GEM-5B Array

The GEM-5B is a larger version of the GEM-5 Array providing a higher transmitter moment for deeply buried targets. Vehicletowed as shown below, the sensor may be used for geologic mapping, dam and levee inspection, as well as for detecting/ characterizing manmade underground structures like clandestine tunnels. It can also passively detect loaded power lines by measuring the background EM noise that may emanate from the structures.

Its operational features including the data display mode are basically the same as the smaller GEM-5 Array. The array measures inphase and quadrature responses at 8-12 programmable frequencies. From these, one can derive apparent conductivity at each frequency and magnetic susceptibility at the lowest frequency. The sensor can also measure passive emissions at power line frequency and its harmonics.

The trailer-mounted GEM-5B Array consists of a central transmitter coil with two identical receiver coils above and below. The difference between the two receiver coils constitutes the signal with the following advantages:

- Broadband operation, typically 10-12 frequencies between 90Hz – 96kHz;
- Seven equally-spaced receiver channels operating simultaneously;
- Immunity to noise induced by sensor motion;
- Immunity to near-field cultural EM and far-field geomagnetic noise;
- Increased signal-to-noise ratio (SNR) owing to improvements in noise immunity.

GEM-5B Array Specifications

Swath	3 m (10 ft)
Dimensions	180 cm x 240 cm x 200 cm (H)
Coils configuration	Coaxial
Transmitter current	45 amp RMS max
Transmitter moment	Approx. 2,000 Am^2 at 270 Hz
Power supply	24 VDC
Frequency range	90 Hz to 96 kHz
No. of frequencies	Programmable Typically 10-12
Sampling rate	25 Hz or 30 Hz

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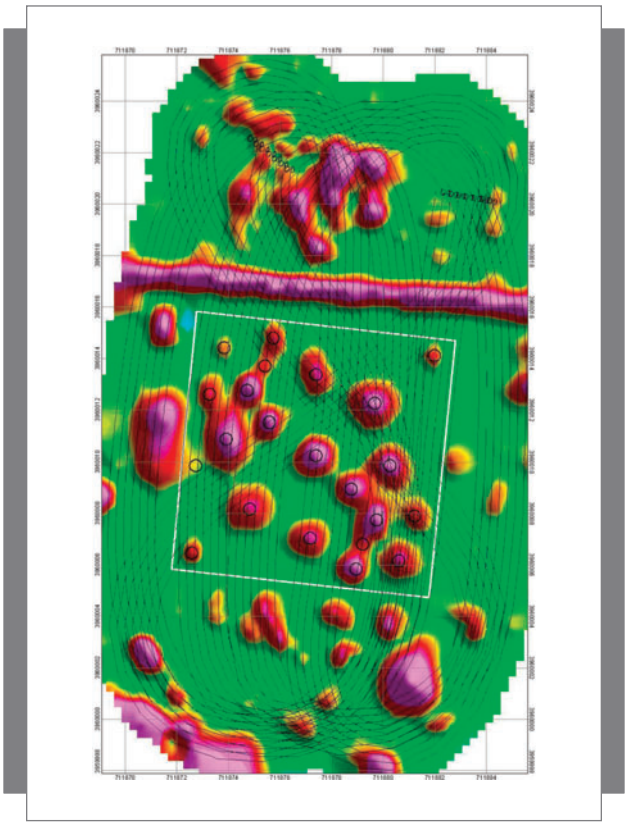
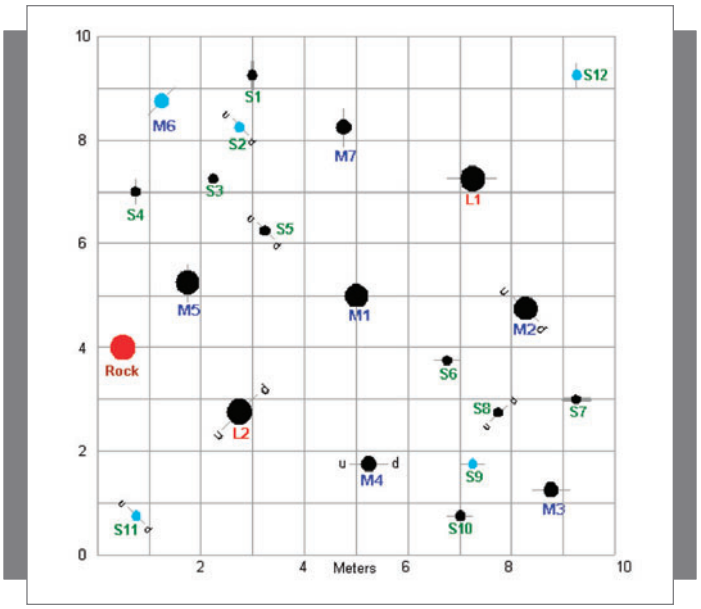
GEM-5B ARRAY (CONT'D)





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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