Repeated charging and discharging of a storage battery reduces battery performance over time, and increases the internal resistance until charging is no longer possible. Faults may also be caused by internal short-circuits, resulting in reduced battery voltage, over-heating, or fire.

To prevent these issues, the SBS battery interrogators determine the state of the battery immediately by taking on-the-spot measurements without having to shut off the charger. (Models 3002 and 3003)

Features:
- **Model 3003 support for high-capacity batteries**
  The higher the capacity of a battery, the lower the internal resistance. In the case of high-capacity batteries, the check decision requires accurate measurement of an extremely small internal resistance (e.g. tens or hundreds micro ohms.) The 3003 has a resolution of 1, a finer order of magnitude than the 3002 along with the special purpose 9465 pin type leads. This enables the user to make better decisions for high-capacity batteries.

- **Simultaneous measurement of resistance, voltage, and temperature**
  *Temperature measurement with the 3003 requires the optional 9460 Clip Type: leads with temperature sensor.

- **Three-rank rating of battery state: Pass, Warning, or Fail**
  The Pass/Warning/Fail assessment of a battery’s state is based on a 6-way combination of comparisons against upper and lower resistance limits and a voltage threshold. Results are indicated by the LEDs and a beeper alarm.

- **Measurement without shutting down the battery**
  Hospital or computing facility UPS systems cannot tolerate a break in the supply. As a result, battery maintenance must be carried out while the battery is in use. Models 3002 and 3003 are designed to take measurements while the battery is being charged.

- **Memory function and printed output**
  The testers have an internal memory function, which retains the measurement values and the decision result. The 3002 model holds 260 sets of data, while the 3003 holds 250 sets. Information can be recalled on the tester itself, or printed together with statistics, using the 3006 digital printer option.

Sample Printouts

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Low</th>
<th>In Range</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning</td>
<td>Warning</td>
<td>Fail</td>
<td></td>
</tr>
</tbody>
</table>

* The comparison threshold values depend on the battery manufacturer, type, and capacity, which must be established by the user.

**3006 Printer**
In addition to basic data and decision-result printing, this printer can also produce statistics on the data, including maximum, minimum, mean, and standard deviation values. It can also be used to print histograms. You can use this versatile tool for desk analysis and trend spotting in data gathered in the field.
SBS-3001, 3002, 3003 Interrogator (Continued)

Ordering Information, Prepackaged kits

### Specifications

<table>
<thead>
<tr>
<th></th>
<th>SBS-3002</th>
<th>SBS-3003</th>
<th>SBS-3001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Number</strong></td>
<td>SBS-3002</td>
<td>SBS-3003</td>
<td>SBS-3001</td>
</tr>
<tr>
<td><strong>Battery Capacity (estimate)</strong></td>
<td>0 to 400AH</td>
<td>0 to 12,000AH</td>
<td>0 to 200AH</td>
</tr>
<tr>
<td><strong>Resistance Ranges</strong></td>
<td>30mΩ, 300mΩ, 3Ω</td>
<td>3mΩ, 30mΩ, 300mΩ</td>
<td>30mΩ, 3Ω, 30Ω</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>10µΩ</td>
<td>1µΩ</td>
<td>100µΩ</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>0.8% rdg. 6 digits, 30 mChm to 30 Chm ranges; 1/0% rdg. 8 digits, 3mChm range</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>1kHz +/- 30 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Voltage Measurement</strong></td>
<td>±3V - 30V</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resolution/Accuracy</strong></td>
<td>1mV, 10mV/0.1% rdg. +/- 6 digits</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature Measurement</strong></td>
<td>-10°C to 60°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resolution/Accuracy</strong></td>
<td>0.1 C/ +/- 0.5%/rdg. +/- 10 digits</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Sampling Rate</strong></td>
<td>0.83 times/second</td>
<td>1,25 times/second</td>
<td></td>
</tr>
<tr>
<td><strong>Comparator</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Settings</strong></td>
<td>Resistance upper and lower limits, voltage lower limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>10 sets of values</td>
<td>99 sets of values</td>
<td>10 sets of values</td>
</tr>
<tr>
<td><strong>Data Memory</strong></td>
<td>260 data sets</td>
<td>250 data sets</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Maximum Input Voltage</strong></td>
<td>50V DC</td>
<td>60V DC</td>
<td>50V DC</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>Six AA alkaline batteries</td>
<td>Six AA alkaline batteries</td>
<td>Six AA alkaline batteries</td>
</tr>
<tr>
<td><strong>Battery Charge Life (cont. use)</strong></td>
<td>7 hours</td>
<td>5.5 hours</td>
<td>18 hours</td>
</tr>
<tr>
<td><strong>Size (HWD)</strong></td>
<td>5.12 x 1.97 x 7.72&quot;</td>
<td>5.12 x 2.56 x 7.72&quot;</td>
<td>5.12 x 1.97 x 7.72&quot;</td>
</tr>
<tr>
<td><strong>Weight w/ Batteries</strong></td>
<td>1.56 lbs. (710g)</td>
<td>1.89 lbs. (860 g)</td>
<td>1.5 lbs. (680 g)</td>
</tr>
</tbody>
</table>

### Prepackaged Kits

<table>
<thead>
<tr>
<th>Model</th>
<th>System consists of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBS-3002 K1</td>
<td>(1) SBS-3002 Battery Tester, 0-400 AH, 10 Comparators, 260 Memory Storage (1) 3006 Digital Histogram Printer (1) Cable sets (9425) (1) Custom carrying and storage case Installed in heavy duty case with all cables to connect to printer</td>
</tr>
<tr>
<td>SBS-3002 K2</td>
<td>(1) SBS-3002 Battery Tester 0-400 AH, 10 Comparators, 260 Memory Storage (1) 77518P battery-powered mini-parallel printer (thermal) and custom heavy duty case (1) Cable Sets (Part No. 9425)</td>
</tr>
<tr>
<td>SBS-3003 K1</td>
<td>(1) SBS-3003 Battery Tester, 0-12,000AH, 100 Comparators, 250 Memory Storage (1) 3006 Digital Histogram Printer (1) Cable Sets (Part No. 9425) (1) Custom carrying and storage case Installed in heavy duty case with all cables to connect to printer</td>
</tr>
<tr>
<td>SBS-3003 K2</td>
<td>(1) SBS-3003 Battery tester, 0-12,000AH, 100 Comparators, 250 Memory Storage (1) 77518P Battery-Powered Mini Parallel Printer (thermal) and custom heavy duty case (1) Cable Sets (Part No. 9425)</td>
</tr>
</tbody>
</table>

### Portable Thermal Printers and Accessories

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>77518P</td>
<td>Mini Parallel Printer (Thermal) with rechargeable battery and charger</td>
</tr>
<tr>
<td>3006</td>
<td>Digital Printer, Provides Statistics, Histograms, and Graphs on Quality Thermal Printer</td>
</tr>
<tr>
<td>9418-10</td>
<td>AC Adaptor For 3003, Used For Production Testing</td>
</tr>
<tr>
<td>9425</td>
<td>Centronics Cable – to Connect Between 3002, 3003, and 3006 Printer</td>
</tr>
<tr>
<td>9460*</td>
<td>Test Lead For 3002 or 3003, Clip Type Leads With Temperature Sensor</td>
</tr>
<tr>
<td>9461*</td>
<td>Test Lead For 3001, Pin Type</td>
</tr>
<tr>
<td>9287*</td>
<td>Clip Type Leads for 3001</td>
</tr>
<tr>
<td>9465</td>
<td>Pin Type Leads for 3003</td>
</tr>
<tr>
<td>9466</td>
<td>Remote Control Switch For 3003 Test Leads</td>
</tr>
<tr>
<td>9467</td>
<td>Large Clip Type Test Leads For 3002 or 3003, Opens to 1.14&quot; (29mm)</td>
</tr>
<tr>
<td>P115A-C</td>
<td>Centronicns/n232 Converter Box – Allows Direct Computer Interface Via Windows 95 Hyper Terminal. Instructions Provided. Also order 9425 cable.</td>
</tr>
<tr>
<td>9465TIPS</td>
<td>Replacement Tipe for Part No. 9465 - Pin type leads</td>
</tr>
</tbody>
</table>

*Replacements
**SBS-IM and ECO-VRI**

**Battery Conductance Testers**

**Applications:**
- Security systems
- Emergency lighting
- Mobility vehicles
- UPS Systems
- Contact resistant to circuit breakers, bus bar joints, and isolators

**Accessories Available:**
- Infrared Printer*
- Infrared PC Data Receiver and software
- Infrared Temperature Sensor*
- Multiple String Storage Device*
- Protective Carrying Case
- Both Clamp and Probe Cables
- Custom Interfaces available
- Amp Test Connector
* Included with standard IM Kit

**SBS-IM**
- Quick, simple, safe and accurate operation
- Measures individual cell and overall string health and voltage
- Consistent, repeatable on-line testing without discharge to batteries
- Tests 2-volt through 12-volt batteries on-line or off-line
- Stores up to 252 consecutive test results and overall string statistics
- Provides advanced warning or potential battery failures
- Tests each cell in under 10 seconds
- Tests battery cell intercell strap integrity
- Portable IR wireless printing and data transfer to PC laptop

**ECO-VRI:**
- Efficient and accurate battery tester priced to fit into every technician's tool kit, designed for small VRLA batteries:
  - Tests 6V and 12V batteries
  - Helps to ensure the operation of critical systems despite power loss
  - Prioritizes battery replacements and addition testing for cost-effective system management
- No external power source needed

**Operating range:**
- 6V and 12V nominal batteries from 0.5 to 25 Ampere hours in capacity
- Voltmeter: +6.0 to +14.0 VDC
- Conductance: 20 to 600 Siemens

**SBS DSM200 and DSM600 Digital Micro-Ohmmeter**

**Digital Micro-Ohmmeters**

**DSM200 Features**
- 0-10A and 0-200A DC test current
- 0.1µΩ resolution
- mV, A, and µΩ displayed simultaneously
- Direct Ohms reading at any current
- Large back-lit liquid crystal display

**DSM600 Features**
- 0-600A DC test current
- 0.1µΩ resolution
- mV, A, and µΩ displayed simultaneously
- Direct Ohms reading at any current
- Large back-lit liquid crystal display
- Thermal and over-current protection
- Compact and portable
- Isolated RS232 interface for printer or PC connection
- Triple supply voltage
- Microprocessor controlled

**Operating range:**
- 90V - 264V Supply voltage range*
- High-quality 3-meter lead set

* Included with standard IM Kit

Order toll-free: 800-554-2243
Battery testing has never been this easy. Simply insert the nozzle into the battery, depress the finder pump, and extract a few drops of sulfuric acid (H₂S O₄) electrolyte. Touch one button and the processor does the rest. Within three seconds you have a temperature compensated accurate reading of specific gravity and temperature.

Field studies show time savings of at least 5 times (500%) using the SBS-2002 Digital Hydrometer over a standard glass hydrometer and thermometer.

Example of Cost Savings:
If you spend 15 minutes testing specific gravities every month in 20 sites, this total, 15 minutes x 20 sites x 12 months per year = 3,600 minutes divided by 60 = 60 hours. Since we can reduce this time 500%, 60 divided by 5 = 12 hours total time with the SBS-2002. That’s a 48-hour savings per year per employee. 48 hours x $39.00 labor cost with benefits = $1,872.00 of savings per year, per employee.

General Information:
Each SBS-2002 Includes:
1. Sampling Tubes (3)
2. 9V Alkaline Batteries
3. Case for Storage and Carrying
4. Instructions

Ordering Information:
SBS-2002 Digital Hydrometer
2002 HOL Holster for SBS-2002
2002 Kit Spare parts kit

Features:
- Time savings – 5 times faster than conventional methods
- 99.998% accurate
- Measures specific gravity and temperature
- Automatically temperature-compensated to 25°C (77°F)
- Waterproof membrane keypad
- Adjustable hand strap
- Carrying case
- 7.8” suction tube (1/8” dia)
- Rugged/durable
- Compact and only 8 oz.
- Long-life pump
- Large LED display
- 30-day, 100% money-back guarantee
- 1-year warranty

Specifications
<table>
<thead>
<tr>
<th>Method of Detection:</th>
<th>Specific gravity; light refraction system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature:</td>
<td>Platinum membrane thermal sensor</td>
</tr>
<tr>
<td>Range:</td>
<td>1.000-1.300</td>
</tr>
<tr>
<td>Indicator:</td>
<td>LCD display; specific gravity, temperature</td>
</tr>
<tr>
<td>Measuring time:</td>
<td>Within 3 seconds after pushing “START” button</td>
</tr>
<tr>
<td>Power Supply:</td>
<td>DC 9V alkaline battery</td>
</tr>
<tr>
<td>Size:</td>
<td>2.95” x 1.81” x 8.66” HWD (7.5 x 4.6 x 22 cm)</td>
</tr>
<tr>
<td>Suction Nozzle:</td>
<td>Approx. 7.8”L (20cm) x 1/8” (3mm) dia</td>
</tr>
</tbody>
</table>
The SBS-1001 Digital Hydrometer sets you free from the ordinary nuisance of battery testing. Its digital readout lets you know the specific gravity and temperature for the electrolyte, and the cell voltage for lead acid batteries.

Features:
- Measures lead acid, battery specific gravity, temperature, and voltage
- Bright LCD readout
- Automatic temperature compensation to 25°C (77°F)
- Data logger (DL-1000) measures the specific gravity, voltage and temperature of up to 50,000 batteries
- Data can be viewed, printed, saved to a disk, or exported to an ASCII file.

General Information:
Each SBS-1001 includes:
1. Hydrometer (SBS-1001)
2. Test leads
3. Sensor with bulb pick-up
4. Sensor adjustment tool
5. 9V alkaline battery
6. Carrying case

PDL-1000 includes:
1. Palm
2. Hydrometer interface
3. Interface cable
4. PC software

1001 HOLBP includes:
1. Carrying holster
2. Dual battery pack and charger
3. Heavy-duty case

Ordering Information:
SBS-1001B Bulb Digital Hydrometer
PDL-1000 Data Logger & Software
1001HOLBP Holster
SBS1001 Kit Package Kit of all of above

Specifications:
Sensor: Sensor probe dia: 0.9" (23 mm) fits into vent well of most stationary or motive power batteries (bulb screws on to allow use with any type lead acid battery down to 1/4" opening)
Method of Detection: Specific gravity: optics, temp: silicon diode resistance
Indicator: LCD digital indicator
Measurement Range Accuracy
Specific Gravity: 1.050 to 1.350 +/- 0.003
Acid Temp.: 10 C to 50 C +/- 1 C (0-40 C)
Voltage: 19.99VDC +/- 0.01V
Power Supply: DC 9V alkaline battery
Size: 7.5" x 4" x 2.25" HWD (190 x 101 x 57 mm)
Sensor: 7L x 0.9"D (182 x 23 mm) (Bulb 1/8" x 4")

PC Sample Report Screen
SBS BCT-5000 Battery Capacity Tester

DC Resistive Load Bank (24V, 48V, or 120V)

The only way to know your industrial batteries will perform to specification is to test them regularly. SBS's battery capacity testers enable you to test your wet or sealed batteries in a variety of ways and at three voltages. Load bank test 24V, 48V, or 120V DC systems with currents up to 171 amps. A built-in digital meter lets you read volts, amps, amp-hours, and elapsed time without having to hook up a separate meter. The display is accurate to 1% of full scale at the rated voltages. The unit also offers continuous operation, so there's no cool down needed after or between tests. Use the master load control switch to instantly apply or remove loads.

Built-in Protection
The over-voltage and over-temperature protection components coupled with load elements extend instrument life and system reliability by operating at less than 50% of the maximum temperature rating. Additionally, the automatic under-voltage trip keeps cells from being damaged during testing.

Ordering Information:
■ BCT-5000 Battery Capacity Tester
■ 34970A Data Acquisition System

Features:
■ Tests 24V/48V/120V DC power sources
■ Use with wet or sealed batteries
■ Built-in digital meter with 1% full scale accuracy
■ Rated for continuous operation – no cool-down period
■ Master switch instantly applies/removes loads
■ Operates conveniently and quietly

General Information:
Each unit includes:
1. 15-foot quick-disconnect test cables
2. Operating instructions

SBS BCT-3000

Lightweight 24V, 48V DC Resistive Load Bank

The SBS Model BCT-3000 is a lightweight, DC resistive load bank contained in a small enclosure. It provides up to 150 amperes loading capacity for testing utility substation, telecommunication, and related DC power sources at 24V or 48V DC.

Specifications
Capacity: Up to 150 Amps DC
Load Step Resolution: 1 Amp
Voltage: 24V or 48V
Controls: Master Load ON/OFF; 12 Load Step Switches
Load Elements: Helically wound chromium alloy wire; no "cool down" required; over-temperature protected
Blower Power: 120 VAC 1 Ø with line cord or DC-powered version listed
Weight: Approximately 30 pounds

Cat. No Versions
■ BCT-3000 AC Fans  ■ BCT-3010 DC Fans

Visit us at www.sbsbattery.com
SBS Electronic Constant Current DC Load Testers

RBL Series Load Banks (0V-600V and 0amp-1,000amps)

Battery Testing
The SBS RBL Series Load Tester is used to test batteries by analyzing life cycle and establishing the V/I characteristics. The load is operated in the constant current mode, which freezes one of the variables when calculating the battery’s power level. Some batteries require exotic waveform testing in order to simulate real-life uses. This is accomplished by using the internal pulse generator. Many different waveforms can be created through the use of variable current levels, frequency, duty cycle, and slew rate. The load may be controlled through analog remote programming input for situations where the required waveforms are extremely complex. This input is directly proportional to the selected full-scale current of 0 to 10 volts.

The constant power mode is used to test batteries designed for UPS back-up systems. It simulates the changing current demand as the battery voltage decays, which are the characteristics of DC-to-DC converters and inverter input simulations.

Features:
- Ratings from 0-600 volts, 0-1,000 Amps, up to 4,000 watts in a single unit
- Units available in 50V, 100V, 400V or 600V:
  - 800 Watt (8”W x 5.25”H x 22”D)
  - 2,000 Watt (19”W x 5.25”H x 22”D)
  - 4,000Watt (19”W x 8.75”H x 22”D)
- Variable speed fans minimize fan noise
- Master/Slave paralleling
- Five modes of operation: Constant Current, Constant Resistance, Constant Power, Constant Voltage, Pulse Mode
- Synchronized paralleling for larger systems that are controlled simultaneously
- Programmable under voltage
- Internal pulse generator with variable slew adjustable for transient testing.

SBS GL-1000 Constant Current Electronic DC Load Tester

Battery Capacity Tester (1,000 Watts)

The SBS GL-1000 is a great tester for single cells or lower ampere hour battery systems up to 64 Vdc.

- Adjustable, constant current load
- 1.0V to 64.0V Range
- Parallel operation to enable increased load — up to four units
- Selectable CC or CR
- Weight: 11 lbs.

Voltage/ Loading Capacity:
- Input voltage: 120/220 VAC, 60/50 Hz
- Maximum Loading Power: 1,000 Watts
- Minimum Loading Voltage: 1.0 VDC
- Maximum Loading Voltage: 64.0 VDC
- Maximum Loading Current: 200AH

Cat. No GL-1000

Order toll-free: 800-554-2243
Specifications

1. Battery Input
   90 to 180 VDC, 3VA - For 125V battery

2. Ground Resistors
   30K ±1% from each bus to ground

3. Voltage Indication
   0 to ±199.9 VDC in 0.6” bright red LED digit and decimal point accuracy is ±0.2 VDC

4. Ranges
   ■ +Bus to Ground (+GND)
   ■ -Bus to Ground (- to GND)
   ■ Ground Fault Voltage (Fault)
   ■ Battery Voltage (BAT)

5. Scanning
   Each range is automatically scanned and read every three seconds.

6. Alarms
   ■ The “+/- Fault” relay energizes and latches when the + fault voltage exceeds the +/- set value for the time setting. The “alarm” LED lights. Set range is 13.0 to 100.0V
   ■ “Hi Battery” and “Low Battery” relays energize and latch when the battery voltage exceeds the “Hi” or “Low” set value for the time setting. (“Hi” set range is 125.0 to 150.0V, and the “Low” set range is 100.0 to 125.0V)

7. Time Delay
   Can be set from 5 to 60 seconds

8. Reset
   Panel push button or remote contact closure will reset an alarm provided the cause is removed

9. Contact Rating
   2A at 120 VAC or 28 VDC

10. Limit Setting
    Limits and time delay are set by removing the front bezel (4 screws). This can safely be done with power on.

11. Output Options
    ■ 0 to 1mA (isolated) into 0 to 10K load for 90 to 180 VDC input. Accuracy is ±0.1% of FS. P/N is 50-469-101-BB
    ■ 4 to 20 mA (isolated) into 0 to 500 OHM load for 90 to 180 VDC input. Accuracy is ±0.1% of FS. P/N is 50-469-1420-BB
    ■ Digital: RS232/485 with DNP3.0 or Modbus, P/N is 50-469-J3.0-BB

* Additional voltages
  P/N: 50-471-BB=48V Battery
  P/N: 50-472-BB=250V Battery
  Other voltages available - consult factory

Fault Indicator Specifications

■ Operation — Hand-activated on-off button/switch

■ Features — Automatic selection of grounded line. Does not interfere with sensitive electronic equipment, radio, etc.

■ Receiver — Does not contact circuitry; LED and sound indicators

■ Sensitivity — Up to 100Ω resistance

DC Battery Voltage Meters

Optional Fault Indicator Specifications

Operation: Produces current pulses between the transmitter and the ground fault. A pulse receiver can trace the line with these pulses to the ground. Circuit breaker in the line can be identified and open to clean the ground from the system.

Features:
■ On/off switch on front panel
■ Automatic selection of grounded line
■ Does not interfere with sensitive electronic equipment, radio, etc.

Receiver:
■ Hand-held Part No. 200A
■ Does not contact circuitry
■ LED and sound indications

Output Options:
■ 4 to 20 mA (isolated)
■ 0 to 1 mA (isolated)
■ DNP3.0
■ Modbus

Ordering Information
Add voltage to catalog number to complete:
26-328- ___ Digital DCV Transducer
25-321- ___ Digital DCV Switchboard meter
25-327- ___ Meter/relay/transducer
25-469- ___ V meter, ground meter/ alarm relay (shown)*

Call for other switchboard meters not shown

* Add suffix “-BB” for optional ground fault locator

Visit us at www.sbsbattery.com