

## CGT Battery Capacity Testing Procedure

### Pre-Test Requirements

#### A. Battery Preparation

1. Equalize the battery charge (unless the manufacturer recommends otherwise) 3 to 30 days before capacity testing.
2. Perform a complete Monthly/Annual Inspection and maintenance items as per Table 1, "Maintenance Frequencies for Flooded and VRLA Batteries," in Attachment 1.
3. If cell resistance measurements have been taken, wait at least 1 hour before continuing with the capacity test.
4. Take the appropriate precautions when arranging clearances to isolate the battery from any sources and loads during testing.

#### B. Special Requirements – New Battery

New batteries must be acceptance tested within 1 month of installation. New batteries are only required to meet 90% of rated capacity when first installed.

**Important:** Always follow the battery manufacturer's instructions when installing new banks and performing the initial charge.

#### C. Required Test Equipment

The following list identifies the tools and equipment needed to perform battery testing. All test equipment used must be properly calibrated.

- Digital voltmeter.
- DC clamp-on ammeter.
- AlberCorp 5-N load continuous load unit.
- BCT-128 with test lead looms and interconnecting cables.
- Laptop computer loaded with BCT-2000 software.
- Floppy diskette, 3½".
- AlberCorp Cellcorder.
- Insulated torque wrench, inch-pound (in-lb.).
- Infrared temperature detector.
- Jumper cables appropriately rated for the intended discharge current.

### Test Equipment and BCT Software Configuration

#### A. Test Equipment Setup

Setup the AlberCorp test equipment and laptop computer as per the "System Block Diagram" and "General Arrangement Sense Lead Connections" in the *BCT-2000 Software and BCT-128 and BCT-256 User's Guide*.

**Note:** It is very important that all connections to the laptop computer be made before the laptop is turned on. Otherwise, communications with the other equipment will not be properly established.

**B. Jumpering Cells**

Any weak cells identified by cellcorder readings taken in the maintenance inspection must be considered for jumpering before the start of any load test. Jumpered cells must have terminal connectors to adjacent cells removed before applying any load to the battery bank.

**Do not Jumper any cell once the capacity test has begun.**

**Voltage in any cell must not fall below 1.0 volt during a capacity test.<sup>1</sup>**

Cells falling below the *shutdown voltage* established in the test setup (typical value is 1.75 volts per cell [VPC]), must remain connected in the battery and closely monitored using the infrared temperature detector.

**Note:** If the temperature detector indicates a significant or rapid increase in cell temperature, terminate the load test immediately to prevent equipment damage and employee injury.

**C. BCT-2000 Software Setup**

Detailed instructions for BCT-2000 software setup are contained in the *BCT-2000 Software and BCT 128 and BCT-256 User's Guide*. Only a few important points are highlighted in this supplement. Specific page references below are to this User's Guide.

Discharge test parameters can be found in Attachment 5, "Battery Discharge Test Parameters."

**1. Battery Strings Setup** (Pages 17-18 of the User's Guide)

Most CGT batteries contain only one string. Batteries with more than one string must have each string tested separately. **Do not test parallel strings together.**

The software will automatically configure the BCT-128 to accept the proper inputs from the sense leads based on the number of cells entered on this screen.

**2. Test Setup** (Pages 22-23 of the User's Guide)

The test type selected will always be **Performance and Constant Current**.

**Rated Time** comes from Attachment 5. Ensure that the proper **Cell Voltage** is selected. Select **IEEE Correction**.

Set the **Alarm Levels** as follows:

2-Volt Cells	12-Volt Jars	Inter-Tier Connections*
Warning = 1.80	Warning = 10.8	Warning = 0.1
Shut Down = 1.75	Shut Down = 10.5	Shut Down = 0.2

\*Select the inter-tiers desired (1-8) and repeat the settings for each.

<sup>1</sup> An exception to this rule would be near the end of a test to allow the remaining cells to be fully discharged. Close attention must be paid to any cells allowed to discharge below 1.0 volt, especially the cell temperature.

**Test Steps** setup: A performance test only allows one test step.

Highlight the **Test Discharge Duration** field. Use the **hh:mm:ss** format to enter the time that is 1 hour longer than the rated time entered earlier.

Enter **Amps** from Attachment 5. The software will automatically correct the value entered based on the temperature input and **IEEE Correction** selected.

**3. Inter-tier Setup** (Pages 24-25 of the User's Guide).

Select an inter-tier (1-8) and then use the cell list to select the two cells between which the inter-tier connection is made. Repeat this step for all inter-tiers.

**4. Load Bank Setup** (Pages 25-26 of the User's Guide).

Ensure that the proper current shunt is installed on the load bank and that the **Shunt Rating** and **Amps Per** settings are correct as per Attachment 5.

Click on the **X** in the upper right-hand corner of the window to exit the setup screens.

## Capacity Test

### A. Starting the Test

Once all the settings have been entered, start the test by clicking **Test** on the **BCT-2000 Main Menu**. If the settings and test equipment connections are correct, and the equipment is operating properly, the **BCT Test Screen** will appear. There should be a green vertical bar showing in the middle of the screen corresponding to each battery cell. If this display does not appear, there is a problem with the test setup or the equipment.

Double-check the **Test Duration** and **Amps** (lower left corner). If the settings are correct, click on **F1 Stop Test** or press [F1] on the keyboard. You will hear the load bank start searching for the optimum combination of load resistors to achieve the desired discharge current.

### B. Stopping the Test

Click on **F1 Stop Test** or press [F1] on the keyboard to stop the test when any of the following conditions occur:

- Approximately half of the cells fall below 1.75 V.  
**Note:** The test stops automatically when a cell falls below the shutdown limit setting.
- Overall battery voltage drops to 1.75 VPC.
  - o 21 V for a 24 V battery.
  - o 28 V for a 32 V battery.
  - o 42 V for a 48 V battery.
  - o 105 V for a 120 V battery.
- The infrared gun indicates an overheating cell(s).
- Any cell falls below 1.0 V (or 6 V for a 12 V jar).

**Post Test Requirements**

**A. Equalize Charging**

Allow the battery approximately 10 minutes to stabilize following the end of the capacity test. Then reconnect the battery to the charging equipment and equalize the charge at the appropriate setting (consult the manufacturer's literature for recommended durations and voltage levels).

**B. Return to Service**


Remove any jumpers that were installed, or install permanent jumpers if a cell must remain disconnected.

**Note:** Readjust the float voltage if any cells are removed.

Reconnect the battery to system loads when the voltage has recovered to approximately 2.2 VPC (132 V for a 120 V battery) or when the charger is capable of supplying both the battery charging requirement plus its normal load.

**C. Load Test Results**

Copies of annual load test results must be mailed (or emailed) to:

  
 GSM&TS Station Engineering  
 375 N. Wiget Lane, Suite 130  
 Walnut Creek, CA 94598