# MBITE Application Note
Battery Manufacturing Plants

The Biddle[□] MBITE" is ideal for battery manufacturing plants to obtain baseline impedance and cell voltage readings. It is a lightweight and compact unit incorporating advanced design, features and capabilities.

Many battery customers are requesting baseline data in order to perform long term evaluation of their battery installations. Having baseline readings can enhance battery manufacturers rapport with their customers for enhanced customer service. The data derived can also be used as a quick QA/QC check for process control of individual cells.
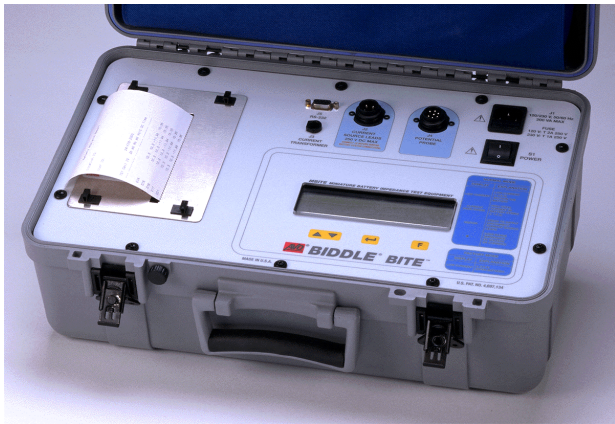
Impedance is the measurement of electrical path components in a battery whether lead-acid or nickel-cadmium. A capacitively coupled AC current is applied to the cell via two of the four points of the dual point probes. The other two points are used to take the measurements. Therefore, a true four-wire measurement is taken. The resultant effect is measured as impedance using the following electrical equation:
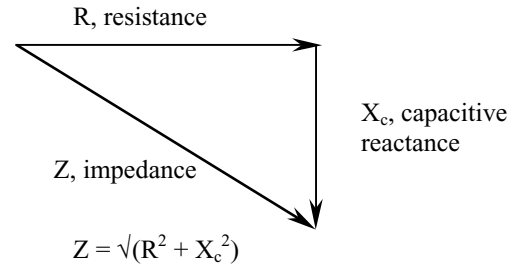
$$E = I * Z$$

where   E is the measured cell ac voltage drop,
         I is the applied ac current,

and

         Z is the calculated impedance, which has two (vector) components: resistance, R, and capacitive reactance, X_c.

The vectors comprising impedance:

R, resistance

X_c, capacitive reactance

Z, impedance

$$Z = \sqrt{(R^2 + X_c^2)}$$

But the MBITE does this automatically so there is no need for complex mathematics to derive impedance data. (Please note that impedance should be higher in value than resistance.) Furthermore, the test data can be verified by the operator and then stored by pressing the data send button on the probe. The operator is able to view the data via the 5 in. (12 _-cm) LCD. This easily enables the operator to find out-of-range cells for further analysis and evaluation.

The impedance data measured by the MBITE is identical to the impedance data measured by other Biddle[□] BITE" products operating.
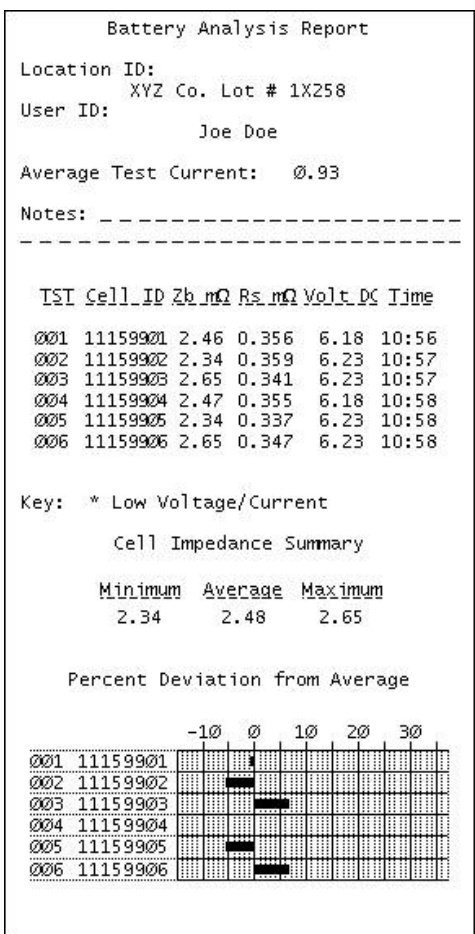
Other features of the MBITE are:

- Configurable for cell-only measurements, as well as cell/strap and strap-only modes.
- Simultaneously takes impedance and cell voltage readings.
- Takes cell readings in less than 5 seconds.
- Integrated bar code wand for complete traceability to lot number and individual cell.
- Standard code 3 of 9 bar coding.
- Does not discharge the cell compared with other techniques.
- Numerous accessories to enhance the usefulness of the MBITE.

The printout (below) shows the bar coded location ID, user ID and cell ID which become a permanent part of the record. It displays and prints cell impedance and voltage data as well as the time stamp of the measurement. The MBITE calculates the (lot) average impedance, the minimum and the maximum of the data set. The printout includes a histogram showing

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graphically how each cell performed compared to the (lot) average, which clearly indicates out-of-range cells , typically greater than − 5% deviation.

A printout from the MBITE:

```
        Battery Analysis Report
Location ID:
        XYZ Co. Lot # 1X258
User ID:
             Joe Doe

Average Test Current:   0.93

Notes: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _


  TST Cell_ID Zb mΩ Rs mΩ Volt DC Time

  001 11159901 2.46 0.356  6.18  10:56
  002 11159902 2.34 0.359  6.23  10:57
  003 11159903 2.65 0.341  6.23  10:57
  004 11159904 2.47 0.355  6.18  10:58
  005 11159905 2.34 0.337  6.23  10:58
  006 11159906 2.65 0.347  6.23  10:58


Key:  * Low Voltage/Current

        Cell Impedance Summary

    Minimum  Average  Maximum
     2.34     2.48     2.65


  Percent Deviation from Average

            -10   0   10   20   30
001 11159901
002 11159902
003 11159903
004 11159904
005 11159905
006 11159906
```

here:

TST =   CELL NUMBER

Zb =   BATTERY CELL IMPEDANCE IN mΩ

Rs =   STRAP OR INTERCONNECT RESISTANCE mΩ

VOLTS DC =   DC VOLTAGE AT TIME OF IMPEDANCE READING

TIME =   RECORDED AT TIME OF IMPEDANCE READING

Minimum =   LOWEST VALUE CELL IMPEDANCE CURRENTLY STORED

Average =   AVERAGE VALUE CELL IMPEDANCE CURRENTLY STORED

Maximum =   MAXIMUM VALUE CELL IMPEDANCE CURRENTLY STORED

The MBITE is a compact, powerful tool for obtaining baseline impedance data on the factory floor in battery plants. And since it s from AVO International, it has a long tradition of quality and reliability backed by solid engineering, service and our commitment to customer service.

Specifications

Power: 120 Vac, 60 Hz/230 Vac, 50 Hz
Display: Backlit 5 in. (12 _ cm) LCD
Voltage Range:
        max cell/jar voltage: 25 Vdc
        0 - 2.5Vdc, 1 mV resolution
        2.5 — 25.0, 10 mV resolution

Impedance Range:
        0 — 1.000 m, 0.001 m_ resolution
        1 — 10.00 m, 0.01 m_ resolution
        10 — 100.0m_, 0.1 m_ resolution

Measurement Precision:
        AC Impedance: –0.3%
        DC Voltage: –0.1%

Safety: Designed to meet IEC 1010-1 specifications

Dimensions: 7 H x 11 D x 17 W in. (18 x 29 x 45 cm)
            19.5 lbs (8.8 kg)

Ordering Information:

MBITE, 120 Vac, 60 Hz   . .246005B
MBITE, 230 Vac, 50 Hz   .246005B-47
MBITE, 230 Vac, 50 Hz, CE-marked .. 246005B-47-CE
Factory Probes w/ dual points 246037
Bar Code Wand Kit 246036
Bar Code Label printing software
        Windows   .246039
AVOLink downloading software   35303-2

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