

Technical Bulletin #19

To: Coulometrics Support Personnel
From: Engineering Dept.
Date: revised 08-16-04
Subject: Electronic Evaluation of a CM5011/CM5012 Carbon Coulometer

Procedure for checking the Electronics of a Carbon Coulometer

The following is a procedure to evaluate the electronics of a Carbon Coulometer. It requires the unit to be plugged in and turned on with no cell in the instrument. The Coulometer should be on for at least 10 minutes prior to testing to allow the electronics to stabilize.

1. Perform the Maximum and Minimum % T test:

a. Without a cell in the Coulometer, turn the % T knob fully clockwise and record the %T obtained. The % T should be greater than 100 %. The factory setting is 110 %. Please record the reading.

Maximum % T _____

b. Rotate the %T knob fully counter clockwise and record the minimum %T obtained. The minimum %T is typically 12 % for a model 5012 Coulometer. Please record the reading.

Minimum %T _____

2. Perform the Electronic Calibration Check :

This procedure is in the Coulometer Operation manual. It is repeated here for convenience.

a. Set the coulometer as follows:

Mode Selector switch to Mode 15 (or CALIB).

Set the Run/Latch switch to latch.

Set the Count/Time switch to count.

Set the Timeset switch to 10.0 (In mode 15 this represents 10 seconds).

b. If the instrument is a model 5012, set the cell current switch to calibrate. If the instrument is a model 5011, install a shorting strap in the cell terminal and turn on the cell current.

d. Press the reset switch and let the electronics stabilize for at least 10 minutes.

e. Rotate the %T knob fully clockwise until 200 mA is displayed on the current display.

f. Every ten seconds the audible alarm will sound and the display should freeze at 100,000 +/- 500 counts. Record the results of 10 readings below.

g.

- 2
1. _____ 2. _____ 3. _____ 4. _____ 5. _____
6. _____ 7. _____ 8. _____ 9. _____ 10. _____

3. 1 Minute Calibration checks on Modes 1 - 6:

- a. If the instrument is a model 5012, set the cell current switch to calibrate. If the instrument is a model 5011, then install a shorting strap in the cell terminal and turn on the cell current.
- b. Adjust the %T knob so cell current is at the maximum 200mA.
- c. Set the coulometer as follows:

Set the Run/Latch switch to latch.
 Set the Count/Time switch to count.
 Set the Timeset switch to 1.0

- d. Set the mode to 1 for your first reading and press the reset switch. Record your reading and then select your next mode, again pressing the reset switch. The modes and expected readings for each are as follows:

<u>Mode</u>	<u>Expected reading</u>	<u>Your reading</u>
1 (ug / C - to 0.1)	1493.8	_____
2 (ug / C - to 0.01)	1493.8	_____
3 (mg C / L)	7469.0	_____
4 (ug CO ₂)	5473.5	_____
5 (ug CO ₃)	7463.1	_____
6 (ug O)	1989.8	_____

4. Evaluate the performance of the Current Settings:

- a. If the instrument is a model 5012, set the cell current switch to calibrate. If the instrument is a model 5011, then install a shorting strap in the cell terminal and turn on the cell current.
- b. Open (model 5011) or remove (model 5012) the left side panel of the Coulometer (when facing the front of the coulometer).
- c. Locate the CM110-019 main Coulometer board. This is the top board of the two circuit boards located in the Coulometer on the left side.
- d. Locate the toggle switch mounted on the main (top) circuit board. The normal position for this switch is in the center marked RUN. Change this switch to the position marked LO (to the left / back of the coulometer). This is the low current setting. See attached pictorial for location of this switch.
- e. Observe the cell current display on the front of the Coulometer. It should read 2 mA. Please record the reading.

Toggle switch on LO (low current setting)_____ (2 mA)

f. Change the switch to the setting marked HI (to the right / front of the coulometer). This is the high current setting. The current display on the front of the Coulometer should read 200 mA. Please record the reading.

Toggle switch on HI (high current setting)_____ (200 mA)

Make sure to put the switch back to the middle RUN position.

5. Evaluate the Current reduction system:

The following test is performed without a cell in the Coulometer.

a. If the instrument is a model 5012, set the cell current switch to calibrate. If the instrument is a model 5011, then install a shorting strap in the cell terminal and turn on the cell current.

b. With the %T knob at maximum clockwise rotation, the cell current display should be reading 200 mA. Slowly rotate the %T knob counter clockwise until the cell current drops (199 mA). This should correspond to 62% +/-1% T. Please record the response below.

Initial current reduction_____ %T (62% +/-1% T)

c. Continue rotating the knob slowly counter clockwise and record the cell current at the following points:

Cell current @ 50% T_____ (130 +/- 5)

Cell current @ 40% T_____ (69 +/-5)

Cell current @ 35% T_____ (39 +/- 5)

d. From the 35% T point, continue to slowly rotate the knob counter clockwise and observe the point at which the cell current goes to zero. This is called the cell current cutoff. It should be 29% T +/-1 %T and a cell current of 2 mA. The unit should be able to maintain a current of 2 mA with the %T just above the cutoff point. Please record the readings below.

Cell current cutoff (endpoint)_____ %T (29% +/-1% T)

