



GEOMETRICS

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2190 Fortune Drive, San Jose, CA 95131 USA • www.geometrics.com

Portable Cesium Vapor Magnetometer

Model G-858 MagMapper™

A Professional Magnetic Mapping System

For Utilities, Ordnance, Archaeology, Environmental, Minerals and Petroleum Surveys



- **Excellent Performance**
Low Noise/High Sensitivity, best in the industry – $0.008\text{nT}/\sqrt{\text{Hz}}$ RMS – and world wide operation
- **Very Fast** – Log mag and GPS at up to 10 samples per second for economic large area surveys at high sample density
- **Optional Non-Magnetic cart** for near surface target search
- **Optional Integrated GPS with Backpack** – Includes non-magnetic backpack and Novatel™ WAAS/EGNOS/MSAS ready GPS
- **Low AC Field Interference** – Best in the industry for rejecting AC power line grid noise (50/60 Hz)
- **Easy-to-use** – Simple setup and rapid in-field map generation with free MagMap2000™ software
- **Reliability** – Our Cesium sensors *never* need calibration or factory realignment. Designed for extreme ruggedness and reliability.
- **Designed for large surveys in many disciplines** – This versatile tool is specially designed for large area surveys with 8 hr data storage capacity and two 6 hr battery packs.

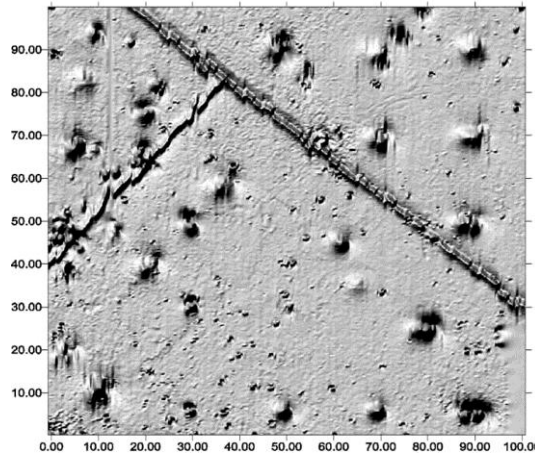
OPERATION

The G-858 MagMapper 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 Novatel Smart-V1™ GPS for mapping positions automatically. Position information may come from an external GPS, from regularly spaced fiducial marks input by the operator or both. At any time, the user may switch to "profile" mode to observe the last 5 data lines as stacked profiles.

Data is collected in up to 5 separate survey files and transferred via high speed RS-232 data link (or USB with converter) to a computer for further analysis and map generation. The full featured graphical data editing program MagMap2000 is provided to allow repositioning, realignment, GPS smoothing, data filtering and interpolation of the data. After editing, the data is formatted in either Surfer for Windows or Geosoft formats for further plotting and analysis.

SPEED AND EFFICIENCY

G-858 data acquisition offers either continuous (automatic) or discrete station recording. Data quality is uniformly high and lower costs are inherent for most projects due to the high sampling rate of the instrument in continuous mode. This allows the operator to survey an area at a fast pace, covering as much as 10 times more area in a given time period than other magnetometers.

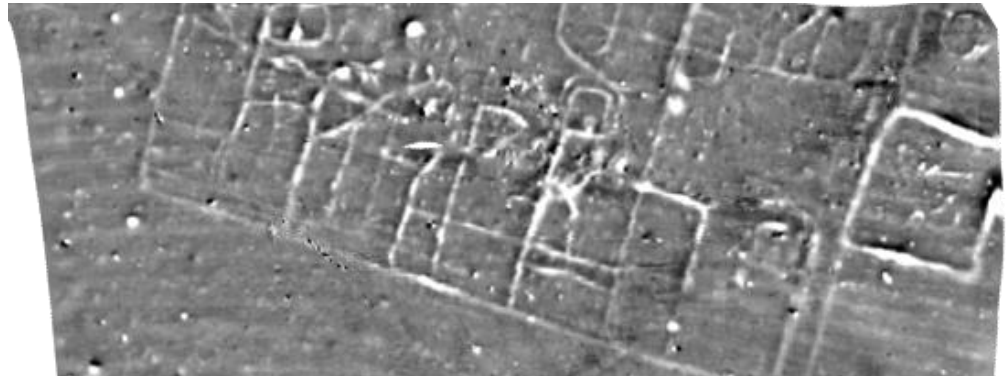


Stanford Metal Test Site and Archaeological Survey Maps

The map on the left is data taken at a magnetometer test site on Stanford University campus. Metallic objects of different material, size, shape and weight were buried throughout the 100 m x 100 m survey area at different depths. Magnetic features were chosen to simulate common environmental, engineering and UXO targets to be able to characterize anomaly shapes and magnitudes.

This survey was conducted using a single sensor G-858 cesium magnetometer held on an aluminum staff at waist height. Measurements were taken at 10 Hz at a normal walking pace with lines separated by 2 m.

Photo credit to Geometrics, Inc with special thanks to Stanford University for access to test site.



The map above is of a large Roman-era farm site in the English East Midlands, defined by ditch and pit fills and spreads of magnetic soil and situated on fine grade till deposits over mudstone.

Plotted black -3.5 nT, white +3.5 nT from data collected using three G-858 magnetometers as dual magnetometers, with sensors 0.3m above the surface on a ATV-pulled sledge and coupled to ArchaeoPhysica's multi-instrument acquisition system exploiting the real time RS232 data transfer from each magnetometer. Although the data is clear, subsequent excavation by archaeologists revealed only the bases of features which highlighted the potential of magnetic survey for mapping otherwise poorly preserved sites below arable fields.

Data courtesy of ArchaeoPhysica, with special thanks to Martin Roseveare for providing this image and information.

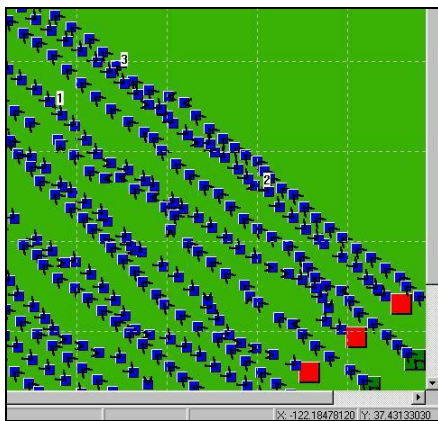
RELIABLE, RUGGED & LOW COST DESIGN

In addition to its speed and sensitivity, the G-858 is also reliable, economical, and easy to use. Electrical connectors on the G-858's sensor have been eliminated in order to increase reliability and reduce setup time. The G-858's internal firmware has been streamlined to include those features important for UXO, archaeological, environmental, utility, and mineral exploration. As for economy - Contact Geometrics for a quotation today! You'll be pleasantly surprised.

The concentration of magnetic minerals often varies with geological formation or chemical alteration and can indicate hydrocarbon bearing structures or economic mineral deposits. A primary application of the G-858 MagMapper™ is surveying for utility lines, UXO's, archaeological, environmental, and mineral projects. The G-858 is an excellent instrument for use in academic research and education and can also be used for local environmental studies such as mapping waste sites, locating buried metal drums and storage tanks buried pipelines, well-heads and other sizable ferrous structures.

DIGITAL QUALITY

The G-858 system produces raw data of the highest quality. Data is digitally recorded in compressed form in high capacity RAM and later transferred to a computer for permanent storage and processing. Sensitivity, resolution and recording rate of the cesium magnetometer are user selectable as well as mapped survey grid coordinates or GPS position data. *The system is ruggedly packaged for extreme field conditions.* Data storage is sufficient to record 8 hours of data at the maximum rate of 10 Hz. Battery life is approximately 8 hours powering both the Magnetometer and Novatel Smart-V1™ GPS.

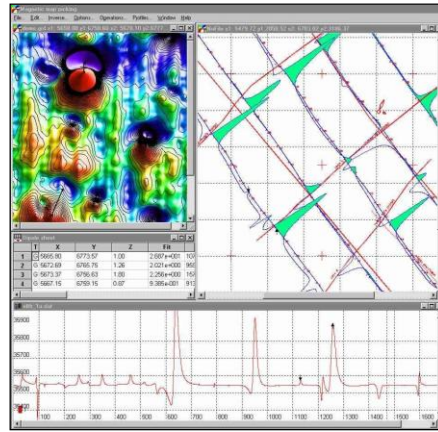


MagMap2000 GPS Track Plot

BASIC SOFTWARE

A basic software package MagMap2000 is supplied as an integral part of the G-858 system and provides:

- Transfer of the raw magnetometer, base station and other survey data to the client PC
- Standard corrections for position errors, transients, and time varying errors (diurnal)
- GPS track plot with adjustable smoothing and independent point editing
- Repositioning, linear interpolation and format of corrected data into X, Y, Z or Latitude/Longitude ASCII columnar values for use with Surfer for Windows, Geosoft or



MagPick software with multiple data processing windows

- other client supplied contouring programs.
- Conversion of GPS to UTM coordinate system using a selected Datum.

In addition to the standard MagMap2000 download and editing software, Geometrics is pleased to offer MagPick™, a full



G-858 and GPS Re-Usable Shipping Case with foam padding and transport wheels

featured potential field analysis package with excellent profile and contour map generation capability.

MagPick™ can perform source body inversion, reduction to the pole, upward continuation and a variety of other transforms and gradient extractions. We are also pleased to offer a Windows™ version of CSAZ™, a world total field map, field inclination and

sensor orientation program for performing surveys worldwide in any survey direction. MagMap2000, MagPick™ and CSAZ™ are available on our website for free download. Manuals for these programs are supplied as internal documents in PDF format.

NOVATEL SMART-V1™

Accurate data positions are as important as accurate magnetic field measurements and Geometrics is pleased to include the Novatel Smart-V1™ as an integral part of the G-858 system. This small light-weight, all-in-one GPS Antenna and electronics package is WAAS/EGNOS/MSAS ready for <1.5m positioning.



Novatel GPS Antenna/receiver

The Smart-V1™ systems is installed on Geometrics non-magnetic back pack and carefully screened and degaussed for minimum magnetic interference.

The Smart-V1™ is designed to be quickly assembled and installed on the backpack, with special mounting studs and a cable wiring harness for data and power distribution. The storage case allows the main components to be stored as a unit providing minimum assembly at the job site. The storage case is a rugged reusable fiberglass and aluminum travel case with handles and wheels for easy transport.

G-858 MagMapper™ SPECIFICATIONS

MAGNETOMETER / ELECTRONICS

Operating Principle: Self-oscillating split-beam Cesium Vapor (non-radioactive Cs₁₃₃) 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.

Sensitivity Statistics: 90% of all reading will fall within the following Peak-to-Peak envelopes:

- 0.03 nT at 0.2 sec cycle rate
- 0.02 nT at 0.5 sec cycle rate
- 0.01 nT at 1.0 sec cycle rate

Noise: < 0.008 nT/√Hz-RMS

Heading Error: < 1.5 nT including backpack and GPS

Gradient Tolerance: > 500 nT /inch (>20,000 nT/ meter)

Temperature Drift: < 0.05 nT per °C

Cycle Rate: Variable from 0.1 sec to 1 hr in 0.1 sec steps or by external trigger.

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:

1. Audio tone of field variation; pitch and volume adjustable. (Search mode)
2. Audio pulse each 1 second (Pace metronome).
3. Alarm for loss of signal, low battery or quality control setting exceeded.

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: 320 x 200 graphic liquid-crystal display, daylight visible with selectable outputs for:

1. Data display: Up to 5 stacked profiles, real time or review mode. Survey grid showing boundaries and position.
2. All system set-up functions, e.g., memory status, data transfer, sample time.
3. All Survey set-up functions, e.g., survey profile number and direction, station number or GPS data transfer protocol, line number.
4. Survey monitoring functions, e.g. total field, noise level, profile number x or x-y coordinates.

Internal Clock: Resolution of 0.1 sec, drift: < 1 sec/day

Battery Life:

1. 24 VDC rechargeable gel cell, 6 hrs for Mag w GPS. Magnetic effect less than 1.5 nT (γ) at 4 ft
2. Internal backup battery for clock and non-volatile RAM.

Software: Supplied as part of the basic system and including functions for:

Operating Software:

1. Survey Modes:
 - a. Search survey
 - b. Simple survey
 - c. Map survey, station or continuous
 - d. Base station
2. Data acquisition/display:
 - a. Acquire and store data and survey functions.
 - b. Display profiles, total field to 0.1 nT resolution, survey / map parameters and diagnostics.

Post-acquisition Software: MagMap2000 software for installation on customer's computer.

1. Data transfer and corrections:
 - a. Transfer of data from the field Magnetometer GPS, or Base station to PC.
 - b. Diurnal correction using base station data.
 - c. Processing the corrected data into ASCII values of X-Y-Z.
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: 2-3/8" dia., 6-3/4" long, 12 oz. (6cm x 15 cm, 340 grams)

Backpack: Backpack for Magnetometer, 9.5 lb (4.3 kg). Includes Nylon chest harness with all cables attached (1 kg to 1.3 kg)

Battery: 3" H, 5" W, 8" L, 3.5 lbs (8 cm x 13 cm x 20 cm, 1.6 kg) belt-mounted, attaches to harness.

Console: 6" W, 3" H, 11" L, 3.5 lbs. (15 cm x 8 cm x 28cm, 1.6 kg), attaches to battery belt and harness. 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: Survive a 3 ft drop onto a hard surface

WARRANTY: 1 YEAR on G-858 and sensor, one year on accessories

Novatel Smart V1™ Specs:

- Code and carrier phase tracking with 1Hz (optional 20 Hz) Position, velocity, time output or optional 20 Hz raw data output
- SBAS capable and designed for harsh environments
- RS-232, RS-422 compatible interface

Hardware Specs:

Size and Weight	115mm dia x 90mm height, Weight: 575 g
Input Voltage:	+9 to +28 VDC
Power Consumption:	1.8W (typical)
Com Ports:	1 RS-232 (optional 2 RS-232) at up to 19,200 baud
Operating Temperature:	-40°C to +75° C

GPS L1 Product Performance

Position Accuracy:	Single point L1	<5 m CEP
	WAAS L1	<1.5m CEP
Measurement Precision:	L1 C/A Code	18 cm RMS
	L1 Carrier Phase	1.5 mm RMS
Data Rates:	Measurements	1 Hz (optional 20 Hz)
	Position	1 Hz (optional 20 Hz)
Time to First Fix:	Cold Start	60 s
	Warm Start	45 s
	Hot Start	35 s
Signal Reacquisition:		0.5 s typical



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