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TANDEM® 70

Charger / Power Supply

Owner's Manual

TABLE OF CONTENTS

1	INTRODUCTION FEATURES SAFEGUARDS GROUNDING/EARTHING
2	OPERATION Charging Applications Three Stage Charging Methodology
3	Led Indications
4	OPERATION AS DC CAMERA SUPPLY FROM MAINS POWER LOSS FCC NOTICE SPECIFICATIONS FUSE/TYPE REPLACEMENT
5	WARRANTY

INTRODUCTION

The Tandem® 70 is the smallest and lightest package available in both a charger and on-camera power supply. It incorporates all of the Logic Series® circuits that are employed in every Anton/Bauer charger. The fast charge feature makes it a perfect complement to a current Anton/Bauer battery system and given its small size is ideal for travel.

Like all Anton/Bauer chargers, everything is automatic. Once a battery is placed onto the charger, it will automatically go into one of the Three Stage Charging modes. If the unit and battery are then attached to a piece of equipment, the power supply mode will prevail, stopping all charging. Once the camera/camcorder is turned off, the Tandem® 70 will continue charging the battery, remembering where it previously stopped.

FEATURES

- 70 Watt Power Supply @ 16.4 VDC
- Fast Charging
- Logic Series technology
- Wide Range Input (100-240vac 50/60Hz)
- Seven (7) Independent Charge Termination Systems
- Lightweight (16 oz.)

WARNING:

Tandem® 70 is a 70 watt power supply. Exceeding 70 watts may cause fuse to short leaving unit unable to function. Please check equipment to be powered to ensure under 70 watts of total draw.



This symbol indicates the presence of un-insulated, dangerous voltage inside the enclosure of the charger. There is a risk of shock if the charger case is opened.



This symbol indicates that important operating and maintenance instructions are in the accompanying literature.

SAFEGUARDS

Power Sources: This unit was designed to operate at mains voltages from 100 to 240 Volts AC, 50/60 Hz.

Risk of Electrical Shock: Refer servicing to qualified service personnel.

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

GROUNDING/EARTHING

IMPORTANT WARNING: THIS APPARATUS MUST BE EARTHED.

To ensure safe operation, the three pin plug supplied must be inserted only into a standard three-pin power point which is effectively grounded through the normal household wiring. Extension cords used with the equipment must be three-conductor and be correctly wired to provide connection to earth ground. Improperly wired extension cords are a dangerous electrical hazard.

The fact that the equipment operates satisfactorily does not imply that the power point is properly grounded and that the installation is completely safe. If any doubt exists about the correct grounding of the power point, consult a qualified electrician.

IMPORTANT: The wires in this mains lead are colored in accordance with the following code:

Green and yellow	Earth
Blue	Neutral
Brown	Live

OPERATION

Charging

As with all Anton/Bauer chargers, charging with Tandem® 70 is fully automatic. Mount any Logic Series® battery to the Tandem® 70 and it will automatically determine and execute the appropriate charge routine.

Applications

The Tandem® 70 will charge any Anton/Bauer Logic Series® Gold Mount® battery including model: ProPac®, Trimpac®, Digital ProPac®, Digital Trimpac®, HyTRON®, and DIONIC® series.

NOTE: Anton/Bauer always recommends that each battery has its own charge position. A battery can remain on an Anton/Bauer charger indefinitely.

The Tandem® 70 incorporates the exclusive InterActive® communication between battery and charger, which allows the charger to identify any Anton/Bauer battery attached and determine the precise charge routine for that battery under the prevailing conditions.

NOTE: Due to the specialized communications between the charger and the battery, batteries without the Logic Series® construction and communication capability (manufactured by Anton/Bauer before 1989 as well as so-called “rebuilt”) can not be charged with this charger. The InterActive® communication of Logic Series® batteries is the key which allows the Tandem® 70 to safely identify and address new style and chemistry batteries as they are developed. Moreover, this communication ensures that batteries contain the quality cells, workmanship and safety of genuine Anton/Bauer products. If a non-Logic Series® battery is placed on the charger, the red and green LED indicators will flash alternately. This indication means that the battery cannot communicate its identity to the Tandem® 70 and is not charging. After 30 seconds of flashing green and red LED’s, the red LED will remain on, indicating a HOLD state.

WARNING: USE OF THIS CHARGER WITH ANY BATTERY NOT MANUFACTURED BY ANTON/BAUER MAY RESULT IN BATTERY DAMAGE AND CAUSE RISK OF FIRE OR PERSONAL INJURY.

THREE STAGE CHARGING METHODOLOGY

In general, the TANDEM® 70 will deliver a **three stage charge routine** to each battery.

1. STAGE ONE will deliver a high rate charge matched to the capabilities of the battery (typically a one or two hour rate, depending on battery type). During this stage, seven separate cutoff methods are in operation, simultaneously, ensuring the fastest, safest charge for that battery:

when a temperature indicative of full charge is reached;

Dt/dT - A microprocessor based algorithm which measures a rise in temperature over a specific time, very accurately indicating full charge. This method is also the recommended method for charging Ni-MH technology;

-ΔV - A method to determine the end of stage one charging by identifying a characteristic “reverse slope” of a Ni-Cd cell. Since this characteristic can be disguised by the age, temperature and the number of the cells in a battery, it can never be employed alone;

CCO - This method requires the identification of the particular battery size (capacity) and chemistry, an exclusive Anton/Bauer Logic Series® feature. The charger determines the maximum charge time for the particular battery and uses this information to ensure that overcharge conditions are avoided.

FUL - This determination is made when a fully charged DIGITAL battery is returned to a charger within specified parameters of time, temperature, and battery voltage. The DIGITAL battery communicates its fully charged condition and the charger confirms the parameters and immediately indicates a fully charged condition, without additional verification.

TEMPERATURE COMPENSATED VCO – For HyTRON™ series of batteries. Optimizes VCO cutoff to operate only within certain temperature parameters.

I-Min – for DIONIC batteries, a seventh cutoff method is employed. The battery is charged to specific voltage and I-Min current until full charge is reached. I-Min is the “minimum current” flow required for proper cutoff.

2. STAGE TWO charging is a BALANCING or “equalize” mode which calculates each battery pack type to offset any imbalance of the battery’s cells, created by unequal self discharge or any capacity mismatch of the individual cells in the pack. This stage can vary in duration from zero to as much as 16 hours, depending on the condition of the battery. A battery will typically leave Stage Two in 2-4 hours under average operating conditions.

3. STAGE THREE Charging is the Anton/Bauer exclusive Lifesaver® maintenance mode. This patented pulse routine keeps batteries fully charged, free from self-discharge - indefinitely - without damaging heat associated with a so-called “trickle charge”.

NOTE: Anton/Bauer strongly recommends that batteries are kept on a charger until ready for use. The Lifesaver® mode will keep them 100% charged and ready for use.

TCO - Temperature cutoff which stops the Stage one charge precisely

OPERATION CONTINUED

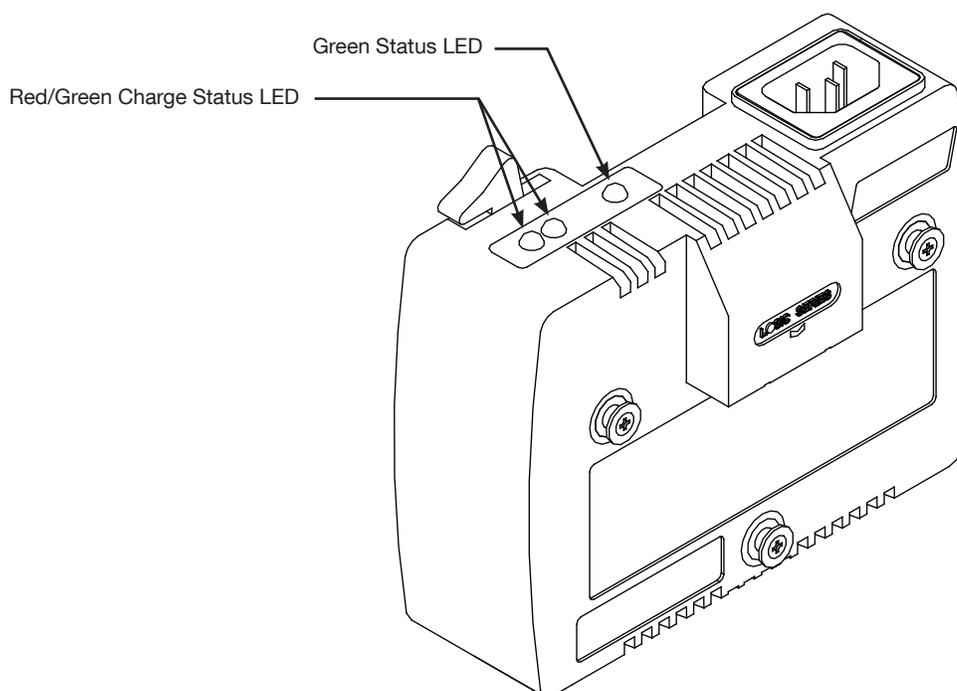
LED INDICATIONS

The Tandem® 70 has three LEDs one red (charger), two green (ready and status). The status green LED indicates three states;

1. Solid green LED indicates Tandem® 70 is operating as a charger.
2. Flashing status green LED indicates Tandem® 70 is operating as a power supply.
3. No green LED indicates power has been removed from Tandem® 70.

The red and green LED's will indicate the charging status of the battery. The following table identifies all of the LED indications and their meaning:

LED INDICATION	MEANING
Alternating Red & Green	Indicates that the Tandem® 70 is evaluating the battery and/or communicating with a DIGITAL battery, loading battery parameters and determining the appropriate charge routine. A low voltage (<11V) battery will cause this indication to continue until the battery is "rejuvenated" to a safe charging voltage. NOTE: This indication will continue if a non-Anton/Bauer Logic Series® battery is mounted on the charger. These batteries cannot identify themselves to the Tandem 70 and will not be charged.
Steady Red	Indicates that the battery is being held by the Tandem® 70 to stabilize an out-of-range temperature condition.
Flashing Red	Indicates that the battery is currently under Stage One charge.
Flashing Green (slow rate)	Indicates that the battery is currently under Stage Two charge.
Flashing Green (fast rate)	Indicates a fully charged DIGITAL battery is placed on the charger and a FUL cutoff condition cannot be met. The charger is VERIFYING that the battery is in a full charge condition.
Steady Green	Indicates that the battery is READY and in Stage Three Lifesaver® mode.



OPERATION AS DC CAMERA SUPPLY FROM MAINS

The Tandem® 70 will automatically operate as a DC power supply once the camera, or other device is turned on. There are no switches, it is fully automatic. The single green LED will light indicating that the unit is operating as a power supply.

A battery may be attached to Tandem® 70 while mounted to a camera. With the camera OFF, the battery will charge. When camera is turned ON, Tandem® 70 will supply power to camera remembering the point at which it left charging. When camera is turned off, Tandem® 70 will again resume battery charging.

If AC line voltage is removed from the Tandem® 70, and a charged battery is mounted on the unit, power from the battery will be routed to the camera. When AC line voltage is restored, the battery will be re-evaluated for a proper charge routine.

TIP: When camera is used on stakeout, (such as indoors on a tripod) keeping a battery mounted to the Tandem® 70 allows instant switching to handheld. Simply remove the power cord for an automatic switch to battery power.

At all times when the Tandem® 70 is mounted to the camera, whether on AC or battery, the total continuous load limit is 70 watts @ 16.4 VDC.

WARNING: DO NOT OPERATE THIS UNIT IN THE RAIN.

POWER LOSS

If AC power is lost during operation the unit will function in the following manner:

- When powering a camera with a battery applied, the green status LED will blink once every three seconds. The battery will take over powering the camera as long as the battery is charged.
- When powering a camera and no battery is applied, no LEDs will be lit.

FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment has been approved by one or more agencies. All changes and/or modifications not expressly approved by Anton Bauer, Inc. could void the users' warranty and authority to operate this equipment. There are no serviceable parts in this equipment.

SPECIFICATIONS

Size	5.2" x 4.03" x 2.19"
Weight	16oz (1 lb.)
Input Voltage	100-240VAC 50/60 Hz
Output Voltage	16.4 VDC
Fuse Rating	7 amp Surface Mount
Maximum Power	70 watts at 16.4 volts

FUSE/TYPRE REPLACEMENT

The fuse of the Tandem® 70 is a PCB mounted device which should only be replaced by a qualified service technician.

LIMITED WARRANTY

This three (3) year limited warranty for the product specified in this document ("Product") is given by Anton/Bauer, Inc. ("Anton/Bauer"), 14 Progress Drive, Shelton, Connecticut 06484. If you (the purchaser of the Product from Anton/Bauer, or the person for whom the Product was purchased, if it was a gift) have any questions regarding Product applications, Product specification, or to obtain warranty service on this or any Anton/Bauer product, contact the company at the address above.

THIS PRODUCT MUST BE REGISTERED WITH ANTON/BAUER WITHIN 30 DAYS OF PURCHASE TO ASSURE WARRANTY COVERAGE. TO REGISTER YOU MAY EITHER:

1. MAIL WARRANTY REGISTRATION CARD or
2. REGISTER ON LINE AT www.antonbauer.com

The liability of Anton/Bauer hereunder is expressly limited to a claim for repair or replacement of the Product or as otherwise stated herein at Anton/Bauer's sole discretion. Notice of any claim under this warranty shall be delivered to Anton/Bauer during the period of the warranty and the Product shall be returned with its packaging promptly, at your expense, to an Anton/Bauer Customer Support Center or to the address above. Upon receipt of the Product and a record of your compliance with the conditions of this warranty, Anton/Bauer will repair or replace the Product and return it to you, or issue a credit, as applicable. You are responsible for all shipping and handling charges to and from authorized facility.

THIS WARRANTY DOES NOT APPLY TO AND IS VOID IN THE CASE OF DEFECTS OR DAMAGE RESULTING FROM ACCIDENTS, DISASTER, NEGLIGENCE, MISUSE, IMPROPER INSTALLATION, IMPROPER OR UNAUTHORIZED SERVICE OR MAINTENANCE, UNAUTHORIZED REPLACEMENT PARTS OR ATTACHMENTS; OR DYSFUNCTION OR MALFUNCTION OF, OR CAUSED BY, ANY OTHER PRODUCT OR DEVICE. **Misuse includes any use of the Product in other than its intended application, including the use of this Product with any charging device or accessory not manufactured by and/or specified by Anton/Bauer. This warranty does not cover, and Anton/Bauer assumes no responsibility for, any equipment or devices used in conjunction with the Product.**

ANTON/BAUER DISCLAIMS ANY LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY WRITTEN OR IMPLIED WARRANTY OF THE PRODUCT. UNDER NO CIRCUMSTANCES WILL ANTON/BAUER BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This Warranty is to be construed and enforced in accordance with the law of the State of Connecticut, including the provisions of the Uniform Commercial Code as adopted and from time to time amended in the State of Connecticut, and not the Convention for the International Sale of Goods. This choice of Connecticut law is exclusive of any Connecticut law that would require reliance on any law foreign to Connecticut. Should any action of law or in equity be brought by any person under this Warranty, such action shall be brought only in the

United States District Court for the District of Connecticut, or in any Superior Court in Fairfield County, Connecticut, USA. Some states do not allow limitations on how long a warranty lasts, so the time period limitation herein may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may have other legal rights which may vary from state to state.

Use of unauthorized equipment in conjunction with Anton/Bauer products constitutes misuse under our warranties and may limit or void those warranties. Anton/Bauer does not authorize, condone, recommend, or otherwise assume any liability or responsibility resulting from the use of any battery, charger or accessory made by Anton/Bauer manufacture with any battery, charger or accessory not manufactured, produced or sold by Anton/Bauer. Anton/Bauer only authorizes the use of original Anton/Bauer product with this product. Use only original Anton/Bauer equipment with this product.



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