

Battery Capacity Analyzer

Field Calibration Procedure Manual



Battery Capacity Analyzer P/N: BC3000-0003

Manual ES1022 Revision C

ElectrodeltaTM
by **Lamar**
Technologies LLC

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BC3000-0003

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BC3000-0003

Field Calibration Procedures

INTRODUCTION:

The Lamar Technologies LLC BC3000-0003 Battery Capacity Analyzer has been designed to perform automatic capacity testing of 12 and 24 Volt lead-acid batteries. This unit is capable of accurately measuring the capacity of a fully charged battery with a rating between 10 and 59 amp-hours. It is self-contained and easy to operate.

SCOPE:

This document provides instructions on how to perform the annual calibration for the BC3000-0003. The calibration instruction has been broken down into the following categories:

- Calibrate Cutoff at 20.0 Volts
- Calibrate Cutoff at 10.0 Volts
- Calibrate Frequency
- Calibrate 24 Volt 10 Amp Setting
- Calibrate 24 Volt 50 Amp Setting
- Calibrate 12 Volt 10 Amp Setting
- Calibrate 12 Volt 50 Amp Setting

TEST EQUIPMENT:

- A. BC3000-0003 Battery Capacity Analyzer
Test Fixture: P/N 20758 Test Fixture (Pictured at right).
- B. Battery: 24 Volt, fully charged per manufacturers recommendation.



**Figure 1 – BC3000-0003
Battery Capacity Analyzer**



Figure 2 – P/N 20758 Test Fixture

- C. Battery: 12 Volt, fully charged per manufacturers recommendation.
- D. DC Power Supply: Capable of at least 24 volts and 20 amps with course and fine voltage adjustments.
- E. Battery Chargers: E.1. or E.2 (below).
 - 1. (1) 12 Volt Charger & (1) 24 Volt Charger.
 - 2. (1) At least one DC Power Supply capable of 28 volts or any other means for charging batteries to manufacturers recommendation.
- F. Calibrated FLUKE 87 or Equivalent Multi-meter with DC volts & millivolts ranges (DVM).
- G. Stop watch.
- H. Small common screwdriver for adjusting P1 through P4 calibration pots.
- I. Miscellaneous hand tools for connecting Test Fixture to batteries and power supply.
- J. Photocopy of Page 9 showing Records Table with blank values in Measured Value, Pass & Fail columns.

PROCEDURE:

A. Connections:

- 1. Connect 20758 test fixture to 24 volt 20 amp power supply by connecting the red lead to positive terminal of power supply and the black lead to the negative terminal of power supply.
- 2. Plug the connector for the 20758 test fixture into the BC3000 connector.
- 3. Connect the DVM leads to the power supply leads.
- 4. Record the DVM calibration expiration date in the blank below the Records table.

B. 20 Volt Cutoff:

- 1. It may be necessary to repeat Procedure B (20 Volt Cutoff) & C (10.0 Volt Cutoff) until all values fall within range. When this is necessary there will be interim values that do not need to be recorded in the Records section. The “final” readings to be recorded are the readings in which no adjustment is required to complete Procedure C (10.0 Volt Cutoff).
- 2. Set the DVM to DC-Volts and a range capable of measuring up to 22 volts.
- 3. Turn Power Switch off.
- 4. Adjust power supply until DVM reads 21.0 volts.
- 5. Adjust the current limiting for the power supply to 20 amps or more.
- 6. Turn Power Switch on.
- 7. 24 VOLT LED illuminates.
- 8. READY LED illuminates.

9. RATING display should be flashing at 10.
10. Press the START button for 3 seconds.
11. READY LED extinguishes.
12. TESTING LED illuminates.
13. RATING LED should stop flashing and continue to read 10.
14. Wait until CAPACITY display reads 001 or higher.
15. Slowly decrease power supply voltage while monitoring the DVM.
16. TESTING LED should extinguish and the COMPLETE LED illuminate between 19.80 and 20.20 volts (as indicated by the DVM).
17. If that voltage falls below the 19.80 volts turn P4 CW, if that voltage is above 20.20 volts turn P4 CCW.
18. If P4 required adjustment repeat Procedure B (20.0 Volt Cutoff) until no adjustment is required.
19. Enter the final voltage reading in the “Measured Value” column in the “20.0 Volt Cutoff” row in the Records table.

C. 10.0 Volt Cutoff:

1. Turn Power Switch off.
2. Adjust power supply until DVM reads 11.0 volts.
3. Turn Power Switch on.
4. 12 VOLT LED illuminates.
5. READY LED illuminates.
6. RATING display should be flashing at 10.
7. Press the START button for 3 seconds.
8. READY LED extinguishes.
9. TESTING LED illuminates.
10. RATING LED should stop flashing and continue to read 10.
11. Wait until CAPACITY display reads 001 or higher.
12. Slowly decrease power supply voltage while monitoring the DVM.
13. TESTING LED should extinguish and the COMPLETE LED illuminate between 9.90 and 10.10 volts (as indicated by the DVM).
14. If that voltage falls below the 9.90 volts turn P4 CW, if that voltage is above 10.10 volts turn P4 CCW.
15. If P4 required adjustment repeat Procedures B (Volt Cutoff) & C (10.0 Volt Cutoff) until no adjustment is required.
16. Enter the final voltage reading in the “Measured Value” column in the “10.0 Volt Cutoff” row in the Records table.

D. Frequency:

1. It may be necessary to repeat Procedure D (Frequency) until all values fall within range. When this is necessary there will be interim values that do not need to be recorded in the Records section. The “final” readings to be recorded are the readings in which no adjustment is required when calibration finishes Procedure D (Frequency).
2. Turn Power Switch off.
3. Adjust power supply to 24 Volts.
4. Turn Power Switch on.

5. 24 VOLT LED illuminates.
6. READY LED illuminates.
7. RATING display should be flashing at 10.
8. Press the START button for 3 seconds.
9. READY LED extinguishes.
10. TESTING LED illuminates.
11. RATING LED should stop flashing and continue to read 10.
12. Wait until CAPACITY display reads 001 or higher.
13. With a stopwatch, measure the time interval for the CAPACITY display to increase by 10 units. For example, measure the amount of time from the instant the display changes to 003 until the instant it changes to 013.
14. The period of the interval should be 357 to 363 seconds.
15. If that time falls below the 357 seconds turn P1 CCW, if that time is above 363 seconds turn P1 CW.
16. If P1 has been adjusted repeat Procedure D (Frequency) until no adjustment is required.
17. Enter the final time in the “Measured Value” column in the “Frequency” row in the Records table.
18. Turn Power Switch off.

E. Connections:

1. Remove leads from power supply
2. Plug the DVM leads into the 20758 test fixture terminal jacks. The positive lead in the red jack and the negative lead in the black jack.

F. 24 Volt 10 Amp Setting:

1. It may be necessary to repeat Procedure F (24 Volt 10 Amp Setting), G (24 Volt 50 Amp Setting), H (12 Volt 10 Amp Setting), and I (12 Volt 50 Amp Setting) until all values fall within range. When this is necessary there will be interim values that do not need to be recorded in the Records section. The “final” readings to be recorded are the readings in which no adjustment is required when calibration finishes Procedure I (12 Volt 50 Amp Setting).
2. Connect 20758 test fixture to a fully charged 24-volt battery by connecting the red lead to the positive terminal and the black lead to the negative terminal.
3. Set the DVM to DC-Volts and a range capable of measuring up to 20 mV.
4. Turn Power Switch on.
5. 24 VOLT LED illuminates.
6. READY LED illuminates.
7. RATING display should be flashing at 10.
8. Press the START button for 3 seconds.
9. READY LED extinguishes.
10. TESTING LED illuminates.
11. RATING LED should stop flashing and continue to read 10.
12. DVM should read 9.8 mV – 10.2 mV.
13. If it reads within range, record the final value read in the “Measured Value” column in the “24 Volt 10 Amp Setting” row in the Records table.

14. If the reading is below the 9.8 mV turn P3 CW until it reads 10.0 mV, if that voltage is above 10.2 mV turn P3 CCW until it reads 10.2 mV.
15. Turn Power Switch off.

G. 24 Volt 50 Amp Setting:

1. Set the DVM to DC-Volts and a range capable of measuring up to 100 mV.
2. Turn Power Switch on.
3. 24 VOLT LED illuminates.
4. READY LED illuminates.
5. RATING display should be flashing at 10.
6. Using left ▲ to set 10's digit, set RATING display to 50.
7. Press the START button for 3 seconds.
8. READY LED extinguishes.
9. TESTING LED illuminates.
10. RATING LED should stop flashing and continue to read 50.
11. DVM should read 49.6 mV – 50.4 mV.
12. If it reads within range, record final value read in the “Measured Value” column in the “24 Volt 150 Amp Setting” row in the Records table.
13. If the reading is below 49.6 mV turn P2 CW until it is within range, if that voltage is above 50.4 mV turn P2 CCW until it is within range.
14. Turn Power Switch off.
15. If P2 has been adjusted go back and repeat Procedures F (24 Volt 10 Amp Setting) and G (24 Volt 50 Amp Setting) until no adjustment is required.

H. 12 Volt 10 Amp Setting:

1. Connect 20758 test fixture to a fully charged 12 volt battery by connecting the red lead to the positive terminal and the black lead to the negative terminal.
2. Set the DVM to DC-Volts and a range capable of measuring up to 20 mV.
3. Turn Power Switch on.
4. 12 VOLT LED illuminates.
5. READY LED illuminates.
6. RATING display should be flashing at 10.
7. Press the START button for 3 seconds.
8. READY LED extinguishes.
9. TESTING LED illuminates.
10. RATING display should stop flashing & continue to read 10.
11. DVM should read 9.8 mV – 10.2 mV.
12. If it reads within range, record final value read in the “Measured Value” column in the “12 Volt 10 Amp Setting” row in the Records table.
13. If the reading is below the 9.8 mV turn P3 CW until it is within range, if that voltage is above 10.2 mV turn P3 CCW until it is within range.
14. Turn Power Switch off.
15. If P3 has been adjusted go back and repeat Procedures F (24 Volt 10 Amp Setting), G (24 Volt 50 Amp Setting) and H (12 Volt 10 Amp Setting) until no adjustment is required.

I. 12 Volt 50 Amp Setting:

1. Set the DVM to DC-Volts and a range capable of measuring up to 100 mV.
2. Turn Power Switch on.
3. 12 VOLT LED illuminates.
4. READY LED illuminates.
5. RATING display should be flashing at 10.
6. Using left ▲ to set 10's digit, set RATING display to 50.
7. Press the START button for 3 seconds.
8. READY LED extinguishes.
9. TESTING LED illuminates.
10. RATING display should stop flashing & continue to read 50.
11. DVM should read 49.6 mV – 50.4 mV.
12. If it reads within range, record final value read in the “Measured Value” column in the “12 Volt 50 Amp Setting” row in the Records table.
13. If the reading is below the 49.6 mV turn P2 CW until it is within range, if that voltage is above 50.4 mV turn P2 CCW until it is within range.
14. Turn Power Switch off.
15. If P2 has been adjusted repeat Procedures F (24 Volt 10 Amp Setting), G (24 Volt 50 Amp Setting), H (12 Volt 10 Amp Setting) and I (12 Volt 50 Amp Setting) until no adjustment is required.
16. Disconnect unit from test fixture.
17. Test is complete.

J. Records:

1. If all values input into the records section are within range, check the corresponding space in the “Pass” column.
2. If any value cannot be brought within range using this calibration procedure check the corresponding space in the “Fail” column.
3. If all value are checked as “Pass”, check the space in the “Pass” column in the BC3000-0003 Battery Capacity Analyzer.
4. Sign and date the bottom of the Records section.
5. Retain that sheet for your records.
6. If any values are checked as “Fail”, check the space in the “Fail” column in the BC3000-0003 Battery Capacity Analyzer.
7. Contact Lamar Technologies for repair or replacement. *See owners manual for details.*

RECORDS – P/N: BC3000-0003; S/N: _____

Table 1 - BC3000-0003 Battery Capacity Analyzer				
Record Name	Measured Value	Specification	Pass	Fail
20.0 Volt Cutoff		20.20 – 19.80 Volts		
10.0 Volt Cutoff		10.10 – 9.90 Volts		
Frequency (Period for 10 Unit Increase)		357 sec. – 363 sec.		
24 Volt 10 Amp Setting		9.8 – 10.2 mV		
24 Volt 50 Amp Setting		49.6 – 50.4 mV		
12 Volt 10 Amp Setting		9.8 – 10.2 mV		
12 Volt 50 Amp Setting		49.6 – 50.4 mV		

Multi-meter Calibration Expiration Date: _____

BC3000-0003 Calibration performed as specified by _____ Date _____

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