

ANALYTIC SYSTEMS

Power Conversion Solutions

INSTALLATION & OPERATION MANUAL



BCA800MW-24A

AC Source Battery Charger

An ISO9001 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

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AC SOURCE BATTERY CHARGER

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS — This manual contains important safety and operating instructions for the battery charger.

BATTERY CHARGER PRECAUTIONS

1. Do not expose the battery charger to rain or snow unless it is a sealed model.
2. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
3. Do not disassemble the battery charger; return it to the manufacturer or an authorized service center when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire. Voltages in excess of 350 volts are present inside the charger anytime it is plugged into an AC outlet, even if it is switched off.
4. To reduce risk of electric shock, unplug the battery charger from the AC outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
5. Never place battery charger directly above battery; gases from battery will corrode and damage battery charger.
6. Never allow battery acid to drip on the battery charger.

BATTERY SAFETY

1. **WARNING — RISK OF EXPLOSIVE GASES**
 - i. **WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE SERVICING EQUIPMENT IN THE VICINITY OF THE BATTERY, YOU READ THIS USER GUIDE AND FOLLOW THE INSTRUCTIONS EXACTLY.**
 - ii. To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review the cautionary marking on these products.
2. **PERSONAL PRECAUTIONS**
 - i. Someone should be within range of your voice or close enough to come to your aid when you work near a battery.
 - ii. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
 - iii. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
 - iv. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately



- i. NEVER smoke or allow a spark or flame in the vicinity of a battery.
- ii. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit the battery or other electrical part that may cause a fire or explosion.
- iii. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to melt metal, causing a severe burn.
- iv. NEVER charge a frozen battery.
- v. If it is necessary to remove a battery from service, always remove grounded terminal from battery first. Make sure all accessories connected to the battery are off, to prevent an arc when reconnecting the new battery.
- vi. Be sure area around battery is well ventilated.
- vii. Clean the battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- viii. Study all the battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge

GROUNDING AND AC POWER CORD CONNECTION INSTRUCTIONS

The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

DANGER Never alter the AC power cord or plug provided. If it will not fit the output, use an approved adapter or have the proper AC power cord installed by a qualified electrician. Improper connection can result in the risk of electric shock.

Medical Equipment Notice

Analytic Systems does not recommend the use of their products in life support applications where failure or malfunction of this product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Analytic Systems does not recommend the use of any of its products in direct patient care. Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), auto-transfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as "critical" by the U.S. FDA



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Introduction

The BCA800MW-24 Battery Charger provides up to 800 watts to charge a military battery system (one or two bank) from a 110 or 220 VAC source (auto-switching) at 50 or 60 Hz. The charger features a water resistant construction (IP66 or better) that meets the MIL-STD-810F shock and vibration standard.

This single board design incorporates modern switch mode technology for high efficiency and quiet operation. Multiple stages of filtering reduce radiated or conducted noise to very low levels that meet MIL-STD-461F. Extra features include a switch to select 2-stage or 3-stage charging algorithms, a trim control to fine tune the charging voltage, a push button to initiate an equalize cycle, two battery temperature sensors c/w cabling and LED indicators to monitor charger operation.

Box Contents

The box you have received should contain the following:

- One BCA800MW-24A AC Source Battery Charger
- One Temperature Sensor Splitter
- Two Temperature Sensors
- This manual
- One Warranty Card

If anything is missing or damaged please contact your dealer or Analytic Systems for a replacement



Main Parts



Front Panel

- | | |
|--|--|
| 1. Output Voltage Adjust | 5. AC Power Cord |
| 2. Indicator LEDs | 6. Battery Temperature Sensor Connection |
| 3. 2 Stage / 3 Stage Select
(locking toggle switch) | 7. Battery Output Connections |
| 4. AC Input Circuit Breaker & On/Off Switch | 8. Equalize Start Push button (recessed) |



Operation

Prior to turning on the unit, you must decide on which charging profile, 2 or 3 stage charging, to use. To help you decide, please see the following section entitled 2 or 3 Stage Charging to determine the charging profile. Once you have decided on the charging profile you must set the switch to the correct position. Simply lift the toggle over the step to place it in the correct position.

To turn the unit on, simply move the power switch to the ON position. The alarm buzzer will sound and the Low Output LED will come on briefly, and then the green OUTPUT ON LED will illuminate.

When the unit is first turned on, it will charge the batteries at a constant current and the charging light will be on. After a period of time, which may be minutes to hours, the batteries will reach the float voltage at which time the charging light will go off, and the charging current will reduce as necessary to maintain the batteries at that voltage. You may check this voltage at the battery with a good digital voltmeter.

As shipped from the factory, the unit is preset to a float voltage of 27.2 VDC, which is generally recommended for lead-acid batteries. If you wish to adjust the charging voltage rotate the output adjust potentiometer, clockwise increases the output voltage, and counter clockwise decreases it. Double check the new battery float voltage with a voltmeter.



Installation

MOUNTING

The charger can be mounted or simply carried and placed in any convenient location. Keep some clearance around the fins for cooling.

POWER CONNECTION

The unit is supplied with power leads about 8 feet long. This should normally be adequate to connect to a source of power. If you must extend the power leads, be sure to use at least a good quality (type TEW or equivalent) AWG 14 gauge wire. The wire colors are:

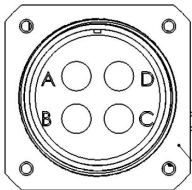
Wire Colour	110VAC	220VAC
Black/Brown	AC Hot	AC Hot/Phase 1
White/Blue	AC Neutral	AC Neutral/Phase 2
Green	Ground	Ground

All connections should be made inside an appropriate junction box. The maximum current draw from the 110 VAC supply is 14 amps, so a 20 amp circuit breaker should be used in the circuit panel.

Output Connection

The unit is equipped with a military connector MS3102E22-22S. The battery connections are shown in the following table:

Pin A: Battery 1 Negative
Pin B: Battery 2 Negative



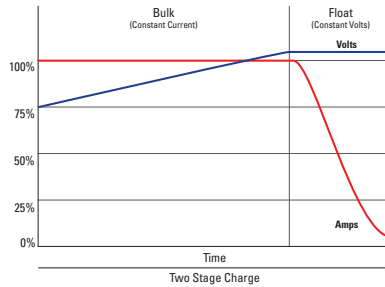
Pinout facing front panel

Pin D: Battery 1 Positive
Pin C: Battery 2 Positive

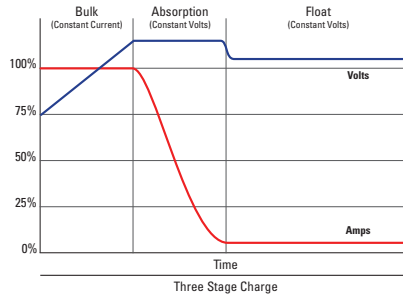


2 or 3 Stage Charging

This charger features user selectable 2 or 3 stage charging. The charging profile is selected by turning the switch on the front panel to 3 stage or 2 stage charging.



A **two-stage** charger provides a constant current until the battery reaches its rated capacity and then switches to a “float” voltage. The current then reduces as necessary to maintain the battery at the float voltage. The charger can be connected to the battery indefinitely and will provide the appropriate profile. A two-stage charger is recommended in most instances since it is the most versatile and can be permanently connected to attenuate the characteristic discharge of unused batteries. A load can be put on the battery or batteries without altering its ability to keep the battery at optimal charge



A three-stage charger is the fastest charger. It charges the battery at a constant current until the battery voltage reaches a slightly elevated level. The battery is maintained at this voltage while the charging current diminishes to a low value, and then the battery is switched to the float voltage where it can be maintained indefinitely. However, the charger cannot differentiate between a current going to a load on the battery, or being absorbed by the battery, so it can overcharge a battery supplying current to a load. A two-stage charger is preferred for “loaded” batteries and a three-stage for idle or unloaded batteries during recharging.

All of Analytic Systems’ chargers include adjustable output voltage for charging standard or deep cycle lead-acid, VLRA or gel type batteries.



Battery Temperature Sensors

Up to 2 battery temperature sensors can be connected to the charger to allow temperature compensation of the battery charging voltage. If no sensor is used, the charger will default to standard output voltage.

The battery temperature sensor allows the monitoring of the battery bank so that the charging profile can be adjusted to optimally charge the battery bank depending on the temperature of the battery bank. NOTE: The temperature sensor must be used during an equalize cycle or damage to the battery may occur.

The battery temperature sensor may be installed in many different ways, so long as the sensor stays in contact with the battery. The preferred method is as follows: The batteries to be charged will be placed on a platform made of wood. Prior to placing the batteries on the wooden platform a cavity is hollowed out such that the sensor will fit inside the cavity and be flush with the battery. Place the sensor inside the cavity facing the proper way (this is shown on the sensor).

If a battery blanket is used the sensor may be tucked inside the blanket with the proper side of the sensor facing the battery. The sensor may be placed on top of the battery but it should be secured to the battery so as to prevent it from losing contact with the battery.

Battery Charger Temperature Compensation

The charger is calibrated with the sensor input preset to 77 degrees (25 degrees C). For example, for a 12V battery, this voltage is 13.6 volts, and 27.2 volts for a 24V battery. See the specifications for the temperature compensation coefficient.



Equalize Cycle

The purpose of the Equalize Option is to deliberately overcharge the battery at a low rate of current to ensure that all cells are fully charged and to reduce the chance of sulfation of the battery. During the Equalize cycle, the cells, which are fully charged, will produce Hydrogen gas, and the cells, which are undercharged, will be brought up to full charge. An Equalize cycle should be done once every 2-3 months, or whenever battery capacity appears to be diminished. The Equalize Option also includes a battery temperature sensor to compensate the charging voltage for battery temperature, as well as to shut the charger down if the battery should become overheated. A 2nd temperature sensor can be added to allow monitoring of both batteries if the charger is connected to 2 banks of batteries.

An Equalize cycle can be initiated at any time by simply pressing the equalize start push button. If the charger is in the middle of charging the battery (the Charging LED is on), the Equalize LED will flash. Once the main charging cycle is complete, the Equalize cycle will begin and the Equalize LED will stay on continuously. If the Charging LED is off when the button is pressed, the Equalize cycle will begin immediately.

The charger will charge the battery at approximately 10% of its normal rate (i.e. 4 amps for a 40 amp charger) until the battery reaches equalize voltage and then the current reduces as necessary to maintain the battery at that voltage. Three hours after the Equalize cycle begins, the charger will return to the float mode where the battery can be maintained indefinite. If the battery temperature reaches 120 degrees F (50 degrees C) the equalize cycle will end and the charger output reduced to a very low voltage until the battery cools, and then the charger will return to the float mode.

The Equalize Cycle can be cancelled at any time by turning the main power switch to OFF and then back to ON.



LED Indicators

This unit has LED indicators to indicate operational status and help diagnose any problems.

LOW INPUT VOLTAGE Indicates that the input voltage is below normal because:

- The input voltage is not in the correct range for proper operation of the unit. If it is being run from a generator, the generator may be overloaded.

LOW OUTPUT VOLTAGE Indicates that the output voltage is below normal because:

- The battery is very deeply discharged. If this LED does not turn off soon after a charging cycle is started, the battery may be defective.

CHARGER OVERTEMP Indicates that the Battery Charger is running too hot because:

- The Battery Charger is located in a poorly ventilated area. If the charger gets too hot, the temperature sensor inside the unit will turn off the outputs. After the unit cools sufficiently, it will automatically come back on. If this happens frequently, remount the unit for increased airflow so it cools better.

CHARGING Indicates that the battery charger is charging the batteries:

- This LED should be on any time the charger is in Constant Current mode, and during Constant Voltage mode if the charging current is greater than 10% of rated output. If the LED is OFF, the charging cycle is complete.

OUTPUT ON Indicates there is voltage at the output of the charger.

BATTERY OVERTEMP Indicates that the one or both batteries are too hot

- The batteries are too hot because there is not enough ventilation, or are on the verge of failing. The charger will shut off until the batteries cool sufficiently for normal operation to resume.

EQUALIZE REQ/RUN Indicates that an equalize cycle has been requested or is running.

- If the LED is flashing it indicates an equalize cycle has been requested. The cycle will start when the main charging cycle completes. If the LED is on solid, the equalize cycle is running.



Specifications

Electrical (Input)	
Nominal Vac (ip)	110 and 220 (auto-switching)
Actual (Vac)	90-140 and 180 - 280
Input Amps (max)	16.2 8.1
Input Circuit Breaker	25A Magnetic
Input Frequency	45 - 405 Hz
Noise on Input	<50 mV
Electrical (Output)	
Output Nominal (op)	24
Output Actual (VDC)	28.8 VDC Absorption / 27.2 VDC Float +/- 0.2 VDC (calibrated at 1 Amp load for battery charger)
Output Adjustment (VDC)	+/- 2 Volts (affects Absorption and Float Voltage together)
Output Current (Amps)	30A
Charging Stages	2 (Bulk to Float) or 3 (Bulk to Absorption to Float) by front panel switch
Battery Banks	1 or 2
Output Fuse (ATC)	None - Internally protected against battery reverse connection
Duty Cycle	Continuous 100% for 24 hours per day
EMC	Meets MIL-STD-461E
Efficiency	> 75% Maximum Output
Environmental Specification	
Operating Temp. Range	-40°C to +50°C @ maximum output (derate linearly 2.5% per C from 50°C to 85°C)
Humidity	0-95% relative humidity (non-condensing) with standard conformal coating
Audible Noise	NONE Ødb @ 1 m
Typical Service Life	> 10 yrs. (87,600 hours)
Isolation	Input-Case & input-output 1500VDC / output – case 500VDC

* Specifications subjects to change without notice.

Designed and manufactured by: **ANALYTIC SYSTEMS WARE (1993) LTD.**

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Specifications

Mechanical Specifications	
Length	17.4 +/- 0.1 in / 442 +/- 2 mm
Width	8.35 +/- 0.1 in / 212 mm +/- 2 mm
Height	5.43 +/- 0.1 in / 138 mm +/- 2 mm (including carrying handle)
Clearance	1 inch (2.5 cm) all around
Material	Marine Grade Aluminum
Finish	Black anodized
Fastenings	18-8 Stainless
Weight	19.7 lb / 8.95 kg
Output Connections	4 pin MS3102E22-22S for connection to 1 or 2 battery banks
Temperature Sensor Connections	4 pin PT07A-8-4S(027) for connection to 1 or 2 battery temperature sensors
Input Connection	CEE 7/7 2.5 Metres
Shock and Vibration	Meets MIL-STD-810F
Warranty	Two years
Safety	Designed to meet CSA 22.2.107.1 & UL458

* Specifications subjects to change without notice.

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Limited Warranty

1. The equipment manufactured by Analytic Systems Ware (1993) Ltd. (the "Warrantor") is warranted to be free from defects in workmanship and materials under normal use and service.
2. This warranty is in effect for:
 - a. 3 Years from date of purchase by the end user for standard products offered in our catalog.
 - b. 2 Years from date of manufacture for non-standard or OEM products
3. Analytic Systems will determine eligibility for warranty from the date of purchase shown on the warranty card when returned within 30 days, or
 - a. The date of shipment by Analytic Systems, or
 - b. The date of manufacture coded in the serial number, or
 - c. From a copy of the original purchase receipt showing the date of purchase by the user.
4. In case any part of the equipment proves to be defective, the Purchaser should do the following:
 - a. Prepare a written statement of the nature of the defect to the best of the Purchasers knowledge, and include the date of purchase, the place of purchase, and the Purchasers name, address and telephone number.
 - b. Call Analytic Systems at 800-668-3884 or 604-946-9981 and request a return material authorization number (RMA).
 - c. Return the defective part or unit along with the statement at the Purchasers expense to the Warrantor; Analytic Systems Ware (1993) Ltd., 8128 River Way, Delta, B.C., V4G 1K5, Canada.
5. If upon the Warrantor's examination the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense by the most economical means. Requests for a different method of return or special handling will incur additional charges and are the responsibility of the Purchaser.
6. Analytic Systems reserves the right to void the warranty if:
 - a. Labels, identification marks or serial numbers are removed or altered in any way.
 - b. Our invoice is unpaid.
 - c. The defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.
7. No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so.
8. Only the Warrantor shall perform warranty service. Any attempt to remedy the defect by anyone else shall render this warranty void.
9. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion except for equipment specifically stated to be waterproof.
10. No other express warranty is hereby given and there are no warranties that extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.
11. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof.
12. The Warrantor assumes no liability for incidental or consequential damages of any kind



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