

# Proton Precession

Magnetometer GSM-19T / Gradiometer GSM-19TG  
Walking Magnetometer GSM-19TW / Gradiometer GSM-19TGW

**GEM**  
SYSTEMS  
ADVANCED MAGNETOMETERS

Our World is **Magnetic**.

The new v7.0 system is the industry's latest innovation in proton precession magnetometers with many new technologies that deliver significant benefits for earth science applications

Key technologies include:

Data export in standard XYZ (i.e. line-oriented) format for easy use in standard commercial software programs

Programmable export format for full control over output

GPS elevation values provide input for geophysical modeling

Enhanced GPS positioning resolution (built-in systems)

Standard GPS Option B:

- 1m SBAS (WAAS, EGNOS, MSAS)

High resolution GPS Option D:

- 0.6m SBAS (WAAS, EGNOS, MSAS)
- 0.6m CDGPS (Canada, USA, Mexico)
- 0.6m OmniStar (VBS2 subscription)

Multi-sensor capability and VLF-EM Option for advanced surveys to resolve target geometry

Picket and line marking / annotation for capturing related surveying information on-the-go

**And all of these technologies come complete with the most attractive savings and warranty in the business!**



GSM-19TGW Proton Precession console configured with backpack, additional sensor for gradiometer (simultaneous) readings, built-in GPS and VLF EM system

For earth science survey groups who require a complete solution for end-to-end magnetic data acquisition at an affordable price, the GSM-19T proton precession family is the proven choice - for the most challenging environments.

From robust field units to efficient survey modes and fast data downloading, GSM-19T is designed to deliver the maximum value in a proton precession system.

The GSM-19T also provides numerous technologies that differentiate it from other systems. For example, the proton precession system with **integrated GPS** (optional) for high-sensitivity, accurately-positioned ground surveys.

With v7.0 upgrades, GEM's proton precession system leads in sensitivity, memory, base station technology and other areas.

## Designed From the Ground Up

Leading the list of advances is GEM's rover unit which features a 25% increase in **sensitivity** - reflecting new processing algorithms and implementation of the latest RISC microprocessors.

In addition, v7.0 **standard memory** is 32 Mbytes (expandable in 32 Mb increments), which translates into 1,465,623 readings of line / station data or more than 5,373,951 readings for base station units.

The new memory capacity sets an industry standard, but more importantly, it means that operators can now handle even the largest surveys with ease.

Another important innovation is GEM's unique **programmable base station** which you can enable via either a field unit or a Personal Computer as follows:

Daily scheduling (define working hours and minutes each day). This mode provides economy of memory and battery usage on a daily basis.

Flexible scheduling (up to 30 on / off periods). Simply define a series of intervals and the base station will turn itself on as you need. This mode provides the greatest flexibility for longer surveys where leaving your base station running increases efficiency.

Immediate start. This mode is the traditional mode of starting a base station unit and leaving it until the operator can return to turn off the unit.

## Survey Planning and Efficiency

One of the traditional challenges in ground surveys is ensuring that surveys are designed and implemented effectively.

With the v7.0 proton precession system, GEM addresses this challenge through



standard GEM capabilities: the Walking Mag option that enables the operator to sample while walking. Having nearly continuous data on survey lines also helps to increase the accuracy of interpretations.

Another innovation is GPS way point **pre-programming**. You can define a complete survey in the office on your PC and download this information directly to a rover unit via RS-232. The operator performs the survey using the points as survey guide with a resulting decrease in errors and more rapid survey completion.

### Survey Operations

The GSM-19T helps the operator on a daily basis while performing surveys. A key feature is the easy-to-read LCD data display in graphical (or text) format with a signal quality indicator to determine when readings need to be repeated.

GEM's proton precession unit is very tolerant to gradients and provides a warning indicator: the operator can monitor data quality continuously. Other features include easy-to-use line and station incrementing together with the end-of-line indicators.

### Fast Data Transfer

Another traditional area in which time is lost in surveys is in data transfer. In v7.0, GEM addressed this in several ways:

Data download is tripled to 115 KBaud (fastest rate possible with RS-232).

PC-based data reduction is possible using an upgraded version of GEMLinkW, GEM's proprietary data transfer software.

### GPS and Other Software

GEM Systems recently became the only manufacturer to provide a fully integrated GPS option for its line of proton precession products. Along with metre to sub-metre positioning options, the new processing functionality enables users to take advantage of the benefits of GPS.

Some of the capabilities include:

Preprogramming of way points. Post-processing of GPS data. GEM's DGPS option enables transfer of GPS data for post-processing and merging via 3rd party software.

Precise time synchronization of field and base station units. This capability is particularly important for working in noisy magnetic conditions and provides the highest accuracy possible.

In addition to its own software, GEM is also pleased to offer a variety of data analysis and processing software from 3rd party developers.

### Ongoing Maintenance and Support

As a potential user of a GSM-19T system - the industry's end-to-end solution - you should also know that we stand by our technologies, products and services.

With 30 years of success and new innovations in magnetics plus Internet-based upgrades that keep your system up-to-date and ongoing support, GEM offers the best solution in proton precession units today.

## Specifications

### Performance

Sensitivity: 0.15 nT @ 1 reading per sec.  
0.05 nT @ 1 reading every 4 sec.  
Resolution: 0.01 nT  
Absolute Accuracy: +/- 0.2 nT @ 1 Hz  
Dynamic Range: 20,000 to 120,000 nT  
Gradient Tolerance: over 7000 nT/m  
Samples at: 60+, 5, 4, 3, 2, 1, 0.5 sec  
Operating Temperature: -40C to +50C

### Operating Modes

Manual: coordinates, time, date and reading stored automatically at minimum 3 sec. interval  
Base Station: time, date and reading stored at 3 to 60 second intervals  
Remote Control: optional remote control using RS-232 interface  
Input / Output: RS-232 or analog (optional) output using 6-pin weatherproof connector

### Storage - 32 MB (# of Readings)

Mobile: 1,465,623  
Base Station: 5,373,951  
Gradiometer: 1,240,142  
Walking Mag: 2,686,975

### Dimensions

Console: 223 x 69 x 240 mm  
Sensor: 170 x 71mm diameter cylinder

### Weights

Console: 2.1 kg  
Sensor and Staff Assembly: 2.2 kg

### Standard Components

GSM-19T console, GEMLinkW software, batteries, harness, charger, sensor with cable, RS-232 cable and USB adapter, staff, instruction manual and shipping case.

### Optional VLF

Frequency Range: Up to 3 stations between 15 to 30.0 kHz  
Parameters: Vertical in-phase and out-of-phase components as % of total field. 2 relative components of the horizontal field.  
Resolution: 0.1% of total field



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