

Standard Operating Procedure: Geonics EM31-MK2 Ground Conductivity Meter Servicing & Calibration

Sensor System: Geonics EM31-MK2 Electromagnetic Induction Meter | Doc Ref: SOP-GEONICS-EM31-2026

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1. Purpose & Scope

This Standard Operating Procedure (SOP) defines field assembly, battery testing, inphase and quadrature zeroing, and sensitivity checks for the Geonics EM31-MK2 ground conductivity meter. The EM31 uses electromagnetic induction (EMI) across a 3.7-meter inter-coil separation operating at 9.8 kHz to measure apparent soil conductivity (σ_{EC_a}) down to 6 meters depth without ground contact.

2. Equipment & Reference Standards

- **Geonics EM31-MK2 Console & Boom:** 3.7 m dual-section aluminum boom with internal transmitter/receiver coils.
- **Power Supply:** 8 C-cell alkaline batteries (1.5 V DC nominal).
- **Digital Data Logger:** Allegro CX / Field Data Logger running EM31 logging software.
- **Non-Metallic Calibration Stand:** 1.5 m tall wooden/fiberglass elevated support structure.

3. Site Selection & Safety Preparation

Select a quiet calibration area clear of metal fences, power lines, buried pipes, and reinforced concrete. Technicians must remove all personal metallic items (rings, belt buckles, watches, keys) prior to zeroing.

4. Calibration & Zeroing Procedure

1. **Battery & Warm-Up:** Set mode switch to BAT. Verify display reads >1000 (replace C-cells if <720). Allow 5-minute thermal stabilization.
2. **Initial Inphase (I/P) Nulling:** Set mode to I/P . Elevate EM31 onto 1.5 m non-metallic stand in Horizontal Dipole mode. Adjust I/P Zero control until meter reads $0.00 \pm 0.50\text{ ppt}$.
3. **Quadrature (Q/P) Conductivity Zeroing ($V=2H$ Rule):** Set mode to Q/P . Adjust Q/P Zero control to 10.0 mS/m ($H=10$). Rotate instrument to Vertical Dipole mode (V). Confirm $V = 2H = 20.0\text{ mS/m}$. If $V \neq 2H$, compute correction $C = V - 2H$, adjust H by C , and verify $V = 2H$.
4. **Sensitivity Check:** In Horizontal Dipole mode at 1.5 m, rotate Q/P knob 1 full turn CW; confirm meter deflection matches factory sensitivity scale ($20\text{--}26\text{ mS/m}$). Return knob to calibrated baseline.
5. **Cross-Fleet Check:** Cross-check instrument at designated uniform field reference station to verify fleet measurement agreement.

5. Data Quality Control

Verify Q/P zero stability every 2 hours during continuous surveying. Record baseline values and battery levels in site logs.

FIELD SPECIALIST APPROVAL	DOCUMENT CONTROL STAMP
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