

GEM Version 7.0 – The “Efficiency” Release

With the resurgence in mineral exploration coupled with continuing demands on time, geologists and geophysicists are seeking tools that will enable them to achieve greater efficiencies in both the field and office.

The new version 7.0 release of GEM’s magnetometers and gradiometers is designed to enhance efficiency in key areas, such as field work; data input and output, and preparation of data for advanced post-processing as required to deliver exploration products, such as models and maps.

Specific v7.0 capabilities include:

- Standard Line Format for Data Import
- GPS Triggered Readings
- Picket Marking / Annotation
- GPS Elevation for Enhanced Magnetic Data Modeling
- <1m Internal GPS Capability
- Enhanced Positioning Resolution for GPS Surveys
- USB-RS232 Adapter for Easy Data Transfer from Non RS232 PCs
- Programmable Export Format
- **GEM-VIS** QC / Basic Processing / Visualization Software Bundle

Additional Enhancements

- Improved Signal Processing for Magnetic Field Readings
- Multi-Sensor Capability
- Ergonomic Backpack Option (Effective for “extreme” geophysics in difficult terrains and made for everyday performance as well)
- All Terrain Vehicle Mode Option
- Non-Magnetic Towed Cart Option
- Support of Multiple GPS Engines

Upgrade Pathway and Free Diagnostic Check-Up

GEM v5.0 and v6.0 magnetometers and gradiometers owners can take advantage of key v7.0 features through an upgrade process. The upgrade includes a *free diagnostic check-up and evaluation of all major components*. An upgrade is a great way to acquire new features AND ensure that you continue to operate your system at its operational peak! Book your upgrade now as appointments will be filling up quickly!

Standard Line Format for Data Import

With the current generations of GEM systems, the field operator or geophysicist may be required to spend time editing the data to input line numbers.

One of the industry standard formats for geophysical data (Encom-, Geosoft-, and Intrepid-compatible) is the line-oriented format. Here, individual lines of data are marked by a simple line number (for example, Line 34) and blocks of data follow until the next line number is encountered, and the process repeats.

GEM has now implemented Standard Line Format for Data Import in its v7.0 series instruments to eliminate non-productive data manipulation tasks.

GPS Triggered Readings

The industry upturn has put pressure on the entire industry in terms of filling vacant openings, from drillers to geologists to line-cutters. Line-cutting issues, for example, pose significant difficulties as many of the industry workers have left the field and it is becoming more challenging to cut grids.

However, the availability of proven field-based magnetometer and gradiometer systems equipped with GPS, provides a key benefit for industry – the ability to perform surveys without necessarily laying in a full grid (a time-consuming process that requires dedicated resources and that increases survey costs significantly). The key to taking advantage of this benefit is to enable magnetic instrumentation to record data using GPS timing (i.e. automatically).

GEM has implemented this capability; meaning that customers can now perform a) line-oriented surveys without line cutting or b) “random-walk” surveys (i.e. that traverse an irregular pattern or acquire data “around” obstacles).

For line-oriented surveys, the operator or geophysicist first performs the survey. When data are downloaded, the user selects the specified station spacing and the system automatically outputs data with the correct GPS positioning. For irregular surveys, the data is output according to the position recorded at the time that each satellite pulse is received (typically, once a second).

Picket Marking / Annotation

One of the main roles of magnetic surveys is to provide positioning information that can be used to georeference magnetic maps with maps obtained from different sources, such as electromagnetic or other ground surveys.

GEM now provides a special Picket Marking function that enables the operator to mark a picket position in the field for future reference. This versatile capability also enables the user to mark the location of hazards, cultural objects (such as fences), or rivers, streams, etc. Another useful application is text marking of topographic highs and lows for target modeling purposes.

Lane Guidance

Lane guidance is a feature that enables users of GPS-configured systems to proceed in a survey with on-screen notification when the operator has exceeded the survey tolerance (i.e. deviation from line). Version 7.0 provides a larger arrow for guidance purposes which enables the operator to more tightly control survey “wander”.

Programmable Output

Often an instrument manufacturer’s format is fixed – creating challenges in post-processing data as records may require manipulation to convert them to a format suitable for today’s standard software packages.

GEM’s v7.0 solution is to implement Programmable Output. Customers have a choice of a default output format or selecting up to 10 data fields. Each field can, in turn, be allocated to a set of 10 pre-defined variables, including X, Y, Elev, Time / GPS Time Total Field1, Corrected Total Field, Grad, SQ (Signal Quality), Number of Satellites, Marker1 and Marker2.

Note: Marker fields relate to the v7.0 Picket Marking / Annotation capability.

USB-RS232 Adapter for Data Transfer

Today’s personal computers are frequently equipped with Universal Serial Bus ports. USB is a standard port for connecting external devices (such as magnetometers, etc.) to Windows and Macintosh computers.

To enable customers to take advantage of the USB ports now provided on many PCs, including laptops, GEM has implemented a standard USB cable for use with its systems. This cable can be purchased as an accessory for a nominal charge.

GPS Elevation for Enhanced Magnetic Data Modeling

As technologies advance, many end users of magnetic data are seeking to employ modeling routines for enhanced interpretation, integration of results, and risk reduction.

GEM has recognized this need through discussion with key customers and has integrated GPS elevation data as a standard input / output item in Version 7.0. This provides key data required by modeling routines and helps to ensure that magnetic modeling results reflect "true" geology and are not distorted through lack of elevation data.

Enhanced resolution for GPS surveys

GPS-based surveying is only as precise as the resolution to which the system can resolve distances. Previously, GEM's Universal Transverse Mercator (UTM) resolution was 1m; now it has been enhanced to 0.01m. This eliminates a previous scenario in which it was possible to have two or more readings occur at the "same" location. Customers can now resolve positioning data to their full two decimal precision (ex. 1.20 and 1.25). This very high resolution eliminates one source of error (i.e. GPS positioning) and ensures that data locations can be fully resolved for subsequent follow-up (i.e. drilling, excavation, etc.) as required.

GEM-VIS Quality Control / Visualization Software Bundle

GEM has added a software bundle provided through reknowned geophysical software developer, Encom Technology of Australia. This software package is a complement to GEM's GEMLinkW download software – taking over from GEMLinkW following PC based storage of data.

Users can quickly and easily import data into GEM-VIS and view data in 1D, 2D or 3D as required. Line annotation, posting and other functions are also provided. Valued at more than \$650 US, this software is provided on a self-support basis (i.e. GEM provides a manual but the software is straight-forward enough that it can be easily learned and then put to good use in the field or office).

A novel feature is that the software can be upgraded in future to Encom's Profile Analyst and the initial purchase price can be applied to this purchase. Note that GEM also continues to support products from other vendors such as Geosoft (Geophysics Core), Golden Software (Surfer 8) and Pico Envirotech (EMIGMA) so that GEM users have a complete set of software for performing all tasks from data acquisition to interpretation.

<1m Internal GPS Capability

GEM is the only major manufacturer to focus on integrating GPS electronics inside its magnetometers and gradiometers – a significant advantage for users in terms of cost, "clean" readings (i.e. minimal noise in contrast to some externally mounted GPS systems), and complexity.

With Version 7.0, GEM now supports an internal board with specifications to <1m resolution via WAAS and EGNOS. And for customers who are operating outside of these systems, GEM also designed an external GPS for measurement using OmniStar or Thales networks.

OTHER ENHANCEMENTS

GEM's Research and Development team is continuously developing new capabilities that will enhance data quality and survey effectiveness. Some of these include:

- **Improved Signal Processing for Magnetic Field Readings**

This capability is based on a) de-spiking (for example, when a user brushes against a tree branch, the magnetometer will automatically handle this type of artificial noise), and on b) optimized measurement period. Here, GEM engineers have extended the measurement period to maximize signal without adding noise.

- **Multi-Sensor Capability**

Both the Overhauser and K-Mag (optically pumped Potassium) series of magnetometers are capable of handling up to four channels of magnetometer readings. This is effective for productivity (i.e. configuration of horizontal sensor installations) as well as for gradient-type readings between sensors arrayed in customer-defined configurations.

- **All Terrain Vehicle Mode (Option)**

This special mode was designed for combined magnetic and electromagnetic readings. In one example, magnetics and VLF sensors were configured in ATV mode and mounted on a fixed platform for towing behind an All Terrain Vehicle.

- **Non-Magnetic Towed Cart (Option)**

GEM now offers a non-magnetic towed cart for high productivity or multi-sensor surveys. The cart is made of plastic and facilitates the mounting of sensors and console as required.

- **Ergonomic Backpack**

For geophysical operators facing the daily challenge of performing high efficiency surveys in sometimes formidable field conditions, it is essential that systems are designed around ergonomic principles. GEM has already incorporated this philosophy in systems such as the industry-leading GSM-19 Overhauser instrument – an extremely light, low-power consuming and robust instrument.

Now, a new ergonomic backpack from a major supplier of outdoor equipment has been added to GEM's line of accessories. The main benefit is that operators can function more efficiently and acquire more data in a typical day than with heavier alternatives from other suppliers. This capability is especially valuable in extreme temperature conditions; in terrain that is difficult to traverse; or high productivity surveys.

- **Support of Multiple GPS Systems**

GEM remains a leader in implementation of GPS systems for its high performance line of Overhauser, K-Mag (Potassium) and Proton Precession magnetometers. This position has been enhanced through additional support of more GPS systems from major suppliers. For more information, contact GEM or one of its agents / representatives.

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