AIRBORNE EM AND IP BELOW 10 Hz

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Most good time domain AEM systems use a base frequency at or above 25 Hz. This keynote describes progress towards the development of viable extremely low base frequency 3 Hz base frequency airborne system. Suspended vector magnetic field sensors, whether B or dB/dt, rotate in the earth's magnetic field and pick up large unwanted signals, often called "motion noise". It is this low-frequency noise that has in the past constrained commercial AEM systems to operate at base frequencies of 25 Hz or more. There are four conceptual mechanisms to improve signal/noise ratios in an AEM system: increase transmitter dipole moment by several orders of magnitude, engineer more stable suspension systems, make rotation measurements and correct the measured B field response, or devise new waveforms and processing strategies that better separate and reduce noise levels.

Power supplies and weight constraints are close to their limit in appropriate aircraft, implying that increasing dipole moments by an order of magnitude or two is impossible using current technology. Most research effort by contractors has addressed suspension systems, with limited successes reported to date. The BIPTEM (B field IP; Time domain EM) system currently under development in Australia has used a combination of rotation rate sensing, waveform optimization and an improved suspension to collect useful inductive magnetometer B and dB/dt field data at extremely low base frequencies, and been successfully tested over known IP targets.