

# ANALYTIC SYSTEMS

Power Conversion Solutions

## INSTALLATION & OPERATION MANUAL

### BCA1505 Battery Charger



An ISO9001 and AS9100 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

8128 River Way, Delta B.C. V4G 1K5 Canada T. 604.946.9981 F. 604.946.9983 TF. 800.668.3884 (US/CANADA)

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**ANALYTIC SYSTEMS**  
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## IMPORTANT & SAFETY INSTRUCTIONS

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1. SAVE THESE INSTRUCTIONS - This manual contains important safety and operating instructions for power supply.
2. Do not expose power supply to rain or snow.
3. Use of an attachment not recommended or sold by the power supply manufacturer may result in a risk of fire, electric shock, or injury to persons.
4. Do not disassemble power supply; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
5. To reduce risk of electric shock, unplug power supply from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
6. Never place marine power supply directly above battery; gases from battery will corrode and damage power supply.
7. Never allow battery acid to drip on power supply when reading gravity or filling battery.
8. O/P CONNECTION PRECAUTIONS

Connect and disconnect DC output connections only after setting the power supply switch to the off position.

**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 AC cord or plug provided — if it will not fit outlet, have proper cord installed by a qualified electrician. Improper connection can result in a risk of an electric shock.

Analytic Systems does not recommend the use of the BCA1505 Series Power Supplies 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), autotransfusion 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.



# Introduction

All new Current Mode switching design offers increased power and reliability in a compact package. Extra input and output filtering reduce EMI to extremely low levels. Reliability features include an input fuse, thermal shutdown, current limiting and output short circuit shutdown with automatic recovery. The model BCA1505 Power Supply supplies 12, 24, 32, 48 or 72 VDC from a 110 or 220 VAC power source.

# Features

In a DC UPS ( Un-interruptible Power Supply ) , the charger simultaneously powers the DC load as well as the battery. As long as the AC power to the charger is available and the charger is working normally, the charger will supply the DC load as well as charge / float the battery. In case the AC power fails or if the charger stops working, the battery will automatically power the DC load. As soon as the AC power to the charger is restored, the DC load will once again be fed by the charger and at the same time the battery will be recharged.

**CAUTION!** Please ensure that the sum of the current drawn by the DC load and the current desired for charging the battery is less than the maximum current capacity of the charger. To use as a DC UPS, first switch off the DC load and connect it to the battery. Now connect the battery. Switch on the charger and then switch on the DC load.

# Specifications

Input Voltages					
Nominal (ip)	110	220			
Actual	90-130Vac	180-260Vac			
Input Amps (max)	16.2A	8.1A			
Input Breaker	25 A Breaker				
Output Voltages					
Nominal (op)	12Vdc	24Vdc	32Vdc	48Vdc	72Vdc
Float (Vdc)	13.6 ± 0.05	27.2 ± 0.05	36.3 ± 0.05	54.4 ± 0.10	
Absorption Voltage (Vdc)	14.4	28.8	38.4	57.6	86.4
Charging Amps	100	50	37.5	25	16
Absorption to Float (Amp)	15	7.5	5.6	3.8	2.4A
Battery Banks	1	1 or 2	1 or 2	1 or 2	1 or 2
Equalize Voltage (Vdc)	15.5	31	41.3	62	93
Temperature Compensation Coefficient	-30mV/°C	-60mV/°C	-80mV/°C	-120mV/°C	-180mV/°C
Battery Size (Amp Hours)*	400-600	200-300	150-230	100-150	70 - 100
Output Crowbar	17.0 ± 0.5 V	34.0 ± 1.0 V	45.4 ± 1.3 V	68 ± 2.0 V	102 ± 3.0V
Adjust	± 1.0 Vdc				



General	
Input Frequency	45 - 65 Hz
Noise on Input	< 50 milli-Volts
Noise on Output	< 50 milli-Volts
Transient Response	< 1 V for 50% surge
Efficiency	> 80 % @ maximum output
Temp. Range	-25 to +40 deg. C @ maximum output
Isolation	Input-Output & Input-Case 1500 Vdc Output-Case 500 VDC (1500Vdc @ 48 V Out)
Isolation	Output-Case 500VDC
Length	17.0 in / 43.2 cm
Width	8.2 in / 20.8 cm
Height	3.95 in / 10 cm (without carrying handle)
Clearance	1 Inch (2.5 cm) all around
Material	Marine Grade Aluminum
Finish	Black Powder Epoxy
Fastenings	18-8 Stainless
Weight	14.4 lb / 6.5 kg
Safety	ABS 11-HS794404E-PDA

\* Specifications subjects to change without notice.

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

8128 River Way, Delta, BC V4G 1K5 p. 604.946.9981 f. 604.946.9983 tf. 800.668.3884 US/Canada  
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Revised August 2014



# Installation

## MOUNTING

Mount the unit in a DRY location. Allow at least 4 inches of clearance around the heat sink fins for adequate cooling.

## POWER CONNECTION

The unit is supplied with power leads about 3 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 (typeTEW) AWG 8 gauge wire. The wire colours are:

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

All connections should be made inside an appropriate junction box. The maximum current draw from the 110 VAC supply is 16.2 amps, so a 20 amp circuit breaker should be used in the circuit panel and for a 220 VAC supply, 8.1 amps is the maximum current draw, so a 10 amp circuit breaker should be used in the circuit panel to feed power to the power supply.

## 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. Set the switch to the correct position as shown on the label.

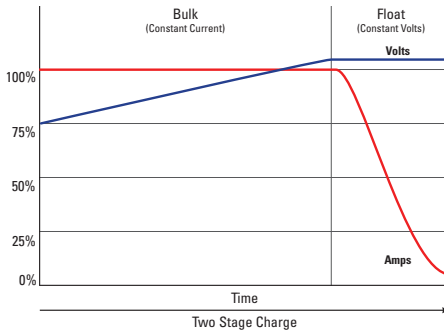
To turn the unit on, simply move the power switch to the ON position. The alarm buzzer will sound and the Low Output LED will come on briefly, and then the green OUTPUT ON LED will illuminate.

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 output terminals of the unit with a good digital voltmeter. As shipped from the factory, the unit is preset to 13.6, 27.2, 36.3 or 54.4 VDC, which is generally recommended for lead-acid batteries. If you wish to adjust the charging voltage, reach in with a very small flat blade screwdriver to rotate the potentiometer. Clockwise increases the output voltage, and counter clockwise decreases it. It is advisable to check with the battery manufacturer before changing the float voltage.

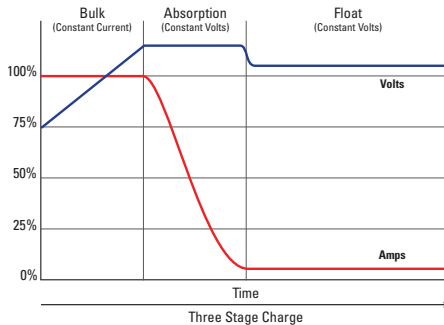


## 2 or 3 Stage Charging

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 (1 is supplied with the unit). If only the 1 sensor is used, it **MUST** be plugged into the 'BATT 1' connection on the front panel of the unit. If no sensor is used, the charger will default to standard output voltage.

For installation instructions of the temperature sensor, please see the section entitled Remote Battery Temperature Sensor Installation.

## **Equalize Option**

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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 second 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 button located at the front panel. This button is deliberately recessed to prevent accidental operation. It is most easily pressed by using a ballpoint pen. 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 all the time. 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. 5 amps for a 50 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 indefinitely. 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.

## **Remote Battery Temperature Sensor Installation**

The remote 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). Next connect the sensor wiring to the telephone jack marked "**Batt 1**" on the front panel of the unit. Note: If there is only one temperature sensor, it gets plugged into "**Batt 1**". If there is a second temperature sensor, it should be plugged into to the phone jack labeled "**Batt 2**".

## Troubleshooting

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This unit provides LED indicators and a buzzer to help diagnose any problems. The unit should sound the buzzer to alert you prior to shutting itself down. You should immediately check the indicators to determine the cause of the shutdown.

**CHARGING** Indicates that the battery charger is charging the batteries:  
If the LED is not on, the batteries may be fully charged and the charger is supplying a float voltage to the batteries to keep them fully charged.

**LOW OUTPUT** Indicates that the output voltage is below normal because:  
The current demanded by the devices connected to the unit exceeds the maximum output current rating, causing the output voltage to drop to maintain the current at the maximum level,  
The input voltage is not high enough for unit to operate,

**LOW INPUT** Indicates that the input voltage is below normal because:  
The input voltage is not in the correct range for proper operation of the unit.

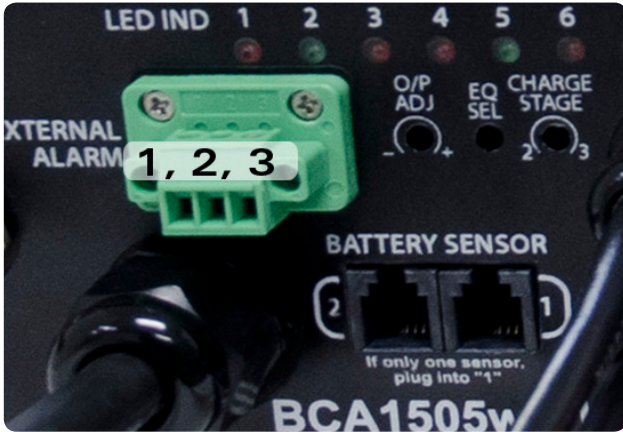
**OVERTEMP** Indicates that the Battery Charger is running too hot because:  
Too much power is being drawn, turn off or unplug some devices.  
The Battery Charger is located in a poorly ventilated area.  
If the load exceeds the continuous rating for too long a period, the temperature sensor inside 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.

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# Dry Contact Relay

Dry contact output fail relay is available at the front panel. Pin1-2 is normally close contact. Pin2-3 is normally open contact.



# Special Services & Options

<b>Conformal Coating</b>	INCLUDED ON ALL UNITS UNLESS REQUESTED NOT TO as of April 1, 2014
<b>Option "c"</b>	Ruggedization Package (EXTRA Conformal Coating and RTV Compound)
<b>Option "v"</b>	Marine / Industrial Pkg (EXTRA Conformal dipping and RTV Compound)
<b>Option "MS"</b>	Military Pkg (incl. Wide Temp Components, Conformal Dipping and RTV Compound)
<b>Option "w"</b>	Wide Temperature Operation (-40 to +55 C, incl)
<b>Option "SM"</b>	High Voltage Protection on the DC Input Side
<b>Option "d"</b>	Paralleling Diodes
<b>Option "FI"</b>	Forklift Modifications
<b>Option "F"</b>	Open Frame - No chassis just heat sink bars (not for all products)
<b>Special Input</b>	There is no charge for nominal output voltages (ie. 12.0, 24.0, 48.0), but this must be noted at the time of order (Contact Factory for details)
<b>Special Output</b>	
<b>Water tight options</b>	IP66, IPS67, IPS68



## Limited Warranty

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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
  - c. 1 Year from date of manufacture for encapsulated 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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