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BBM PLUS

UNIVERSAL BATTERY BALANCER

Installation & Operation Manual

Manual Part No: 018-008-A0

Revision History:

Issue 04 – Updated Format and Diagrams (EMV)

Multilink Inc. 580 Ternes Ln. | Elyria, OH 44035 | 440.366.6966 | www.gomultilink.com

INSTALL AND OPERATION

Contents

IMPORTANT SAFETY INSTRUCTIONS

 Please read the following safety instructions before installing  or operating this product. Even though this product has been designed for safe installation and use, the following symbols have been placed throughout the manual that alert the user to instructions requiring special attention or areas where potential electrical hazards exist.

 Indicates important operating instructions. **FOLLOW THESE INSTRUCTIONS CLOSELY.**

 Indicates areas where dangerous voltages exist. **USE CAUTION IN THESE AREAS.**

ADDITIONAL SAFETY INFORMATION

 Batteries can supply extremely high currents and can cause great physical damage if the terminals are accidentally shorted. Batteries may explode if shorted.

 ALWAYS use a face shield and rubber gloves when installing or maintaining batteries.

 ALWAYS exercise extreme caution when working around battery terminals and connections and when applying grease or other anti-corrosive materials to the terminals.

 ALWAYS use insulated tools. Using tools that are not insulated may cause a short circuit.

 ALWAYS insulate the ends of any disconnected wires to prevent them from accidentally shorting to adjacent terminals when disconnecting batteries.

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 ALWAYS inspect batteries for any signs of leaking, swelling, or cracking. Replace battery if any of these conditions are found.

 ALWAYS neutralize any electrolyte spills or leaks with an appropriate neutralizing solution.

 ALWAYS use appropriate lifting techniques when lifting or moving batteries.

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

1. Introduction

The Second Generation Battery Balance Manager (BBM PLUS):

The BBM PLUS Second Generation Battery Balance Manager has been designed as a universal battery balancer for both two, three, and four battery systems. The BBM PLUS auto-configures for a two, three, or four battery string, depending on the output wire harness connected. An additional feature provides a low voltage disconnect which disables the battery balancer if battery voltage decreases to a preset limit. This feature protects the batteries from extremely deep discharge and permanent damage if the charger in the CATV power supply cannot charge the batteries for any reason.

Product features include:

1. No need to maintain matched battery sets for field replacement.
2. Combine new replacements with older batteries in existing strings. (*)
3. Active battery charge equalization at float voltages.
4. Automatically and correctly tracks charger voltage and temperature compensation.
5. Battery string charges at full charger current, up to maximum of CATV supply capability.
6. Evenly distributes charge across all batteries in the string preventing potential undercharge and overcharge damage.
7. Can be used with CATV supply of any manufacturer.
8. Universal design will work with 24V (two battery), 36V (three battery), and 48V (four battery) systems. (**)
9. Low battery cutoff reduces risk of over-discharge damage during prolonged periods of no charge.

* Replacement battery must be same type, chemistry, size, and AH rating.
** On systems with more than one string of batteries, each string requires a separate BBM Plus

2. Unpacking and Inspection

Unpacking and Inspection

Unpack the battery balancer and inspect for any obvious signs of shipping damage or missing components. Verify that all items are present, including the balancer itself, the interconnecting cable and instruction manual. Since this battery balancer has been designed as a universal product, the only unique item included is the interconnecting harness.

For 2-battery (24 volt) applications, the harness contains three wires in colors of orange, red, and black. For 3-battery (36 volt) applications, the harness contains four wires in colors of red, orange, yellow and black. The 4-battery (48 volt) applications contain a harness with five wires in colors of red, orange, yellow, brown and black. Ensure that the proper harness has been included for your system application.

Missing or Damaged Items

If items are found to be damaged or missing, contact the shipping company and your Multilink representative immediately.

Original Shipping Container

If a unit needs to be returned for service, we recommend that it be shipped in its original shipping container. Items damaged as a result of improper packaging are not covered under warranty.

3. BBM PLUS Installation

Refer to the following diagrams when installing the BBM Plus in **CATV** applications:

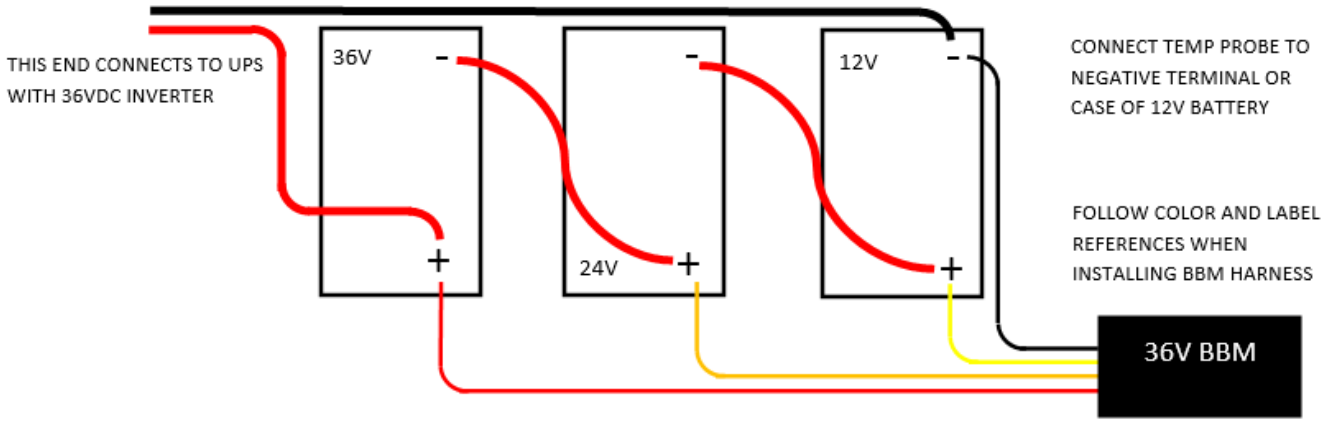

Figure 1 CATV Installation with 36VDC battery string

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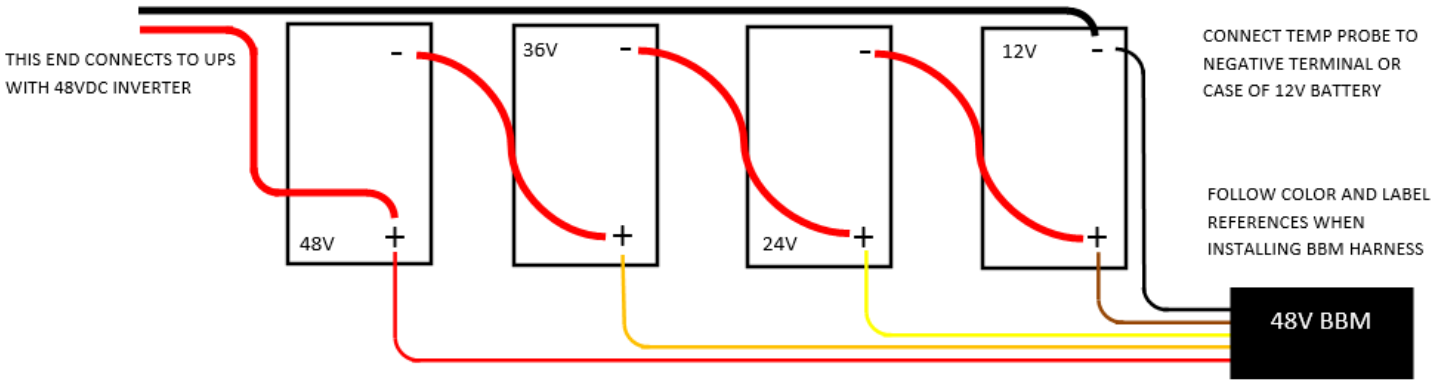

Figure 2 CATV Installation with 48VDC battery string

Refer to the following diagrams when installing the BBM plus in **DOT** and **ITS** applications:

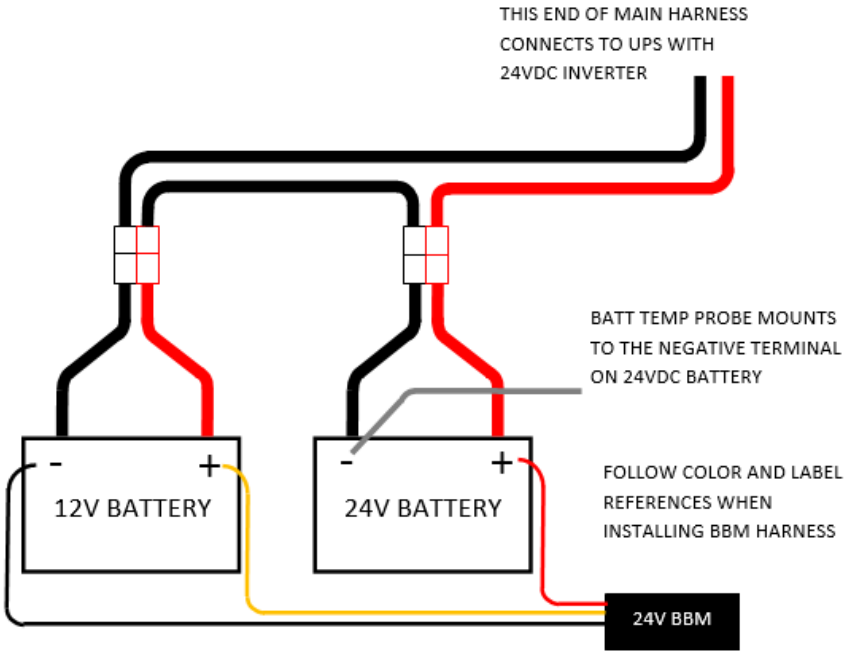

Figure 3 DOT and ITS Installation for 24VDC battery string

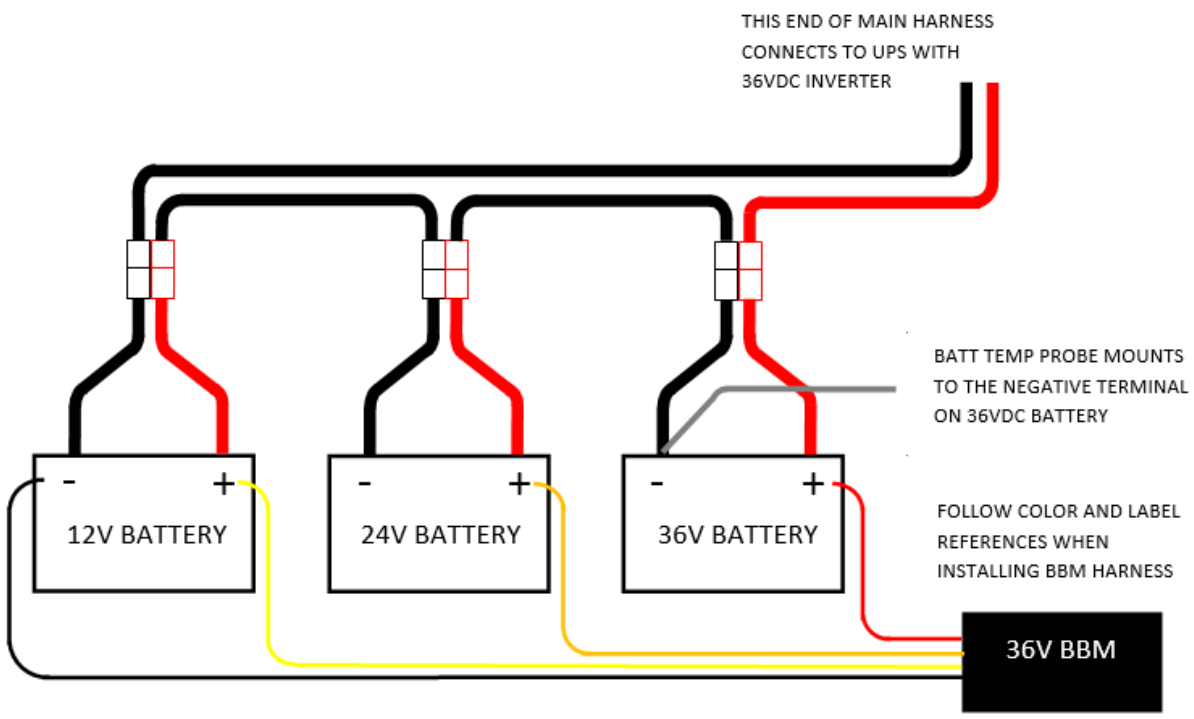

Figure 4 DOT and ITS Installation for 36VDC battery string

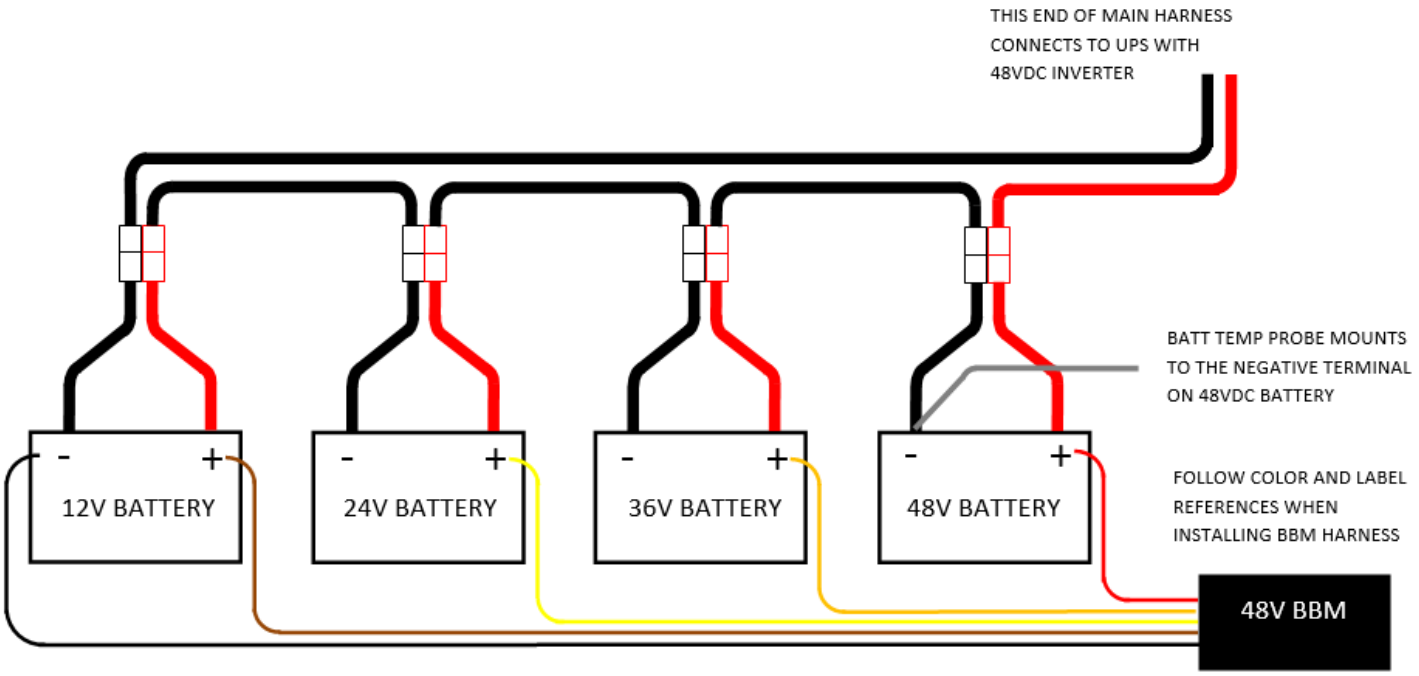

Figure 5 DOT and ITS Installation for 48VDC battery string

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Follow Safety Instructions, Refer to Safety Section

1. Locate a suitable place in the cabinet for the battery balancer where adequate ventilation is assured and where the interconnecting wire harness will reach all battery terminals. The battery balancer may be placed on the power module shelf or inside the battery compartment. Self-adhesive Velcro tape may be used to secure it in place on a vertical sidewall. **DO NOT LOCATE THE BATTERY BALANCER DIRECTLY ON TOP OF THE POWER SUPPLY OR UPS**. **EXCESSIVE HEATING AND SUBSEQUENT FAILURE CAN OCCUR**. Do not place the battery balancer directly on top of the batteries to avoid a short circuit hazard.

2. Measure and record the individual battery voltages. Note the differences between individual batteries.

3. Switch the battery breaker on the standby supply or UPS to the **OFF** position. Un-plug the battery connector from the power supply.

4. Connect the battery wiring harness per the wiring diagram in Figure 3. Inspect and clean the battery terminals as necessary to ensure a good connection. Battery terminal grease should be used to retard oxidation at the connection points. Dress the wires away from any sharp edges and allow sufficient slack for battery tray movement. Excess wire may be bundled and secured with cable ties or other restraining means.

5. Using a voltmeter or digital multimeter (DMM), verify that the correct voltages appear at the appropriate wires on the 8-pin connector on the end of the battery harness. Refer to Section 5 (Advanced Troubleshooting) in this manual for the voltage values and correct wire pairs to be measured. Correct any wiring errors as required.

6. Plug the 8-pin battery harness connector into the **BATTERY CONNECTOR** of the battery balancer unit. There may be a small arc as the connector is mated due to the charging of internal capacitors. After a few seconds the LED should light indicating the balancer is in operation.

7. Plug the battery connector into the front of the power supply or UPS and switch the battery breaker to the **ON** position.

8. Allow the battery balancer to operate for a few minutes. Measure and record the individual battery voltages. Note the differences between individual batteries. Compare the new readings with the old ones, including the differences between batteries. The difference between battery voltages should be less and start to converge as the balancer operates.

4. BBM PLUS Troubleshooting

This troubleshooting guide has been designed to help you quickly locate and resolve common problems:

SYMPTOM	CAUSE / SOLUTION
LED off, Balancer not operating	Check battery harness, connections, and verify for correct connections. Repair/replace battery harness as required. Clean and tighten battery connections. Test and replace balancer as required.
LED on, batteries not in balance	Batteries charging after an outage. Verify that charger is in recharge mode and allow sufficient time for balancer to function.
LED on, one or more batteries excessively low	One or more batteries are over-discharged. Allow sufficient time for charger to recharge. One or more batteries may have shorted cell(s). Test and replace batteries as required. Check battery connections and harnesses. Clean, tighten, repair, or replace as required. Test and replace balancer as required.

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5. Advanced Troubleshooting:

This procedure may be performed either in the lab with a suitable DC bench supply capable of providing the required battery string voltage, or in the field using a known good battery string.

1. Operate the battery circuit breaker of the power supply to the **OFF** position.
2. Unplug balancer from all external connections.

3. If in the field, disconnect all battery balancer harness connections from the batteries except the most positive (red) and most negative (black) wires. Verify that string voltage is present at the connector on the end of the harness. Secure the disconnected wires to prevent shorting but still allowing accessibility for voltage measurements. **(NOTE: Leave power supply battery interconnect wires in place and battery harness plugged into the power supply.)**

4. If testing in the field, the power supply battery circuit breaker may be switched **ON**.

5. Apply string voltage to the balancer, using either the batteries or alternate bench supply.

6. After a few seconds the LED should light. If it does not light, the battery balancer has failed and requires repair or replacement.

7. When the LED is on, measure the voltage between the connections of the leads that would normally be connected to each battery. Refer to the chart for measurement points and voltages. If any voltages are non-existent or beyond tolerance, the balancer has failed and must be repaired or replaced.

36V three-battery measurement points and voltages:

Wire harness colors	**Voltage**
Red to Orange	1/3 of applied string voltage +/- 65mV.
Orange to yellow	1/3 of applied string voltage +/- 65mV.
Yellow to black	1/3 of applied string voltage +/- 65mV.

48V four-battery measurement points and voltages:

Wire harness colors	**Voltage**
Red to orange	¼ of applied string voltage +/- 65mV.
Orange to yellow	¼ of applied string voltage +/- 65mV.
Yellow to brown	¼ of applied string voltage +/- 65mV.
Brown to black	¼ of applied string voltage +/- 65mV.

8. Before replacing and returning the battery balancer to service turn the power supply battery circuit breaker off and reconnect all disconnected battery wiring. Observe correct colors for hookup.

9. Plug the battery harness connector into the balancer.

10. Switch the power supply battery breaker **ON** and verify proper operation of the power supply and the balancer.

6. Service

Preventive Maintenance:

Follow Safety Instructions, Refer to Safety Section

1. Periodically clean and tighten all battery connections. Apply battery terminal grease if necessary.

2. Inspect batteries for any signs of leaking, swelling, or cracking. Replace battery if any of these conditions are found.

3. Inspect balancer wiring harness and connector for signs of damage. Repair or replace as necessary.

4. Measure battery voltages and compare to each other. Battery voltage should be within 65-130 millivolts of each other.

Parts:

Parts can be ordered directly from the customer service department at :

Multilink
580 Ternes Avenue P.O. Box 955
Elyria, Ohio 44035

Models:
BBM PLUS with three-battery harness: part no. 018-008-20

BBM PLUS with four-battery harness: part no. 018-009-20

BBM PLUS with two-battery harness: part no. 018-020-20

7. Technical Specifications:

Balance Rate: 150 hours typical to +/-65 mV after complete discharge/charge cycle, using new 100AH gel batteries.

Maximum string charge: Up to the maximum delivered by CATV power supply charger.

Maximum Balance Current: 1A limited by electronic means.

Balance accuracy: +/-65mV or better when battery capacity mismatch does not exceed 20%.

Overload protection: Electronic self-resetting protection. Accidental reverse polarity protection.

Environmental: -40C to +60C, 0-99% RH non-condensing.

Dimensions: 2.125”H x 6.000”W x 3.437”D

Weight: Approx. 1.25 lbs.

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