

# BC-6000 Field Calibration Procedure 55 AMP

CF1\_FIELDCAL Revised 9/8/2012

## **INTRODUCTION:**

The BC-6000 Battery Capacity Analyzer will perform automatic capacity testing of 12 and 24 volt lead-acid batteries. The micro processor controlled unit uses quartz crystal timing and will accurately measure the capacity of a fully charged battery with a rating between 10 and 55 amp-hours. The BC-6000 saves the date, time, test parameters, and test results. It is equipped with a USB interface. With the BC Report utility software the user can retrieve data from the BC-6000 to create a printable report that includes test settings, test results, time and date of test, and a battery discharge voltage graph. It is battery powered and easy to operate. The recommended calibration interval is 1 year.

## **SCOPE:**

This document provides instructions on how to perform the annual calibration for the BC-6000. The calibration is broken down into the following categories:

- Verify timing accuracy
- Calibrate Cutoff at 10.00 Volts
- Calibrate Cutoff at 20.00 Volts
- Calibrate 10 Amp calibration point
- Calibrate 55 Amp calibration point

## **TEST EQUIPMENT REQUIRED:**

1. CF1 test device.
2. 12 Volt 55 Amp or greater fully charged battery used for 10 Amp and 55 Amp calibration.
3. 24 Volt 1 Amp or greater fully charged battery or a 24 Volt 1 Amp regulated power supply used to calibrate voltage and verify timing accuracy.
4. Calibrated Fluke 87 DMM or equivalent.
5. Shielded test leads for Fluke 87 DMM. (for frequency measurement)
6. Anti-static wrist strap.

## **PROCEDURE:**

### **INITIAL SETUP:**

1. Photo copy the Calibration Work Sheet on page 6.

2. Attach anti static wrist strap to chrome fan guard and your wrist.
3. Remove the 8 lid screws. Remove the lid.
4. Connect CF1 test device ring terminals to the 24V power source. RED lead to the positive terminal of the power source and the BLACK lead to the negative terminal of the 24V power source.
5. Verify unit is OFF. Connect the BC-6000 to the VOLTAGE OUTPUT CONNECTOR on the CF1 test device. It is the connector that has two #16 AWG smaller wires.
6. Locate the display circuit board located on the inside of the front panel and REMOVE the plastic jumper shunt across pins 1 & 3. See Figure 1 for the location of the jumper shunt.

#### **VERIFY TIMING ACCURACY MEASUREMENT:**

1. Set DMM to measure frequency.
2. Use shielded test probe wires or twist non shielded probe wires together to maximize measurement accuracy.
3. Connect DMM minus - to TP1 on the display circuit board. See figure 1 for the location of TP1 and TP2.
4. Connect DMM plus + to TP2 on the display circuit board.
5. Turn ON the BC-6000 power switch.
6. After the sign on message the unit will display "Code:". The UP and DOWN buttons will increase or decrease the digit's number value. The NEXT button will advance to the next digit. Using the UP, DOWN, and NEXT buttons, enter the code of "1234". Press NEXT.
7. The unit will display "CAL VOLTS". Press UP 2 times. The unit will display "CHK 450Hz". Press NEXT.
8. Verify the DMM frequency is 449.8 Hz to 450.2 Hz (450 Hz  $\pm$ 0.2 Hz).
9. Write the Frequency measurement reading into the calibration work sheet. (450 Hz) If the frequency is not 449.8 Hz to 450.2 Hz, the unit must be sent in for repair. The crystal oscillator should provide an accurate time base for the entire life of the BC-6000. If the unit fails this test, it is an indication that the crystal time base may have been damaged.
10. Turn OFF the BC-6000 power.

#### **ADJUST 10.00 and 20.00 VOLT CUTOFF:**

1. Set DMM to a voltage range of 0-200 Volts.
2. Connect DMM minus - to VOLT minus - test point on the CF1 test device.
3. Connect DMM plus + to VOLT plus + test point on the CF1 test device.
4. Turn ON the BC-6000 power switch.
5. After the sign on message the unit will display "Code:". The UP and DOWN buttons will increase or decrease the digit's number value. The NEXT button will advance to the next digit. Using the UP, DOWN, and NEXT buttons, enter the code of "1234". Press NEXT.

6. On the CF1 test device, select the 10 Volt range and turn the voltage adjustment knob to obtain a voltage of 10 volts  $\pm 0.010$  volts on your DMM.
7. The unit will display: "CAL VOLTS". Press NEXT. The unit will display "CAL Volts? 10", press NEXT. The unit will display the voltage on the right and the word "ADJUST".
8. Use the UP and DOWN buttons to make the display read "10.00". Press NEXT to save the calibration data. Wait for the word "SAVED" to appear then disappear.
9. Write the DMM Voltage reading into the calibration work sheet. (10 volt cutoff)
10. On the CF1, select the 20 Volt range and turn the voltage adjustment knob to obtain a voltage of 20 volts  $\pm 0.010$  volts on your DMM.
11. The unit will display: "CAL VOLTS". Press NEXT. Press UP. The unit will display "CAL Volts? 20", press NEXT. The unit will display the voltage on the right and the word "ADJUST".
12. Use the UP and DOWN buttons to make the display read "20.00". Press NEXT to save the calibration data. Wait for the word "SAVED" to appear then disappear.
13. Write the DMM Voltage reading into the calibration work sheet. (20 volt cutoff)
14. Turn OFF the BC-6000 power.
15. Unplug the BC-6000 from the CF1 VOLTAGE OUTPUT CONNECTOR.
16. Disconnect the CF1 test device ring terminals from the 24 volt power source.

#### **CALIBRATE AMP SETUP:**

1. Connect the CF1 test device ring terminals to a fully charged 12 Volt 55 Amp or greater battery. RED lead to the positive terminal of the battery and the black lead to the negative terminal of the battery.
2. Set DMM to a range of 0-200 mV.
3. Connect DMM minus - to the AMP minus - test point on the CF1 test device. Use caution as the DMM meter leads will be connected to a high amperage battery.
4. Connect DMM plus + to the AMP plus + test point on the CF1 test device.
5. Verify the BC-6000 is OFF.
6. Connect the BC-6000 to the HIGH AMPERAGE CONNECTOR on the CF1 test device. It is the connector wired with two #6 heavy duty wires.
7. The scale factor is 1 A/mV. Example: when the DMM reads 10.00 mV, it is indicating 10.00 Amps.

## **CALIBRATE 10 and 55 Amp**

1. Keep hands, arms, test leads, and clothing away from the FAN BLADE. The FAN BLADE will rotate rapidly during the 10 and 55 amp calibration.
2. Turn ON the BC-6000 power switch.
3. After the sign on message the unit will display "Code:". The UP and DOWN buttons will increase or decrease the digit's number value. The NEXT button will advance to the next digit. Using the UP, DOWN, and NEXT buttons, enter the code of "1234". Press NEXT.
4. The unit will display: "CAL VOLTS". Press the UP button until the LCD screen displays "CAL AMP". Press NEXT, the unit will display "Volts? 12". Press NEXT, the unit will display "Amps: 10".
5. Press NEXT to start the process. The FAN will start.
6. Wait 30 seconds.
7. Press the UP or DOWN button to obtain a DMM reading of 9.98 to 10.02 mV ( $10.00 \text{ mV} \pm 0.02 \text{ mV}$ ). Allow a few seconds for the reading to settle. Repeat this step to get as close as possible to 10.00 mV. 10.00 mV is 10 Amps actual current flow out of the battery.
8. Write the mV reading into the calibration work sheet. (10 Amp calibration)
9. Press NEXT to save the calibration data into memory. Wait for the word "SAVED" to appear then disappear.
10. Press UP to select 55.
11. Press NEXT to start the process. The FAN will start.
12. Wait 60 seconds.
13. Press UP or DOWN button to obtain a DMM reading of 54.890 to 55.110 mV ( $55.00 \text{ mV} \pm 0.110 \text{ mV}$ ). Allow a few seconds for the reading to settle. Repeat this step to get as close as possible to 55.00 mV.
14. Write the mV reading into the calibration work sheet. (55 Amp calibration)
15. Press NEXT to save the calibration data into memory. Wait for the word "SAVED" to appear then disappear.
16. Turn OFF the BC-6000 power.

## FINALIZATION:

1. Attach anti static wrist strap to chrome fan guard and your wrist.
2. Locate the display circuit board located on the inside of the front panel and REINSTALL the plastic jumper shunt across pins 1 & 3. See Figure 1 for the location of the jumper shunt.
3. Turn ON BC-6000 power. After sign on message, the unit will display "Volts? ". The unit is ready for use. Turn OFF BC-6000 power.
4. Disconnect the BC-6000 from the CF1 calibration device.
5. Disconnect the CF1 calibration device from the battery.
6. If this wasn't done already, write the DMM calibration due date in work sheet. Photo copy the DMM calibration certificate and attach it to the work sheet.
7. Write the BC-6000 serial number in work sheet. The serial number is located on the inside rear panel.
8. Sign and date the calibration work sheet.
9. Install the lid and attach it with the 8 screws.

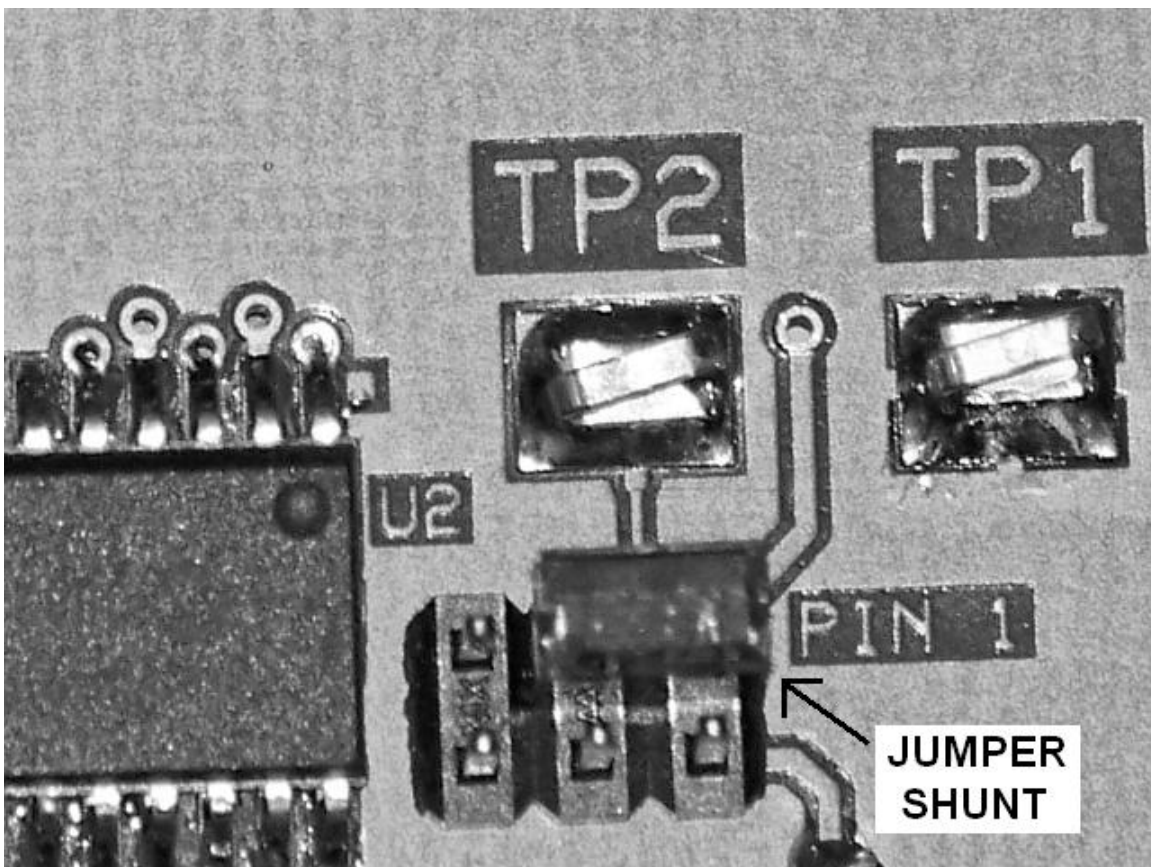


Figure 1

## CALIBRATION WORK SHEET

RECORDS - BC-6000 S/N \_\_\_\_\_

Item name	Measured value	Specification	Pass	Fail
450 Hz		449.8 - 450.2 Hz		
10.00 Volt cutoff		9.90 - 10.10 Volts		
20.00 Volt cutoff		19.80 - 20.20 Volts		
10 Amp calibration		9.98 to 10.02 mV		
55 Amp calibration		54.890 to 55.110 mV		

Digital Multi Meter calibration expiration date: \_\_\_\_\_

Attach a photo copy of the DMM calibration certificate to this work sheet.

BC-6000 Calibration performed

as specified by: \_\_\_\_\_ Date: \_\_\_\_\_