimal extra training if they are already familiar with Autopilot on other vehicle types. Diversity in equipment allows specializing different vehicle systems for different roles.

GEM Hawk UAV Helicopter Specifications:

Operational Weight:	12.4 kg
Usable Payload:	1 - 4 kg
Maximum Take-Off Weight:	16.4 kg
Cruise Speed:	50 km/h
Cruise Endurance:	50 mins
Telemetry:	10 km
Operating Temperature:	-10 to +40 ºC
Batteries:	22.2V 22AhGS LI-PO

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.**

AirBIRD

The self contained, self powered stand alone system does not require any integration with the UAV's navigation or electrical systems.

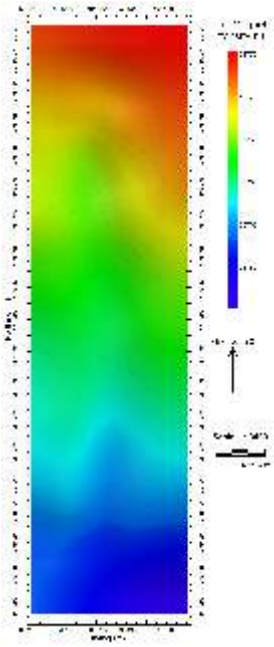
AirBird - Lightweight complete towable system to house; Magnetometer, GPS, Laser Altimeter, IMU and GEMDAS data acquisition module.

AirBird Specifications

The overall length of the **Airbird** is 2.2 metres with the GSMP-35U sensor, installed on a gimbal in the tail to allow for +/- 45 degree rotation of the sensor. The housing shell weighs only 1.6 kg. With all components added, including power, the bird weighs just under 3.3 kg. The battery allows for 1 hour of equipment operation.

Customer provided UAV's

Before deciding on a particular UAV aircraft with adequate range and payload for the geophysical instruments, it is recommended that the magnetic interference generated by the vehicle be assessed with a high sensitivity portable magnetic gradiometer, operated by an experienced geophysicist. The UAV vehicles should have a payload capacity of at least 1.5 kg for minimum requirements. But before purchasing a UAV contact GEM to discuss your plans.



Magnetic data collected with the GSMP-35U during a test flight of the GEM Hawk UAV in southern Ontario.

Standalone light weight towed bird for VTOL UAVs (Turnkey System)

GEM Systems' stand-alone magnetometer **Airbird** for Vertical Take Off and Landing (VTOL) UAVs, comes complete with 1 GSMP-35U Potassium Magnetometer, laser altimeter for terrain clearance control, IMU, GPS navigation, battery, radio link and tow cable. The magnetometer performs all of the functions of a data acquisition unit.

The nose of the Airbird houses all of the navigation and ancillary instruments, complete with a window for the laser range finder

Other Magnetometer Integration Options with UAV's

The light weight GSMP-35U magnetometer can be supplied as a stand alone magnetometer allowing the customer to complete integration into existing platforms. In addition, a variety of options exist.

Option 1 - For UAVs operating with PIXhawk autopilots

This Option includes the lightweight GSMP-35U modified to facilitate recording the rich data stream from the Pixhawk autopilot found in so many UAVs. A full, multi-parameter database, which includes the mag data and all of the UAV's sensor data, such as altimeter and GPS is created onboard the Magnetometer's custom electronics module. Data is retrieved post flight.

Option 2 - For customers with their own UAV that wish to add a complete geophysical system along with specialised ancillary equipment

GEM will supply and integrate GPS, Laser altimeter, IMU and data radio link. The system runs completely independent of the onboard autopilot. The electronics box for the magnetometer system is modified to include a multiplexor (**GEMDAS**) to handle data acquisition and storage for a variety of parameters. The data can be retrieved at the end of the flight or it can be delivered in realtime to the ground via radio link. (a separate DAS system can also be provided)

Magnetomometer Specifications

AirBIRD Components

Light weight sensor, sensor electronics, GPS, Laser Altimeter, IMU sensor and box, interface cables, light weight bird, 10 metre tow cable, LiPO battery with charger, ground station with Radio Link, manual, carrying case

UAV Magnetometer Performance

Sensitivity: 0.0003 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

Magnetometer Orientation

Sensor Angle: optimum angle 35° between sensor head axis & field vector.
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: 22.2 V DC
Power Requirements: approx. 40 W at start up, dropping to 15 W after warm-up
Power Consumption: 15 W typical at 20°C
Warm-up Time: <15 minutes at -20°C

Outputs

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

GEM Systems provide an industry leading 3 year Warranty

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

02/27/2017