

INSTRUMENT SPECIFICATIONS

MAGNETOMETER / GRADIOMETER

Resolution:	0.01nT (gamma), magnetic field and gradient.
Accuracy:	0.2nT over operating range.
Range:	20,000 to 120,000nT.
Gradient Tolerance:	Over 10, 000nT/m
Operating Interval:	3 seconds minimum, faster optional. Readings initiated from keyboard, external trigger, or carriage return via RS-232C.
Input / Output:	6 pin weatherproof connector, RS-232C, and (optional) analog output.
Power Requirements:	12V, 200mA peak (during polarization), 30mA standby. 300mA peak in gradiometer mode.
Power Source:	Internal 12V, 2.6Ah sealed lead-acid battery standard, others optional. An External 12V power source can also be used.
Battery Charger:	Input: 110 VAC, 60Hz. Optional 110 / 220 VAC, 50 / 60Hz. Output: dual level charging.
Operating Ranges:	Temperature: - 40°C to +60°C. Battery Voltage: 10.0V minimum to 15V maximum . Humidity: up to 90% relative, non condensing .
Storage Temperature:	-50°C to +65°C.
Display:	LCD: 240 X 64 pixels, OR 8 X 30 characters. Built in heater for operation below -20°C.
Dimensions:	Console: 223 x 69 x 240mm. Sensor Staff: 4 x 450mm sections. Sensor: 170 x 71mm dia. Weight: console 2.1kg, Staff 0.9kg, Sensors 1.1kg each.
VLF	
Frequency Range:	15 - 30.0 kHz plus 57.9 kHz (Alaskan station)
Parameters Measured:	Vertical in-phase and out-of-phase components as percentage of total field. 2 relative components of horizontal field. Absolute amplitude of total field.
Resolution:	0.1%.
Number of Stations:	Up to 3 at a time.
Storage:	Automatic with: time, coordinates, magnetic field / gradient, slope, EM field, frequency, in- and out-of-phase vertical, and both horizontal components for each selected station.
Terrain Slope Range:	0° - 90° (entered manually).
Sensor Dimensions:	140 x 150 x 90 mm. (5.5 x 6 x 3 inches).
Sensor Weight:	1.0 kg (2.2 lb).

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APPENDIX G GSM-19T MAGNETOMETER/GRADIOMETER

THEORETICAL DESCRIPTION

Introduction

The GSM-19T is a portable standard proton magnetometer/gradiometer designed for handheld or base station use for geophysical, geotechnical, or archaeological exploration, long term magnetic field monitoring at Magnetic Observatories, volcanological and seismic research, etc. The GSM-19T is a secondary standard for measurement of the Earth's magnetic field, having 0.2nT resolution, and 1nT absolute accuracy over its full temperature range.

The GSM-19T is a microprocessor based instrument with storing capabilities. Large memory storage is available (up to 2Mbytes). Synchronized operation between hand held and base station units is possible, and the corrections for diurnal variations of magnetic field are done automatically. The results of measurement are made available in serial form (RS-232-C interface) for collection by data acquisition systems, terminals or computers. Both on-line and post-operation transfer are possible.

The measurement of two magnetic fields for determination of gradient is done concurrently with strict control of measuring intervals. The result is a high quality gradient reading, independent of diurnal variations of magnetic field.

Optionally the addition of a VLF sensor for combined magnetometer / gradiometer-VLF measurement is available.

Magnetic Field Measurement

The magnetic field measuring process consist of the following steps:

- a) Polarization: A strong DC current is passed through the sensor creating polarization of a proton-rich fluid in the sensor.
- b) Pause: The pause allows the electrical transients to die off, leaving a slowly decaying proton precession signal above the noise level.
- c) Counting: The proton precession frequency is measured and converted into magnetic field units.
- d) Storage: The results are stored in memory together with date, time and coordinates of measurement. In base station mode, only the time and total field are stored.