



## GEM-5 ARRAY

The GEM 5 is a vehicle-towed or vehicle-mounted electromagnetic induction (EMI) gradiometer array, which is capable of rapidly acquiring survey data with high spatial density. The system was developed mainly for the purpose of detecting UXO for peace-time environmental cleanup tasks, but is also capable of detecting and characterizing landmines and IEDs in the battlefield environment or buried utility lines in urban environments.

The GEM-5 system includes a realtime, built-in, data display that shows ground images. The display includes automated target detection on a realtime screen. The system is configured with dual GPS units to provide target location with decimeter accuracy . It is a digital, Windows-based system that can acquire and merge data from other detection sensors on the same platform. The sensor includes standard serial communication lines (e.g., RS232, RS485, etc.) for other detectors and devices.

The GEM-5 sensor consist of a central transmitter coil with two identical receiver coils above and below. The difference between the two receiver coils constitutes the signal. The gradiometer sensor has the following advantages:

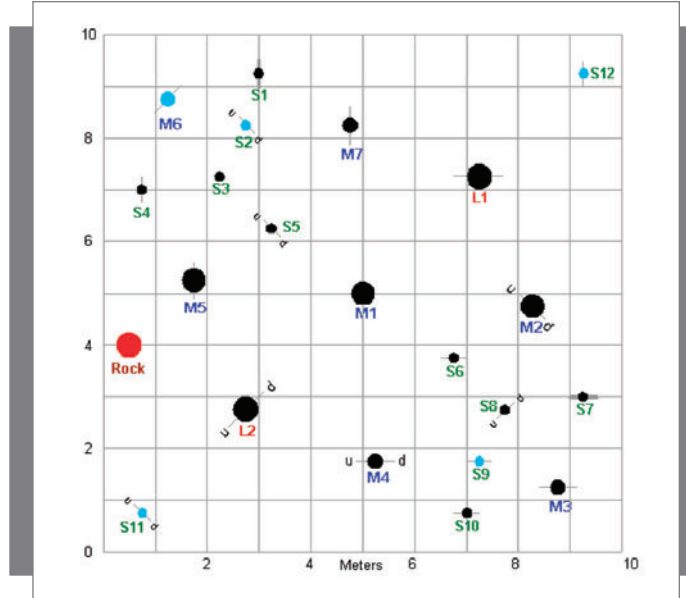
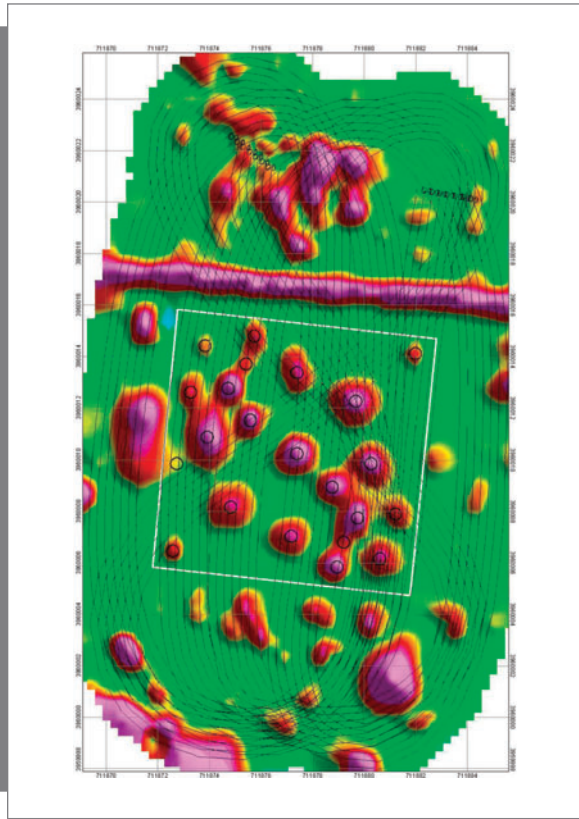
- > Broadband operation, typically 10-12 frequencies between 90 Hz – 96kHz
- > Ability to work as an array in which all sensors can operate simultaneously,
- > Immunity to noise induced by sensor motion,
- > Immunity to ambient environmental EM noise, and
- > Increased signal-to-noise ratio (SNR) owing to improvements in noise immunity

### GEM-5 Array Specifications

Swath	210 cm (7 ft)
Dimensions	30 cm x 50 cm x 210 cm
Coils configuration	Coaxial
Transmitter current	20 amp RMS max
Transmitter moment	180 Am <sup>2</sup> at 270 Hz
Power supply	24 VDC
Frequency range	90 Hz to 96 kHz
No. of frequencies Programmable	10-12
Sampling rate	30 Hz



# GEM-5 ARRAY (CONT'D)



An example Q-sum data obtained by painting the screen over the Geophex UXO Test Site, a 10 m x 10 m area, indicated by the white square boundaries. The ground truth shown on the right shows a total of 20 seeded targets of various metal pipes and one magnetic rock (red circle to the left). The seven parallel lines indicate the ground track of the GEM-5 array having seven receiver channels; the swath is about 2-m wide.



Example data obtained along streets in Raleigh, NC, superimposed upon an aerial photograph of the area. The survey was undertaken to detect all utility lines (water, sewer, powerline, telephone and fiber optic cables) buried under the road. Faint black lines indicate the ground track of the array.



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