TRUE BLUE POWER®

A division of Mid-Continent Instrument Co., Inc.

Lithium-Ion Battery Shipping Preparation Procedure

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FOREWORD

This guide provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install and maintain this equipment. If further information is required, please contact:

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We welcome your comments concerning this guide. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the guide reference number, the paragraph/figure/table number and the page number. Send your comments to:

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REVISION HISTORY

Rev	Date	Detail	Approved
1	02/03/2020	Initial release	ER
2	06/17/2024	Added TB60 to document	KB
3	06/19/2024	Added Part Numbers (PNs) to document	JS

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SECTION 1 PREFACE

1.1 INTRODUCTION

This Shipping Preparation Procedure is intended to provide high level guidance and education on preparing True Blue Power Advanced Lithium-ion Batteries for shipment by ground, maritime and air transportation. True Blue Power Advanced Lithium-ion Batteries are classified as Class 9 Dangerous Goods and have specific regulations levied on their shipment. There is specific documentation and packaging required for the shipment of li-ion batteries. If you are not an authorized HazMat shipper, you may search for certified HazMat shippers near you.

True Blue Power lithium-ion cells and batteries are designed to comply with all applicable shipping regulations as prescribed by industry and regulatory standards. This includes compliance with the UN recommendations on the Transport of Dangerous Goods, IATA Dangerous Goods Regulations, applicable U.S. DOT regulations for the safe transport of lithium-ion batteries, and the International Maritime Dangerous Goods Code. In accordance with IATA and per UN 3480, PI 965, Section 1A and 1B, when shipped by air, the True Blue Power Advanced Lithium-ion Battery will be shipped with a state of charge (SOC) not to exceed 30% of rated capacity.

These guidelines do not supersede the instructions provided in each products' respective installation manual.

1.2 DEFINITIONS

Capacity
A measure of the stored electrical energy that is available from a charged battery. Generally expressed in Ampere Hours, or as a % of the nominal (nameplate) capacity.

State of Charge (SOC)
The amount of stored energy (capacity) available in a rechargeable battery. Usually expressed as a percentage of its full capacity.

Constant Potential Charging
A method used to charge a battery in which a predetermined fixed voltage is passed through it.

Constant Current Charging (NOT to be used with True Blue Power battery products)
A method used to charge a battery in which a predetermined, fixed current is passed through it.

1.3 SAFETY

- Remove all metal articles such as bracelets, watches, and rings.
- Ensure belt buckle is covered when lifting battery.
- Metal tools must be insulated.
- Wear eye protection.

1.4 CAUTIONS

Vent port should be capped or covered whenever the battery is removed from the aircraft.

Remove cap from vent port when charging battery.

Always use Electrostatic Discharge (ESD) Protection when working with a Lithium-Ion battery.

Do **NOT** remove the lid or loosen the lid screws.

1.5 WARNINGS

DO NOT SHORT TERMIANLS AT ANY TIME!

All batteries are shipped at 30-100% state of charge (SOC), making the power terminals active and energized.

Do not use “Constant Current” or “Reflex” settings. This will damage the battery.

Lithium-Ion batteries shall be charged using the “Constant Potential/Voltage” charge setting only.

Lithium-Ion batteries should NEVER be discharged completely to 0VDC or stored at temperatures above 104°F (40°C).

The battery electrolyte is corrosive. Personnel should consult the MSDS for clean-up and personal protection in the event of any venting or thermal runaway.

1.6 REQUIRED EQUIPMENT

True Blue Power Advanced Lithium Ion Batteries can be charged, discharged and capacity checked utilizing most existing equipment used to service other battery chemistries.

- Power supply (capable of constant potential/voltage) – max current is dependent on battery being supported
- Electronic load
- Respective installation manual
- Alternative equipment – battery analyzer that is capable of adjustable constant potential/voltage and adjustable load

SECTION 2 SHIPPING OPTIONS

2.1 GROUND SHIPPING PREPERATION

Ground shipment has no restrictions for SOC in the battery. True Blue Power recommends fully charging the battery (100% SOC) prior to shipment if going ground.

2.2 MARITIME SHIPPING PREPERATION

Maritime shipment has no restrictions for SOC in the battery. True Blue Power recommends fully charging the battery (100% SOC) prior to shipment if going by ocean.

NOTE: If there is any chance for the shipment to use air shipping during its delivery process, refer to the instructions in Section 2.3 AIR SHIPPING PREPARATION. Be aware that a battery will require complete recharge within 30 days of shipping preparation.

2.3 AIR SHIPPING PREPERATION

UNDOT regulations for air shipment of lithium ion batteries requires them to be discharged to 30% SOC prior to shipping. This is an **air shipment** requirement only. True Blue Power recommends discharging the battery just prior to shipment if going air to minimize time at low SOC.

SECTION 3 PREPPING PROCEDURE

3.1 VISUAL INSPECTION

1. Inspect the exterior of the battery case for signs of wear or damage.
2. Verify lid is secure and not loose.
3. Verify no damage has occurred that would prevent the battery from maintaining its air-tight seal.
4. Check the battery for any odors or signs of fluid residue.
5. Visually inspect any battery connectors, including the power terminals, RTD Temp connector, and Comm/Service connector.
6. Verify no connectors are loose and no signs of damage or corrosion.

NOTE: If any of the above conditions are present, the unit must be evaluated and tested for repair or replacement. Contact True Blue Power at +1 316.630.0101 for assistance.

Pre-shipment visual inspection: Any damage or wear to the case or lid of the battery, damage to power receptacle, or connectors is unacceptable for shipping. Contact True Blue Power for assistance.

3.2 CHARGING

***** CAUTION *****

If you attempt to charge a battery and the battery does not accept charge current, contact True Blue Power at +1 316.630.0101 for assistance.
If battery is below 20VDC, contact True Blue Power at +1 316.630.0101 before proceeding further.

Always charge with Constant Potential/Voltage. For automated method with a battery analyzer, reference example below in 3.2.6.

3.2.1 TB17 [PN 6430017-()]

Charge will take approximately 1 hour for a fully discharged unit.

1. Set the power supply to constant voltage of 28.8VDC.
2. Limit maximum current of power supply to 17A.
3. Charge battery until charge current tapers to less than 0.7A.

3.2.2 TB44 [PN 6430044-()]

Charge will take approximately 45 minutes for a fully discharged unit.

1. Press and hold Heater Enable/Disable switch on front of battery for 2 seconds. (Green light should illuminate continuously)

***** CAUTION *****

If the light does not illuminate, this indicates the battery is at a very low SOC or is damaged.
DO NOT ATTEMPT TO CHARGE
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2. Set power supply to constant voltage of 28.5VDC.
3. Limit maximum current of power supply to 60A or less. (Reduced amperage limits will increase charge time)
4. Charge battery until charge current tapers to less than 1.0A.

3.2.3 TB20 [PN6430020-()], TB30 [PN6430030-()], TB40 [PN6430040-()], TB60 [PN6431060-()]

Charge will take approximately 1 hour for a fully discharged unit.

1. Set the power supply to a constant voltage of 28.8VDC.
2. Limit the maximum current of the power supply to 20/30/40A respectively or less. (Reduced amperage limits will increase charge time)
3. Charge the battery until the charge current tapers to less than 1.0A.

3.2.4 Example of Automated Method

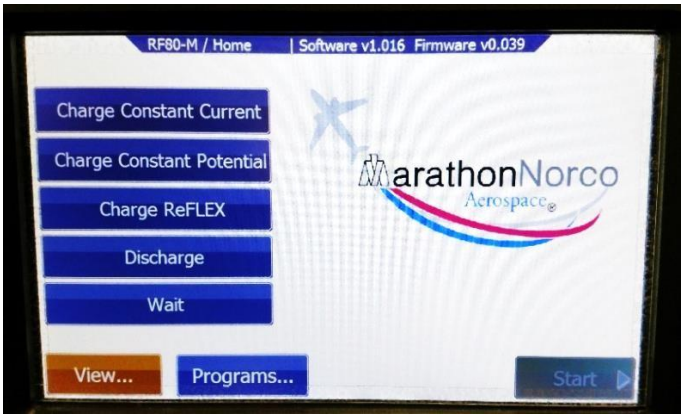
Any battery analyzer that can support Constant Potential/Voltage, set charge current, and charge time can be used following the below instructions to charge any True Blue Power Advanced Lithium Ion Battery products, excluding emergency batteries.

NOTE: Power adjustments for each specific product are in the respective section above.

The below example shows the Christie RF80-M battery charger charging a TB44.

1. Remove cap from vent port.
2. Connect charger cable to the battery.

3. Turn on charger.



4. If handling a TB17, skip this step.
    a. For TB44: Press the HEATER ENABLE / DISABLE button (2-3 sec) on the front of the battery. (Light should illuminate). This wakes up the PCB inside the battery.

***** CAUTION *****

If the light does not illuminate, this indicates the battery is of a very low SOC or is damaged.

DO NOT ATTEMPT TO CHARGE.

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    b. For TB20, TB30, TB40: Press the STATUS button momentarily on the front of the battery. (ACTIVE light should illuminate). This wakes up the PCB inside the battery.

***** CAUTION *****

If the light does not illuminate, this indicates the battery is of a very low SOC or is damaged.

DO NOT ATTEMPT TO CHARGE.

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If the FAULT or SERVICE light illuminates, this indicates the battery needs maintenance.

DO NOT ATTEMPT TO CHARGE.

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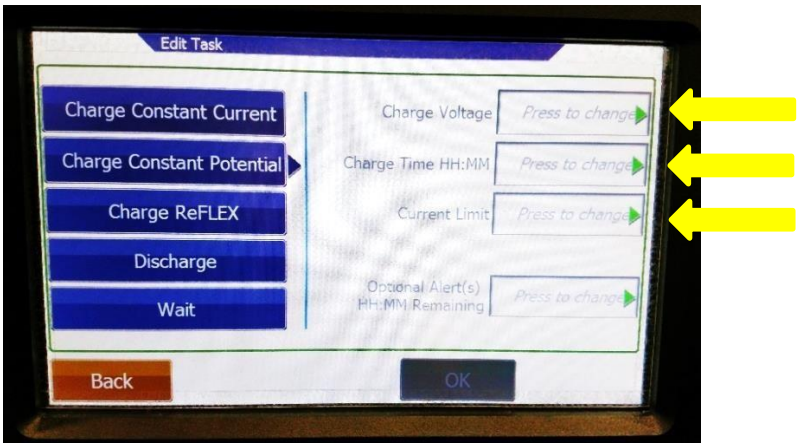
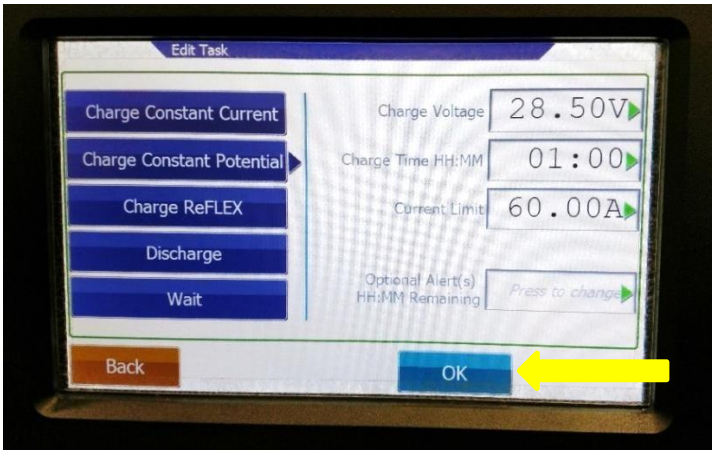


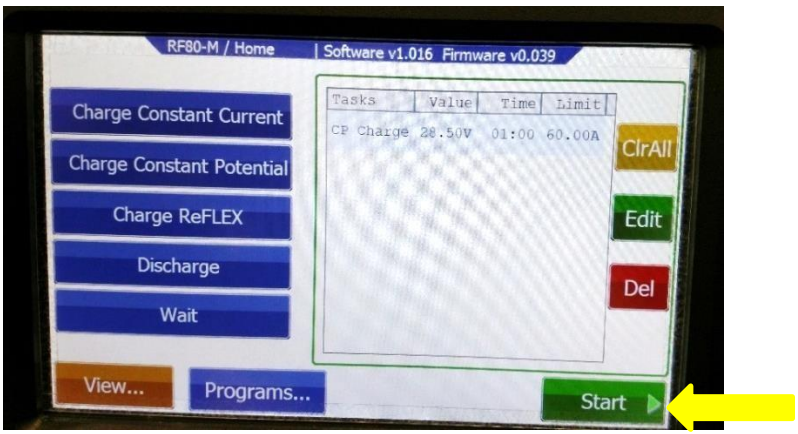
5. Select “Charge Constant Potential” on the touch screen.
6. Select voltage, charge time, and current limit by pressing the boxes on the touch screen, this will take you to the appropriate input screen.
7. Set voltage to 28.5VDC
8. Set time to 2:00 hr
9. Set current limit to 60A

10. Select “OK” after each input.

11. Select “OK” on the touch screen, this screen shows the values selected.



12. Select “Start” to begin charging process.



13. Once the battery voltage has reached the selected voltage, the charger will automatically shut-off or the charging process can be stopped by selecting the “Stop” button.

14. Battery charging complete. Best practice would be to note date of charge for next reference.

3.3 DISCHARGING

NOTE: Battery room and battery should be at 64° – 82° F for accurate results.

***** CAUTION *****

Discharge should occur no more than 24 hours prior to shipment to maintain battery health during shipment. Battery should be fully charged immediately prior to following the instructions below for discharge to ensure battery health and accuracy of SOC.

For automated methods with a battery analyzer, reference example below in 3.3.6.

3.2.3 TB17 [PN 6430017-()]

Discharge will take approximately 42 minutes.

1. Apply a constant current load of 17A.
2. Remove load after 42 minutes

3.3.2 TB44 [PN6430044-()]

Discharge will take approximately 42 minutes.

1. Apply a constant current load of 44A.
2. Remove load after 42 minutes

3.3.3 TB20 [PN6430020-()], TB30 [PN6430030-()], TB40 [PN6430040-()], TB60 [PN6431060-()]

Discharge will take approximately 42 minutes.

1. Apply a constant current load of 20/30/40/60A respectively.
2. Remove load after 42 minutes

3.3.4 Example of Automated Method

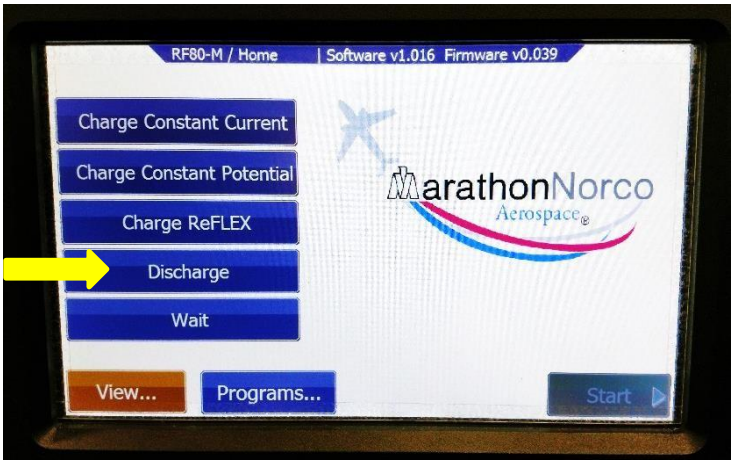
Any battery analyzer that can support Constant Potential/Voltage, set discharge current, and discharge time can be used following the below instructions to discharge any True Blue Power Advanced Lithium Ion Battery products, excluding emergency batteries.

NOTE: Power adjustments for each specific product are in the respective section above.

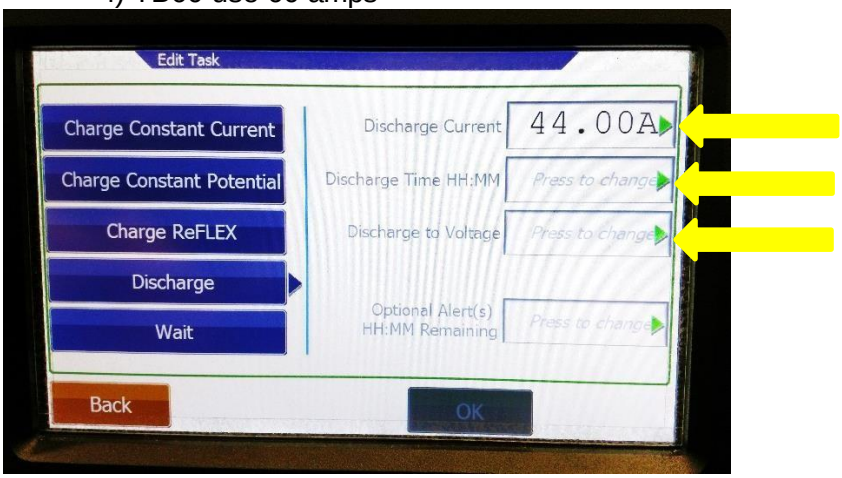
The below example shows the Christie RF80-M battery charger discharging a TB44.

1. Ensure battery has been charged per the charging procedure above immediately prior to discharge.
2. Connect charger cable to battery.

3. Turn battery charger on.
4. Select “Discharge” on the touch screen.



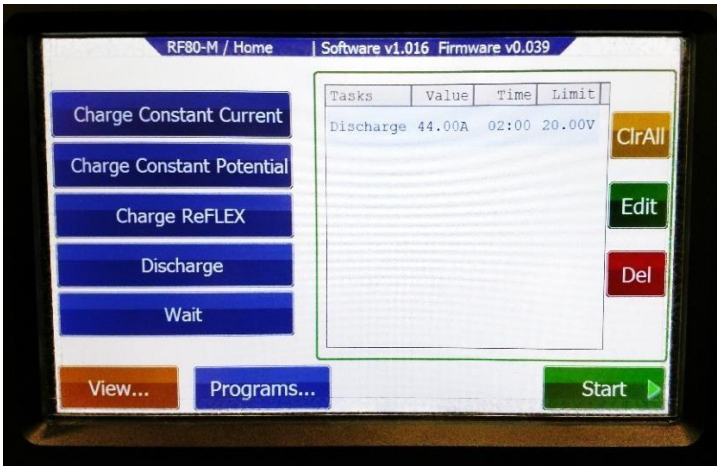
5. Select discharge current, discharge time, and discharge voltage by pressing the boxes on the touch screen, this will take you to the appropriate input screens.
6. Set discharge current according to battery model below:
    a) TB17 use 17 amps
    b) TB20 use 20 amps
    c) TB30 use 30 amps
    d) TB40 use 40 amps
    e) TB44 use 44 amps
    f) TB60 use 60 amps



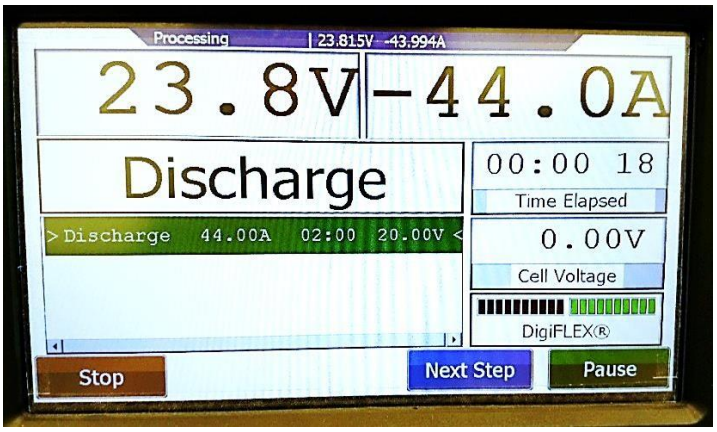
7. Set discharge time to 00:42 hrs:mm
8. Set discharge voltage to 22 VDC
9. Select “OK” after each input.

10. Select “OK”.

11. This screen shows the values selected. Select “Start” to begin discharge procedure.



12. Discharge will run until the selected time is met.



Battery is at 30% SOC for shipping. Battery posts may indicate voltage above 25VDC. This is normal and okay for shipment. Best practice would be to note date and level of discharge for next reference.

***** CAUTION *****

MUST be recharged within 30 days.