PHOENIX GEOPHYSICS

LoTEM Loop Calibration

Version 1.0 April 2007

Printed in Canada on water resistant Xerox® Polyester paper.

This User Guide was created in Adobe FrameMaker 7.0.
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Calibrating LoTEM loop sensors

Calibration of a LoTEM loop uses an excitation loop as the signal source, similar to calibrating an MT air loop. (See Fig. 1-2 on page 2.)

To ensure correct phase relationships, polarity must be correct. Follow the connection instructions carefully.

The LoTEM loop must be calibrated as channel H_x. The H_z channel is used for the excitation loop, and H_y is not used.

Tools and equipment required:

- sensor to be calibrated and a cable for it
- 3-way adapter cable
- air-loop "CAL Box" (See Fig. 1-1.)
- calibrated V8
- battery and cable
- GPS antenna and cable
- a ground electrode and cable
- 202m of #12–#18 gauge copper wire for the excitation loop
- a length of bare wire to short-circuit the E-channel terminals
- measuring tape (≥50m)
- marking stakes and hammer
- a compass and tripod

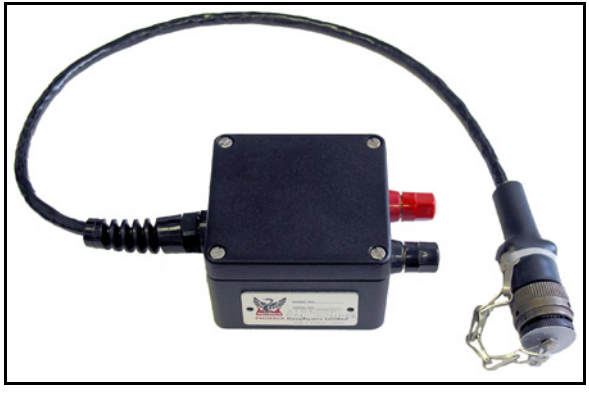

Fig. 1-1: Air-loop CAL Box.

To lay out the excitation loop:

1. Review Figure 1-2.
2. Prepare the wire for the excitation loop by marking it with coloured tape at 1m, 26m, 76m, 126m, 176m, and 201m. The tape will mark the corners and the ends of the loop. Wind the wire onto a portable spool.
3. Set up a compass on a tripod where you plan the centre of the loop.
4. Sight from the compass toward one of the planned corners and have an assistant place stakes to mark 15.9m and 35.35m. These stakes mark one corner of the LoTEM loop and one corner of the excitation loop.
5. Repeat step 4, staking the remaining corners of the two loops by sighting at 90° increments and measuring 15.9m and 35.35m.
6. Starting at the midpoint between two corners, walk the perimeter of the excitation loop, unwinding the copper wire from the portable spool as you go. Align the tape markings at the corners to verify your compass sightings and measurements.

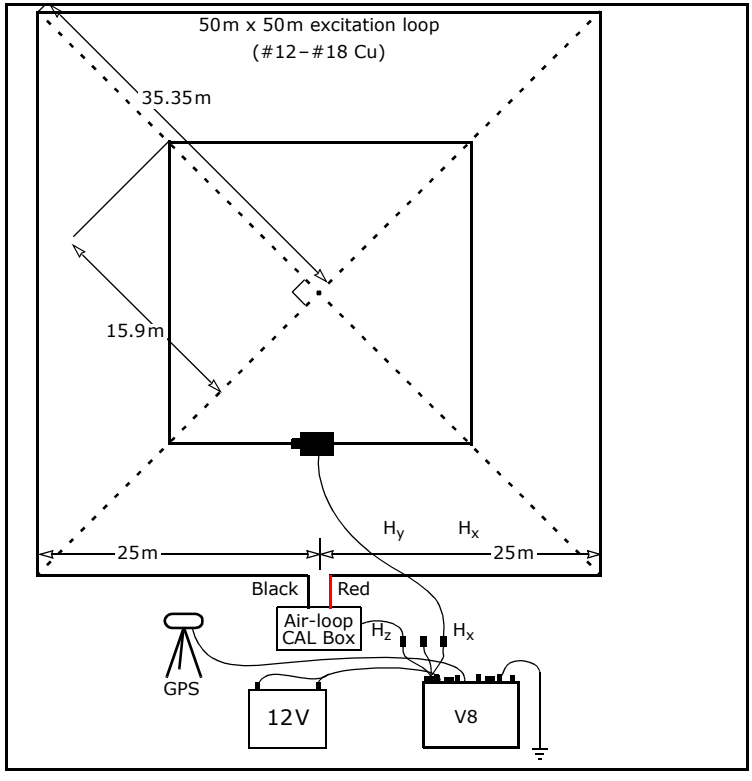

Fig. 1-2: Air-loop sensor calibration.

7. Connect the excitation loop ends to the Air-loop CAL Box, *with the red terminal connecting to the left end of the loop*, when viewed from within the loop.
8. Arrange the 1m excess cable at each end of the loop in parallel, at right angles to the loop side, as shown in Figure 1-2.
9. Place the V8 and remaining equipment near the Air-loop CAL box.

To lay out the LoTEM loop:

1. Start at the midpoint between two stakes of the 15.9m measurements closest to the V8, and place the connector box of the LoTEM loop on the ground with the 8-pin connector facing the V8.
2. Walk counterclockwise around the perimeter of the sensor loop position, unwinding the loop cable as you go.
3. When you complete the perimeter, connect the free end of the loop to the 50-pin terminal on the connector box.
4. Verify that:
   - The LoTEM loop sides are parallel to the excitation loop sides.
   - The LoTEM loop forms a perfect square. (Opposite corners are 31.8m apart.).
   - The 50-pin terminal on the LoTEM loop connector box is *toward the right* when viewed from within the sensor loop.
   - The red terminal on the Air-loop CAL box connects *to the left* side of the excitation loop when viewed from within the loop.

To connect the V8:

1. Set up the V8 with a battery, ground electrode, and GPS antenna.
2. On a Layout Sheet, note the serial number of the sensor loop and connect the cable to the V8 as H_x.
3. Connect the Air-loop CAL Box to the V8 as H_z.
4. Run a bare wire from the GND terminal to all four E-channel terminals to short-circuit them.
5. Complete the Layout Sheet.

6. Power on the V8.

To set calibration parameters for the LoTEM loop:

1. On the V8, select **Calibration** from the main window.
2. From the **Setup** menu, select either **50 Hz** or **60 Hz**, according to the local power grid frequency.
3. From the **Help** menu, choose **Parameter Table**.
4. In the **Lookup entry by code** box, type **CCMN** and press Enter twice to open the **Edit Parameter Table Entry** dialog box.
5. Change the value of **CCMN** to 0.0 and press Enter twice.
6. Using the DOWN arrow to scroll, locate each of the following parameters and similarly change their values as follows:
   - **CCMX**: 0
   - **HAMP**: -0.235
   - **HNOM**: 50
   - **CPHC**: 0.0
7. Choose **Done** to return to the **Calibration** window.

To complete the setup:

1. From the **Calibration** menu, choose **Coil Calibration**.

   The **Coil Calibration** dialog box appears.

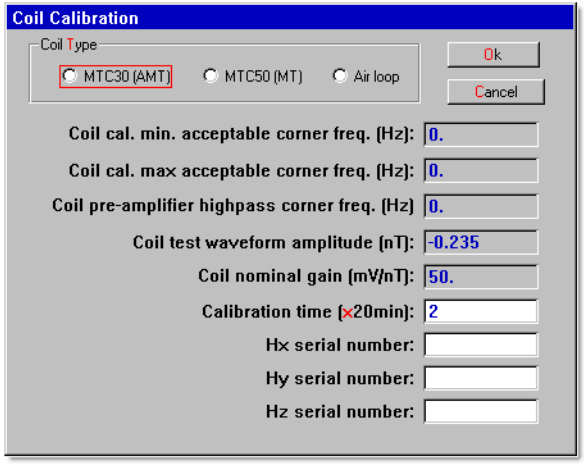

Fig. 1-3: The **Coil Calibration** dialog box.

2. *Do not select a Coil Type!* Doing so will change the parameter values that you set in the previous procedure.
3. In the **Coil Calibration time** box, type a value of at least 2. If you know that the area is electrically noisy, set this parameter to a higher number to extend the calibration time.
4. In the **H_x serial number** text box, type **TDEM** followed by the 4-digit serial number of the sensor. Leave the text boxes blank for the other two channels.
5. To start the calibration, choose **OK**; to cancel the calibration, choose **Cancel**.

   Calibration begins as soon as you select **OK**. The status bar displays **Coil No Cal**, then **Coil In Progress**.
6. Wait until the status bar displays **Coil Cal OK** before closing the **Calibration** main window. (Sensor calibration may take a few minutes longer than the time set in the **Coil Calibration** dialog box.)