



**CODEVINTEC**

Tecnologie per le Scienze della Terra e del Mare

## G-859AP Mining Magnetometer



**Rugged Cesium-Vapor  
Magnetometer System  
designed for Mining  
Exploration**

### Typical uses

- > **Geology** – Survey for regional variations in the magnetic field for mining and oil and gas applications.
- > **Landfill Detection** – Delineate and map landfills and waste sites with precision.
- > **Environmental** – Find abandoned wells, pipes, and storage tanks quickly.



## G-859AP – Mining Magnetometer

This economically priced Cesium vapor magnetometer system offers the mining/oil/gas survey companies the best total field magnetic surveying tool available. Based on our industry-standard G-858 MagMapper system, the G-859AP incorporates all of the reliability and proven **performance in a lightweight survey package with integrated WAAS/EGNOS/MSAS enabled Tallysman™ GPS.**

The G-859AP Mining Mag uses a graphical interface to make **survey design and data acquisition quick and efficient.** A "Simple" or "Mapped" mode uses line numbers and known staked reference points to define the map parameters. Or, the user may use the integrated Tallysman TW5341™ GPS for mapping positions automatically. Position information may come from an external GPS, from regularly-spaced fiducial marks input by the operator, or both.

Electrical connectors on the G-859AP's sensor have been eliminated in order to increase reliability and reduce setup time. The G-859AP's internal firmware has been streamlined to include those features important for mining exploration.

We are so confident in the improved design of the G-859AP that it comes with a **2 Year Warranty.**

The G-859AP also works well for local environmental studies such as mapping waste sites, locating buried metal drums, storage tanks, buried pipelines, well-heads and other ferrous structures.

### Features and benefits

- > **Low Noise/High Sensitivity**  
Measure the smallest changes in magnetic field.
- > **Low AC Field Interference**  
Survey next to power lines when necessary.
- > **Easy-to-use Interface**  
Practical for use by inexperienced personnel.
- > **Rugged and Reliable**  
Weatherproof. Survives three-foot drop onto hard surface.
- > **Ergonomic Backpack**  
More comfort during and after extensive surveying.
- > **Integrated GPS**  
Know the true boundary of each anomaly.
- > **Ultra-stable**  
No need to calibrate sensors.





## G-859AP Mining Magnetometer Specifications

### Magnetometer / Electronics

Operating Principle	Self-oscillating split-beam Cesium Vapor (non-radio-active Cs-133) with automatic hemisphere switching.
Operating Range	20,000 nT to 100,000 nT.
Operating Zones	For highest signal-to-noise ratio, the sensor long axis should be oriented at 45°, ±30 to the earth's field but operation will continue through 45°, ±35°. Sensor is automatic hemisphere switching.
Noise	< 0.008 nT/√Hz <sub>rms</sub> (SX (export) version: 0.02 nT/√Hz <sub>rms</sub> ).
Heading Error	< 1.5 nT including backpack and GPS.
Gradient Tolerance	> 500 nT/in (>20,000 nT/m).
Temperature Drift	< 0.05 nT/°C.
Max Sample Rate	5 Hz.
Data Storage	Non-volatile RAM with capacity for 8 to 12 hrs of magnetometer, time, event marks, field notes and XYZ or GPS locations.
Audio Output	<ol style="list-style-type: none"> <li>1. Audio tone of field variation; pitch and volume adjustable. (Search mode).</li> <li>2. Audio pulse each 1 second (pace metronome).</li> <li>3. Alarm for loss of signal, low battery or quality control setting exceeded.</li> </ol>
Data Output	Three-wire RS-232 standard serial port, optional continuous real-time transmittal of data via RS-232 to PC. Total memory output transfer time less than 5 min at 115,200 baud.
Visual Output	<p>320 x 200 graphic liquid-crystal display, daylight-visible with selectable outputs for:</p> <p>Display of up to 5 stacked profiles, real time or review mode. Survey grid showing boundaries and position.</p> <p>All system set-up functions, e.g., memory status, data transfer, sample time.</p> <p>All survey set-up functions, e.g., survey profile number and direction, station number or GPS data transfer protocol, line number.</p> <p>Survey monitoring functions, e.g. total field, noise level, profile number or x-y coordinates.</p>
Internal Clock	Resolution of 0.1 sec, drift: < 1 sec/day.
Power	24 VDC rechargeable gel cell, 5 hrs for Mag w/GPS. Magnetic effect less than 1.5 nT at 4 ft. Internal backup battery for clock and non-volatile RAM.
Operating Software	<ol style="list-style-type: none"> <li>1. Survey Modes: Search survey - Simple survey - Mapped survey, station or continuous - Base station.</li> <li>2. Data acquisition/display: Acquire and store data and survey functions. Display profiles, total field to 0.1 nT resolution, survey / map parameters and diagnostics.</li> </ol>
Post-acquisition Software:	<p>MagMap software for installation on customer's computer.</p> <ol style="list-style-type: none"> <li>1. Data transfer and corrections: <ol style="list-style-type: none"> <li>a. Transfer of data from field Magnetometer, GPS, or Base station to PC.</li> <li>b. Diurnal correction using base station data.</li> <li>c. Processing the corrected data into ASCII values of X-Y-Z.</li> </ol> </li> </ol>

2. Data processing functions include spike editing, spline filtering, repositioning of X, Y, Z or GPS Lat/Long, conversion to UTM coordinates, profile and contour map plotting.

### Mechanical

Sensor	DIA: 6 cm; L: 15 cm; Weight: 340 grams (2.4x6 in; 12 oz).
Backpack	4.3 kg (9.5 lb).
Console	L: 28 cm; W: 15 cm; H: 8 cm; Weight: 1.6 kg (11x6x3 in; 3.5 lb). Magnetic effect less than 1 nT at 4 ft.

### Environmental

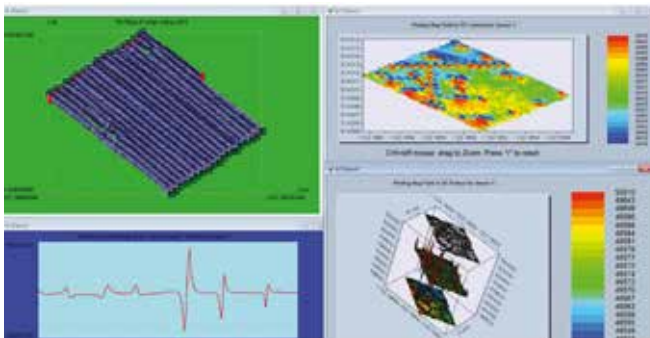
Operating Temperature	-25°C to +50°C (-13°F to + 122°F).
Storage Temperature	-35°C to + 60°C (-30°F to + 140°F).
Water Tight	Weatherproof in driving rain.
Shock	Survives a 3 ft drop onto a hard surface.
Warranty	2 years on G-859AP and sensor, 1 year on accessories.

### Tallysman TW5341™ Specs

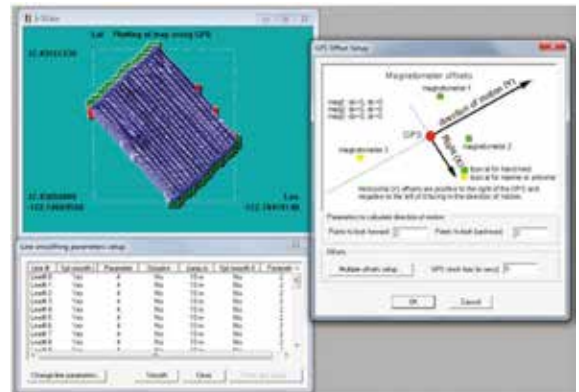
>	Code and carrier phase tacking with 1Hz Position, velocity, time output.
>	SBAS capable and designed for harsh environments.
>	RS-232 compatible interface.
Size and Weight	DIA: 66.5mm; H: 21mm; Weight: 60 g (2.6x0.8 in; 2.1 oz).
Input Voltage	+9 to +16 VDC.
Power Consumption	1.2W (typical).
Com Ports	1 RS-232 (optional 2 RS-232) at up to 19,200 baud.
Operating Temperature	-40°C to +85° C (-40°F to +185°F).
Position Accuracy	Single point L1 <2 m CEP; WAAS L1 <1 m CEP.
Data Rates	Measurements 1 Hz; Position 1 Hz.
Time to First Fix	Cold start 39 sec; warm start 34 sec; hot start 2.5 sec.
Signal Reacquisition	<1 sec typical.



## MagMap – Processing Software for Magnetometer Survey Data



MagMap™ Data Review Screens



Correcting GPS Data for Offsets

This powerful Windows program provides basic data processing filters for quick analysis of magnetic, Ohm- Mapper, and EM61 data. MagMap™ facilitates data download from Geometrics magnetometers, applies diurnal correction upon export, and generates 2D/3D color contour plots and shaded relief maps.

This program also offers full GPS support with UTM conversion, sensor-GPS antenna offset computation as well as GPS file integration with basic magnetic data.

**Erroneous data due to spikes can be eliminated with the despiking function by using a user-selectable maximum and minimum window to cut the data outside of this range.** Dropouts due to entering a dead zone or loss of signal can be removed entirely or interpolated to estimate the actual values.

The magnetic data collected can be checked for accuracy either as a complete profile of the survey, with each transect stitched together, or on a line-by-line basis. **The zooming feature focuses the window on a point of interest and helps determine the validity of a series of readings.**

The time, date, and magnetic readings can be seen in the bottom panel for reference. Data can be shown for each individual magnetometer, both sensors on the same plot to examine consistency, or as a pseudo-gradient.

### Features

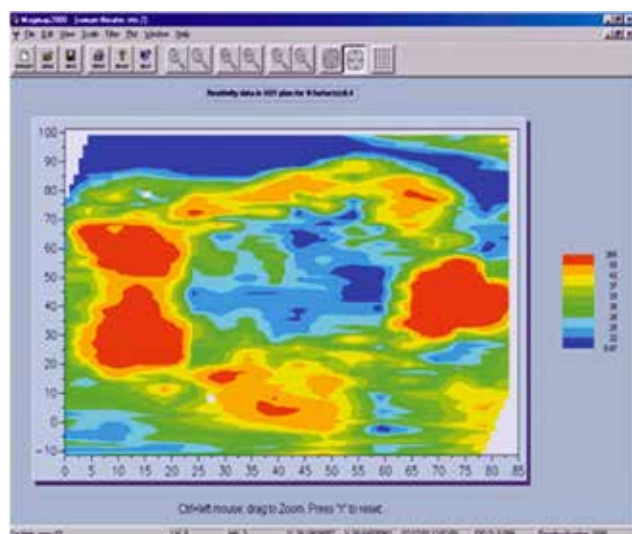
- > **Runs on Windows XP, 7, 8 and Newer** - Multicore Multi-tasking operating systems.
- > **Prompts Automatic Data Download** from Geometrics Magnetometers.
- > **Quickly View Color Contour Maps** within a few clicks after data download.
- > **Process EM Data** in the same program as the magnetometer data such as from the OhmMapper™ or EM61.
- > **Fix Operator Errors** by manually deleting points, lines, or shifting them to the correct position.
- > **Remove Erroneous Data** with Despiking, Destriping and “Remove Dropouts” features
- > **Correct GPS Positions** by performing a sensor-to-GPS offset correction
- > **Merge GPS and Magnetic Data Files** which do not already contain GPS positions.
- > **Constant Updates** feature automatically checks Geometrics FTP site for newer releases of the program each time the program is opened.





## Analog components

MagMap also downloads data from the OhmMapper and can create 2D image plots showing differences in the resistivity of the survey area. Using multiple receivers for a survey also allows you to create multiple depth slices to see how the resistivity changes at different depths, as well as creating vertical profiles of a transect. GPS offsets can be incorporated to properly position the resistivity data.



Map of OhmMapper Resistivity Data

## Merging gps and magnetic data files

If you collect magnetic data and do not have an integrated GPS unit you can still merge both datasets in MagMap. It is important that both files contain accurate time stamps and were recorded simultaneously to marry the two datasets together. It is necessary to download GPS Babel prior to attempting to merge GPS and magnetic data. A link to the download website is provided in the software.

## GPS corrections

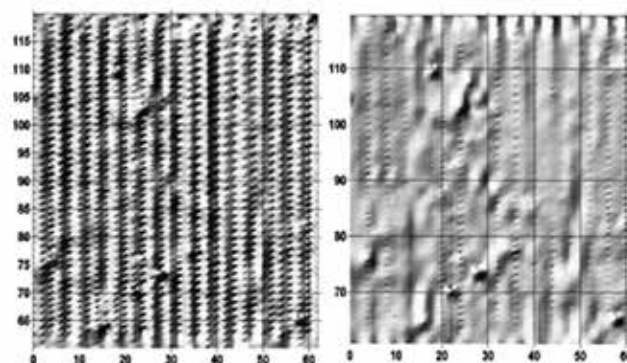
MagMap allows the user to include GPS offsets to correctly associate location information with each magnetic data point. Smoothing parameters are also available to reduce relative positioning errors in the GPS readings.

## 2D/3D grid views

Data can be seen in a traditional 2D image plot or shaded relief to examine the size and nature of each anomaly. The 3D plot is a colored wireframe plot to give a visual representation of the strength of each anomaly as well as a comparison between two features. The 3D grid option also allows you to zoom in on areas of interest for a closer examination of subtle differences in the data.

## Data destriping

Heading and operational errors can be removed with the destriping function. It also employs a high frequency filter to remove small sinusoidal noise typically representative of the walking gait of the operator.



Results of Destriping and Periodic Noise Removal Feature