Portable Cesium Magnetometer/Gradiometer

Model G-858

A Professional Magnetic Mapping System
For Minerals, Petroleum and Environmental/Search

- High Sensitivity — Easily Detect a Single Drum Buried 6 Meters
- Very Fast — Cover Two Acres per Hour at 2 Meter Line Spacing
- Immediate User Feedback — Display Earth’s Field Survey Grid, Position and 5 Stacked Survey Profiles
- Easy-to-use — Produce Hard Copy Maps at Base Site within Minutes, Uses Standard IBM-Compatible Computers, Printers/Plotters
- Options for Simultaneous Vertical or Horizontal Gradiometer, Differential GPS Positioning, Target Analysis Software

The G-858 MagMapper system comprises a belt-mounted display/logging console connected to a cesium sensor mounted on a hand-held counterbalanced staff. The console contains electronics to acquire magnetic field data with position and display it on an LCD screen for review and edit. The console stores high volumes of data in memory and transmits it at high speed to a processing computer for detailed analysis.
**Operation**

The MagMapper™ uses a graphical interface to make survey design and data acquisition quick and efficient. A simple survey mode uses line numbers and known "marks" to define the map parameters. Or the user may define the survey by setting up complete grid boundaries in "Map" Mode. During the survey, the operator can see the portion of the grid that has been completed, i.e. his position on the grid and the current data profile. Position information may come from an external GPS or from regularly spaced fiducial marks input by the operator. At any time, the user may switch to "profile" mode to observe the last 5 data lines as stacked profiles.

Data are collected in up to 5 separate survey files and transferred via high speed RS232 data link to a computer for further analysis and map generation. A full featured graphical data editing program is provided to allow repositioning, realignment and interpolation of the data. After editing, the data is formatted in either Surfer for Windows or Geosoft formats for gridding and contouring.

**SPEED AND EFFICIENCY**

G-858 data acquisition offers either continuous 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 walking pace, covering as much as 10 times more area in a given time period as previous magnetometers. Under certain conditions even lower costs may be achieved by the use of a gradiometer to widen the search radius.

For example, a horizontal transverse gradiometer (dual sensor array held orthogonally to the survey profile) provides twice the density of coverage on tightly spaced survey grids.

Alternatively, only half the number of profiles are required to obtain normal coverage at 50% savings in time.

Since standard and readily available computers, printers/ plotters, and tape storage/backup units are employed, Geometrics encourages clients to provide their own processing hardware. Upon request, Geometrics will provide a complete and fully integrated processing station at a nominal price.

**APPLICATIONS**

The G-858 MagMapper™ may be used to locate buried drums or underground storage tanks; to find pipelines, well-heads and other utilities; to search for unexploded ordnance, discarded weapons or magnetic mines; to locate graves or archeological sites and assist in forensic investigations; to study geological structure associated with oil bearing rock and faulting; to find mineral deposits and aid in the siting of mines and quarries; and in research and education.
DIGITAL QUALITY
The G-858 system produces raw data of the highest quality. Data are digitally recorded in compressed form in high capacity RAM and later transferred to the base site 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 and display parameters. The system is ruggedly packaged for extreme field conditions. Battery life is a minimum 6 hours for the Magnetometer and 3 hours for the Gradiometer with GPS logging.

BASIC SOFTWARE
A basic software package MagMap™ 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)
- Repositioning, linear interpolation and format of corrected data into X,Y,Z ASCII columnar values for use with Surfer for Windows, Geosoft or other client-supplied contouring programs.

Surfer for Windows™ by Golden Software can be employed to grid the data and to generate 2D and 3D color contour maps with full text annotations. See examples in this data sheet.

OPTIONAL SOFTWARE
Geometrics is proud to announce the introduction of a new tool in target identification and location. Our recently developed maximum likelihood dipole pattern matching software MagAID™ allows the user to generate estimations of object x-y position, size and depth using an interactive Windows™ graphical interface. Data is input from Surfer for Windows contour maps and output takes the form of informative icons placed in to the map as well as itemized target lists.

OPTIONAL GRADIOMETER AND GPS
An optional gradiometer configuration (horizontal or vertical) is available with the addition of a second cesium sensor and staff. The G-858 includes an RS232 port to interface to customer supplied GPS or other data source. Both gradiometer and GPS can enhance the precision of the survey and the definition and delineation of small magnetic anomalies. A selection of user definable field notes describing site conditions can annotate the stored data.
The G-858 MagMapper™ complete and ready for operation includes: electronic console with software for data acquisition, location, display and transfer; aluminum staff; cables to sensor(s), two battery packs, RS232 output cable with 9-pin connector; 110/220 AC charger; carrying harness; operator manual and reusable shipping container.

**G-858 MAGMAPPER SPECIFICATIONS**

**MAGNETOMETER/ELECTRONICS**
Operating Principle: Self-oscillating split-beam Cesium Vapor (non radioactive Cs133) with automatic hemisphere switching.

- Operating Range: 17,000 nT to 100,000 nT
- Sensitivity: 90% of all readings will fall within the following Peak-to-Peak envelopes:
  - 0.05 nT at 0.1 sec cycle rate
  - 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

- Information Bandwidth: < 0.004 nT / HzRMS
- Heading Error: < ± 1 nT
- 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: Nonvolatile RAM with capacity for 8 hrs of Magnetometer time, event marks, field notes, location, or 3 hrs of Gradiometer and GPS at maximum sample rates.

Audio Output:
1. Audio tone of earth's field variation, pitch and volume adjustable. (Search)
2. Audio pulse each 1 second (Pace metronome).
3. Alarm for loss of signal, low battery or Quality Control setting exceeded.

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, gradient (differential) to 0.1 nT, survey/map parameters and diagnostics.
  3. Alarm for loss of signal, low battery or Quality Control setting exceeded.

- MECHANICAL:
  - Sensor: 23/8" dia., 63/4" long, 12 ounces (6cm x 15 cm, 340 grams) Staff/Harness: Staff
  - 2 lb to 3 lb (1 kg to 1.3 kg) Battery: 3" H, 4.5" dia., 0.2 lbs (8 cm x 11 cm x 20 cm, 0.9 kg) Staff/Harness: Staff
  - 3.5 lbs (15 cm x 8 cm x 28 cm, 1.6 kg), attaches to harness.

- ENVIRONMENTAL:
  - Storage Temperature: -35°C to +60°C (-30°F to +140°F)
  - Water Tight: To 3 ft (0.9 m) depth
  - Shock: Drop 3 ft on a hard surface without damage

**OPTIONS**
- 1. Gradiometer, horizontal and/or vertical configuration
- 2. GPS navigation (real time differential with radio link to GPS base station or FM-transmitted RTCM codes)