



## **BIDDLE® C-BITE Compact Battery Condition Tester**

- Instantaneously checks battery condition and compares to a baseline
- On-line measurements of lead-acid and NiCd batteries
- Stores, prints, downloads 210 data sets in up to eight tests
- Direct intercell connection resistance measurements

# Compact Battery Condition Tester

## DESCRIPTION

The C-BITE Compact Battery Condition Tester is ideal for determining the condition of batteries in distributed power (outside plant), wireless, customer premise and other telecommunications installations, Railroad signal and communications, smaller UPSs and emergency lighting, as well as many other types of installations.

## APPLICATIONS

The operational life of a battery varies greatly depending on the pattern of use (frequency of power failures, continuous operating time, etc.) and the environmental conditions of the site. With repeated cycling of a storage battery over a long interval, battery performance gradually deteriorates and the internal resistance increases until the battery will no longer take a charge or the battery falls below 80% of its rated capacity. Faults may also be caused by internal short-circuits, negative lug rot, sulphation, etc., making the battery incapable of supporting the load during an event. It is necessary, therefore, to measure the internal resistance, float voltage and intercell connection resistance, and the temperature of the battery or the environment in order to properly assess the condition of the battery. However, experience has shown that many battery failures occur simply due to

loose intercell connections caused by the “cold-flow” phenomenon at the negative battery terminal. The C-BITE finds loose connections by directly measuring intercell connection resistance.

## PRINCIPLE OF OPERATION

The C-BITE measures the internal AC resistance, intercell connection resistance, float voltage and temperature (with an optional probe) of secondary batteries. The internal AC resistance is measured by applying a constant alternating current (1000 Hz) to the cell being measured. The internal AC resistance is then calculated from the voltage drop that is measured (following Ohm’s Law). In order to obtain the voltage drop that is due only to the cell’s internal resistance, synchronous detection circuitry is used.

By using synchronous detection, a more accurate measurement is possible. A four-wire measurement (Kelvin-type) is utilized to eliminate any errors due to lead wire resistance.

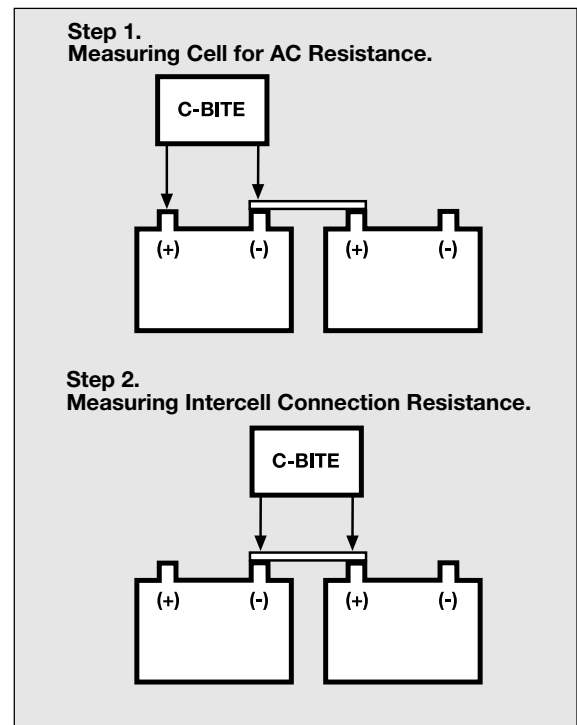


Figure 1. Schematic of measuring procedure.

Another advantage of AC resistance is that it is not affected by the DC voltage of the battery system. Figure 1 shows a typical schematic diagram of measuring procedure.

The C-BITE Compact Battery Condition Tester takes measurements of secondary batteries on-line. The user may enter comparator values for the Warning and Fail resistance levels as well as a low voltage level. Then measure each battery and intercell connector sequentially. Each result is then displayed on the LCD. It is possible to review previous cell data at any time during the test. To print test data, simply connect the C-BITE Digital Printer to the C-BITE and press the print button. All test data are printed with statistical analysis and bar graph.

If the comparator values are set, the C-BITE will indicate the condition of the battery (Pass/Warning/Fail) based on a six-way combination of comparisons against user-defined upper (Fail) and lower (Warning) resistance limits and a low voltage threshold. An LED and a beeper then indicate the result.

The C-BITE can store up to eight tests totaling 210 data sets (eight 24-cell strings). The data can also be easily transferred to a PC or laptop for trending or archival.

**INTERPRETATION OF READINGS**

There are several methods by which the data can be interpreted: individual cell result, short term and long term.

**Individual cell result:** Each result is displayed on the LCD as well as its condition (Pass/Warning/Fail) via LEDs. A comparator value may be entered to compare the individual cells' results against the cell type. The



Taking direct intercell connection resistance measurements with the C-BITE.

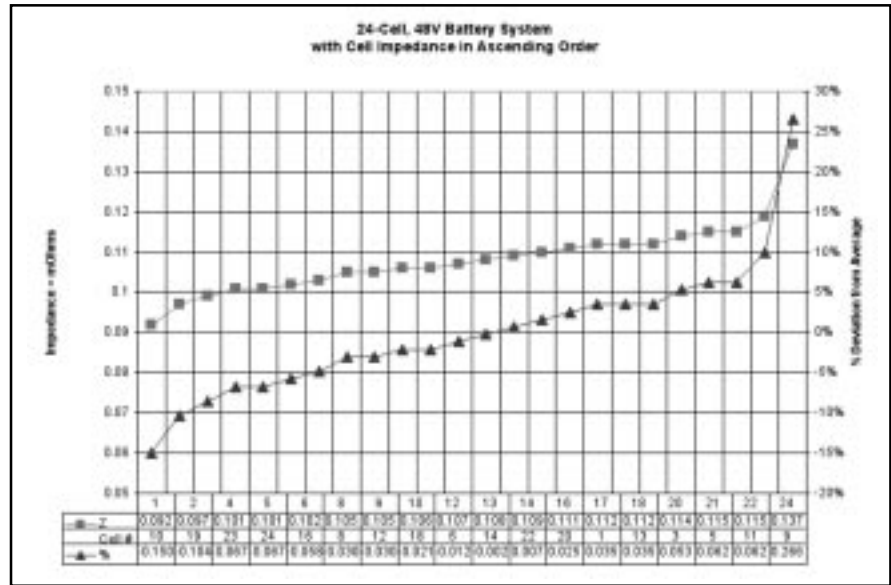


Figure 2. Comparison chart of individual impedance cell values.

Warning and Fail conditions occur at user-defined AC resistance levels.

**Short-term Interpretation:** By graphing the entire string's results using a spreadsheet like Excel®, in ascending AC resistance value, weak cells may be found simply by looking at the slope of the higher resistance cells. See Figure 2.

**Long-term Interpretation:** Long-term Interpretation can be accomplished by trending the AC resistance (and other data) over time. It is best if there is resistance data starting at the initial commissioning of the battery. The baseline (average of the string) AC resistance value can be used as the basis for Warning and Fail comparator values for that string. Experience has shown that at approximately a 20 per cent increase in AC resistance for flooded lead-acid cells and 40% increase for VRLA approximately correlate to 80% battery capacity.

**FEATURES AND BENEFITS**

- Small and lightweight making it easy to handle
- Pass/Warning/Fail Status provides immediate battery condition status based on user entered values
- An extra transmitter is not required because of the synchronous detection ability
- Internal memory function allows 8 tests totaling 210 records (8-24 cell, 48V strings)

- Since the C-BITE uses the AC four-wire (Kelvin-type) method to measure the internal AC resistance, it provides accurate results with the lead-wire resistance eliminated.
- It is possible to display the readings for the battery internal AC resistance, voltage, intercell connection resistance, and terminal temperature, without changing functions.
- A composite comparator function, which can be set on resistance and voltage values, enables reliable detection of battery deterioration.
- The C-BITE's memory function also allows 210 sets of readings and up to 8 tests to be stored at a touch, and later output to a printer. These functions make this instrument an ideal tool for checking batteries which are under constant trickle charging and cannot be disconnected.

**SPECIFICATIONS**

- Maximum Total Voltage at Current Source Leads:** 60 Vdc
- Max Rated Power Consumption:** 2.4 VA max
- Power Supply:** AA-size (LR6) alkaline batteries x 6 (up to 5.5 hrs of operation) or optional 35335 AC adapter
- Display:** LCD panel and LEDs for Pass/Warning/Fail indication
- Voltage Ranges:** 0 - 3, 0 - 30 Vdc

**Resistance Range:**

Impedance Range	Maximum Indication	Measurement Resolution	Current Accuracy	
3 m $\Omega$	3.100 m $\Omega$	1 $\mu\Omega$	50 mA	$\pm 1.0\%$ rdg. $\pm 1$ lsd
30 m $\Omega$	30.00 m $\Omega$	10 $\mu\Omega$	50 mA	$\pm 0.8\%$ rdg. $\pm 1$ lsd
300 m $\Omega$	300.0 m $\Omega$	100 $\mu\Omega$	5 mA	$\pm 0.8\%$ rdg. $\pm 1$ lsd

**Voltage Measurement**

Range	Resolution	Accuracy
3 V	1 mV	$\pm 0.1\%$ rdg. $\pm 1$ lsd
30 V	10 mV	$\pm 0.1\%$ rdg. $\pm 1$ lsd

**Measurement Accuracy:**

(Conditions to guarantee Accuracy)

64° F to 82° F (18° C to 28° C), 80% R.H. or less (no condensation), after zero adjustment and warming up time of at least 10 minutes.

**Temperature Coefficient:** ( $\pm 0.01$  rdg  $\pm 0.5$  dgt.)/ $^{\circ}$  C

**Measurement Current Frequency**1 kHz  $\pm 30$  Hz**Accuracy of Current (Amps)****Measurement:**  $\pm 10\%$ **Temperature Measurement**

(with the optional lead set)

**Measurement Range:** 15° F to 140° F (-10° C to +60° C)

**Resolution:** 0.2° F (0.1° C)

**Accuracy:**  $\pm 5\%$  rdg.  $\pm 1$  lsd

**Temperature Range:****Operating:** 32° F to 105° F (0° C to 40° C)**Storage:** 15° F to 125° F (-10° C to 50° C)**Humidity:** 80% R.H. or less (no condensation)**Safety:** CE marked, designed to meet IEC 1010-1**Dimensions**

5 H x 7.7 W x 2.5 D in. (196 x 131 x 65 mm)

**Weight:** 1.9 lbs

(860 g) including batteries

**A/D Conversion:** Double integration method**Sampling rate:** 0.83 times/second**Beeper Function:** Audible alarm when comparator result is Warning or Fail (switchable on/off)**Input Overflow Indicator:** "OF" indicator**Constant Current Fault Detection:** "----" Display screen indication**Open Circuit Terminal Voltage:** 5 V maximum**Auto Power Off:** After 30 minutes**Comparator Settings:** Resistance upper (Fail) and lower (Warning) limits, and voltage lower limit**Number of Comparator Settings:** Up to 99 sets of comparator values stored in memory**Comparator Output:** Pass (green), Warning (amber) and Fail (red) LEDs plus an audible alarm**Absolute Maximum Input Voltage:** 60 V dc maximum. No AC input.**Withstand Voltage:** Between input terminals and output terminals (including, EXT. MEMO. HOLD terminals) - 2300 volts AC rms, 1 minute)**Data Memory:** 210 Sets of measurement values stored in memory by MEMO (memory) key or on-probe switch**Data Recall:** Recalled from memory for display on screen**Moving Average Function:** For resistance values only (switchable on/off)

Using the C-BITE to measure 4V batteries in a CEV.



BIDDLE C-BITE shown with printer.

**BIDDLE C-BITE**

**Included Accessories**

- Pin type leads
- AMP/Burndy lead set
- Remote Control Switch
- Carrying case
- Zero adjustment board
- Six "AA" (LR6) alkaline batteries
- Instruction manual

**Optional Accessories**

- Custom lead sets
- Spares
- Extended warranty
- Quick Guides in foreign languages:  
Español, Français, Duetsch,Portuguises
- AC power adapter
- Temperature probe  
(platinum temperature sensor)

**Other C-BITE Configurations**

- C-BITE with one lead set
- C-BITE digital printer with  
interconnecting cable



*Testing a second string (without stopping to print).*

**ORDERING INFORMATION**

<b>Item (Qty)</b>	<b>Cat. No.</b>	<b>Item (Qty)</b>	<b>Cat. No.</b>
C-BITE package .....	246006	Instruction manual .....	AVTM246006
<b>Included Accessories</b>		<b>Optional Accessories</b>	
C-BITE tester .....	35325	Parallel/Serial converter .....	35334
Digital printer .....	35326	AC power adapter for C-BITE .....	35335
Pin type test leads with remote control switch .....	35331	Quick-Guide (English) .....	AVTM246006G-E
AMP/Burndy lead set .....	35332	(Español) .....	AVTM246006G-S
Carrying case to hold all standard items .....	35323	(Français) .....	AVTM246006G-F
Instrument case .....	35324	(Duetsch) .....	AVTM246006G-D
Batteries (6) AA .....	23415	(Portuguises) .....	AVTM246006G-P
Zero adjustment board .....	35333		
Printer paper, 2 rolls .....	35327		
Printer/download cable .....	35328		
AC line cord, 8 ft (2.4 m) .....	17032		

Items may be ordered individually