

Replacing the Internal Batteries in UNITY/I™ Models UT3K, UT4K, UT5K, and UT8K

This publication describes how to change the internal batteries in UNITY/I models UT3K, UT4K, UT5K, and UT8K. This procedure is for units with the fuse board mounted below the front panel of the unit. If the fuse board is inside the chassis, see BEST publication UTY 619. **A qualified service technician must perform this procedure.**

If you have any questions or problems while performing this procedure, call BEST Power Worldwide Service at 1-608-565-2100, or 1-800-356-5737 (U.S.A. and Canada), or call your local BEST office.

Replace batteries with the **same series and type** battery.

Tools Required (use insulated tools):

DC voltmeter	7/16" nut driver	½" heat shrink tubing or electrical tape
Phillips screwdriver	Diagonal cutters	<i>UNITY/I User Manual</i>
7/16" box wrench	1/4" nut driver	

Personal safety equipment required by local codes (also see the caution on pp. 2 - 3).

Contents

Important Safety Instructions	2
Section 100: Before Replacing the Batteries	4
Section 101: Powering Down the UPS	5
Section 102: Using Battery Maintenance Mode	5
Section 200: Removing the Batteries	8
Section 300: Replacing the Batteries	10

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS!

This publication contains important instructions that you should follow during battery replacement.

CAUTION

Full voltage and current are always present at the battery terminals.

The batteries used in this system can produce dangerous voltages, extremely high currents, and a risk of electric shock. They may cause severe injury if the terminals are shorted together or to ground (earth). You must be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation. Do not touch uninsulated battery terminals.

A qualified technician or electrician who is familiar with battery systems and required precautions must service the batteries. Any battery used with this UPS shall comply with the applicable requirements for batteries in the standard for emergency lighting and power equipment, UL 924. Batteries must be replaced with BEST battery number BAT-XXXX or equivalent. The installation must conform to national and local codes.

Keep unauthorized personnel away from batteries.

The technician or electrician must take these precautions:

1. Wear protective clothing and eye wear. Batteries contain caustic acids and toxic materials and can rupture or leak if mistreated. Remove rings and metal wristwatches or other metal objects and jewelry. Do not carry metal objects in your pockets where the objects can fall into the battery cabinet.
2. Tools must have insulated handles and must be insulated so that they will not short battery terminals. Do not allow a tool to short a battery terminal to another battery terminal or to the cabinet at any time. Do not lay tools or metal parts on top of the batteries, and do not lay them where they could fall onto the batteries or into the cabinet.
3. When connecting cables, never allow a cable to short across a battery's terminals, the string of batteries, or to the cabinet.
4. Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet even if the battery is moved. Keep the cable away from any sharp metal edges.
5. Install the battery cables so they cannot be pinched by the battery cabinet door or UPS covers.

CAUTION

6. Make sure the fuse is positioned so that it will not contact any cabinet parts or other battery posts if the batteries move. Make sure there is enough clearance when the battery cabinet door closes.
7. If you are replacing batteries or repairing battery connections, follow the procedure in the *UNITY/I User Manual* to shut off the UPS and remove both AC and DC input power.
8. If your local or national code requires you to ground either battery terminal, remove the connection from the terminal to ground (earth) before you service the batteries. If any battery terminal is inadvertently grounded, remove the source of the ground. Contacting any part of a grounded battery can cause a risk of electric shock. An electric shock will be less likely if you disconnect the grounding connection before you work on the batteries.
9. Assume that old batteries are fully charged. Use the same precautions you would use when handling a new battery. Do not short battery terminals or the battery string with a cable or tool when you disconnect the batteries.
10. Do not dispose of batteries in a fire because the batteries could explode. Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
11. Batteries contain lead. Many state and local governments have regulations about disposing of used batteries. Please dispose of the batteries properly.

Section 100: Before Replacing the Batteries . . .

Before replacing the batteries in the UNITY/I UPS, you must do **one** of the following:

Power down the UNITY/I UPS

or

Enable the UNITY/I unit's "battery maintenance mode."

Whenever possible, you should power down the UPS while servicing the batteries. However, you may use battery maintenance mode if necessary. Battery maintenance mode allows a qualified technician to service the batteries without powering down the UPS or the load equipment.

Use the two questions below to help determine whether to power down the unit (Section 101) or use battery maintenance mode (Section 102).

100-1. Can the load equipment be shut down while you service the batteries?

- ☐ **YES** Go to Section 101 now (skip question 100-2).
- ☐ **NO** Continue with question 100-2 below.

100-2. Does the UPS have an external bypass switch?

- ☐ **YES** Go to Section 101.
- ☐ **NO** Go to Section 102.

Section 101: Powering Down the UPS

➡ IMPORTANT

Before beginning, measure the voltage of each replacement battery. Each battery should measure at least 12 V.

- 101-1. If there is an external bypass switch, you may use it to bypass the UPS. Otherwise, shut down the load equipment.
- 101-2. Open the front door of the UPS. Turn the key switch to “OFF.”
- 101-3. Disconnect AC input power to the UPS.

NOTE: Turning the key switch to “OFF” is **not sufficient**.

- 101-4. If you have one or more external battery cabinets, shut off the DC disconnect switches on all of the cabinets.
- 101-5. Skip Section 102. Go to Section 200 on page 8.

Section 102: Using Battery Maintenance Mode

Battery maintenance mode allows a qualified technician to service the batteries without powering down the loads connected to the UNITY/I unit. Battery maintenance mode should be used only when the unit does not have an external bypass switch and is powering critical loads that cannot be shut down while servicing the batteries.

➡ IMPORTANT

In battery maintenance mode, the unit does not regulate voltage or provide back up power in case of a power outage.

Before beginning, measure the voltage of the replacement battery. Each battery should measure at least 12 V.

CAUTION

When the unit is in battery maintenance mode (Parameter 63 set to “1”), there is still **live voltage inside the UPS**.

Battery maintenance mode (Parameter 63 set to “1”) should be used during **battery maintenance only**. Do **not** use battery maintenance mode for any other type of UPS service or maintenance.

102-1. Verify the stability of the AC line. If there are irregularities with the input AC line, BEST recommends that you do not use battery maintenance mode at this time.

- Press the [VLINE] key on the front of the unit. Watch to see if the input voltage is stable.
- You can also check the UPS system log to see if the unit has frequently switched to battery power (inverter) recently. See the *UNITY/I User Manual* for instructions on viewing the system log. Look for the system event code “in” (inverter).

102-2. Access parameter mode and enter the user password (377) as follows:

NOTE: When the unit is in parameter mode, each of the front panel keys has a specific function. The label inside the front door of the unit explains the parameter mode key functions. The label also shows a “Programming Template” with alternate key names that correspond to the parameter mode key functions.

- a. Simultaneously hold down the [CANCEL] and [RUNTIME] keys for two seconds. Release them when the display reads P-00.
- b. Press [CANCEL]. The display should read 0.
- c. Use the [%LOAD] key **or** the [VOUT] key to change the display reading to 377.

NOTE: Use the [%LOAD] key to **increase** the value. Use the [VOUT] key to **decrease** the value. If you hold down either key, the display begins to scroll more quickly.

- d. Press [RUNTIME]. The display should read 1. If it does not, repeat steps “c” and “d.”
- e. Press [CANCEL]. The display should read P-00.

- 102-3. Enter the nominal AC input line voltage in Parameter 62 (Nominal Input Voltage) as follows:



- a. The display should read P-XX, where XX is a parameter number. Use the [%LOAD] key **or** the [VOUT] key to change the display reading to P-62.

Figure 1: Battery Maintenance Mode LEDs

- b. Press [CANCEL].
- c. Use the [%LOAD] key **or** the [VOUT] key to change the display reading to the nominal AC input line voltage (200, 208, 220, 230 or 240).

NOTE: If the UPS has optional 380-415 VAC input, set the nominal AC input voltage value to “240.”

- d. Press [RUNTIME] to enter the new value.
- e. Press [CANCEL]. The display should read P-62.

- 102-4. Put the unit into battery maintenance mode by setting Parameter 63 (Battery Maintenance Mode) to “1” as follows:

- a. The display should read P-XX, where XX is a parameter number. Use the [%LOAD] key **or** the [VOUT] key to change the display reading to P-63.
- b. Press [CANCEL]. The display should read 0.
- c. Press the [%LOAD] key to change the display reading to 1.
- d. Press [RUNTIME]. The display should read 1.

- 102-5. Look at the LEDs on the UPS front panel. The LINE, BYPASS, and ALARM LEDs should be **on**, and the BATTERY LED should be **off**, as shown in Figure 1.



CAUTION

If the front panel LEDs are not lighted as shown in Figure 1, the unit is **not** in battery maintenance mode and it is **not safe** to service the batteries. Repeat all of Section 102 or power down the UPS as instructed in Section 101.

NOTE: If, after repeated attempts, the unit does not transfer to battery maintenance mode, the AC input voltage may be out of tolerance. Call BEST Worldwide Service for technical assistance.

Section 200: Removing the Batteries

➡ IMPORTANT

The steps in Sections 200 and 300 must be performed **in order**.

- 200-1. Remove the screws at the corners of the front ventilation panel and remove the panel from the unit. Also, remove the bottom narrow front panel(s). See Figure 2.

NOTE: On a UT8K, also remove the front kick plate (found below the front ventilation panel); slide it upward, then pull it away from the unit.

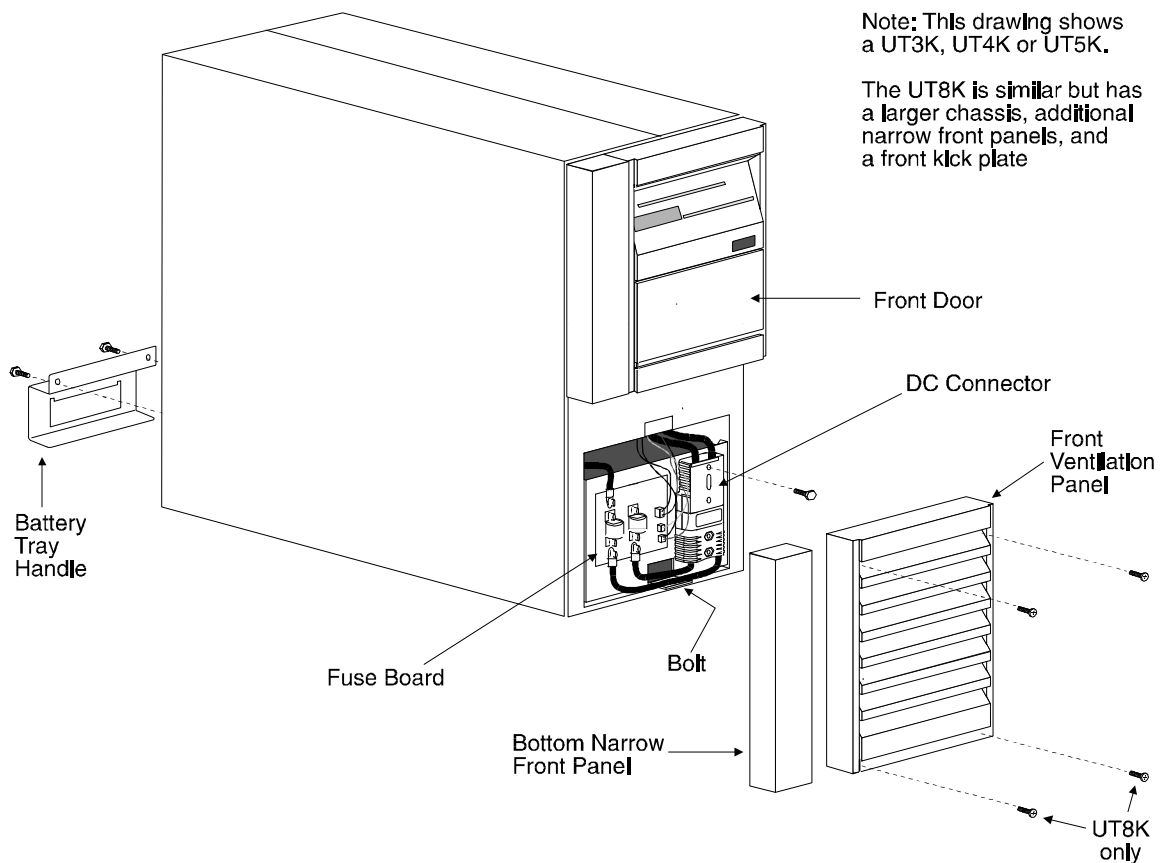


Figure 2: Single-Phase UNITY/I UPS

- 200-2. Remove the battery tray handle from the back of the unit (see Figure 2). Keep the two bolts handy to use in step 200-4.
- 200-3. At the front of the unit, remove the bolt that secures the battery tray to the floor of the chassis. To find the bolt, look under the two cables labeled “+” connected between the bottom DC connector and the fuse board (see “Bolt” in Figure 2).

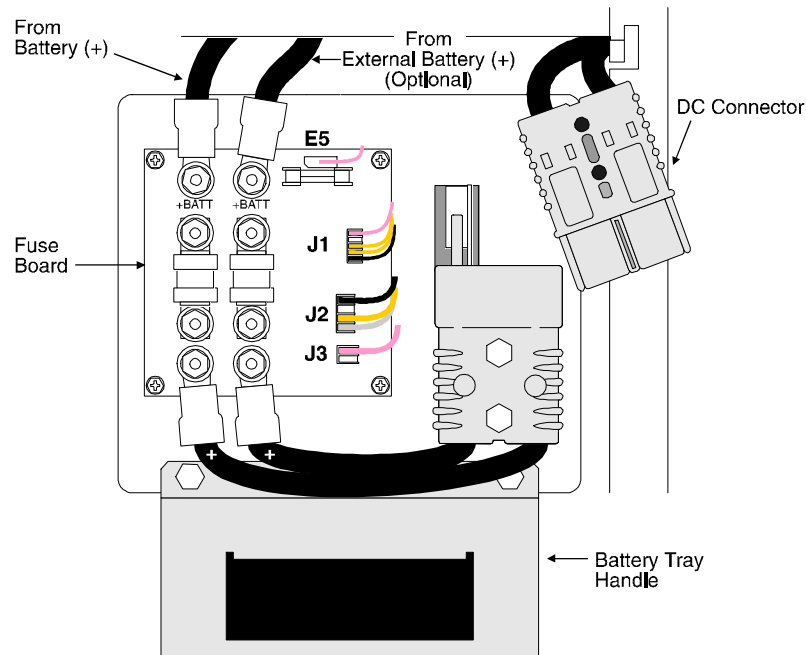


Figure 3: Battery Tray, Front View

- 200-4. Use the two bolts to attach the battery tray handle to the battery tray at the front of the unit (see Figure 3).
- 200-5. Remove the bolt from the top DC connector. See Figure 3 for DC connector location.
- 200-6. Disconnect the top DC connector as shown in Figure 3.
- 200-7. If the unit has external batteries, perform the following steps:
 - a. Switch off the DC disconnect switch on the external battery cabinet(s).
 - b. Disconnect the external battery cable (+) from the “+BATT” post at top of the fuse board (see Figure 3). **Insulate the cable lead with electrical tape or heat shrink tubing.**
- 200-8. **In the order listed**, disconnect the following from the fuse board. Remove any tie wraps. See Figure 3 for connection locations.
 - a. Fast-on connector from E5.
 - b. Connector from J3.
 - c. Connector from J1.
- 200-9. Pull the battery tray out just far enough to expose the first battery.
- 200-10. Disconnect the negative (–) battery cable from the first battery. **Insulate the cable lead with electrical tape or heat shrink tubing.**



CAUTION

The battery tray will drop to the floor if it is completely removed from the unit. Make sure that your feet/hands are not under the battery tray while pulling the tray out of the unit.

- 200-11. Read the CAUTION above. Then, carefully pull the battery tray out of the unit just far enough to expose all of the battery terminals.

Section 300: Replacing the Batteries

- 300-1. Replace the old batteries with new ones of the **same series and type** and rewire in the same order. See Figure 4.

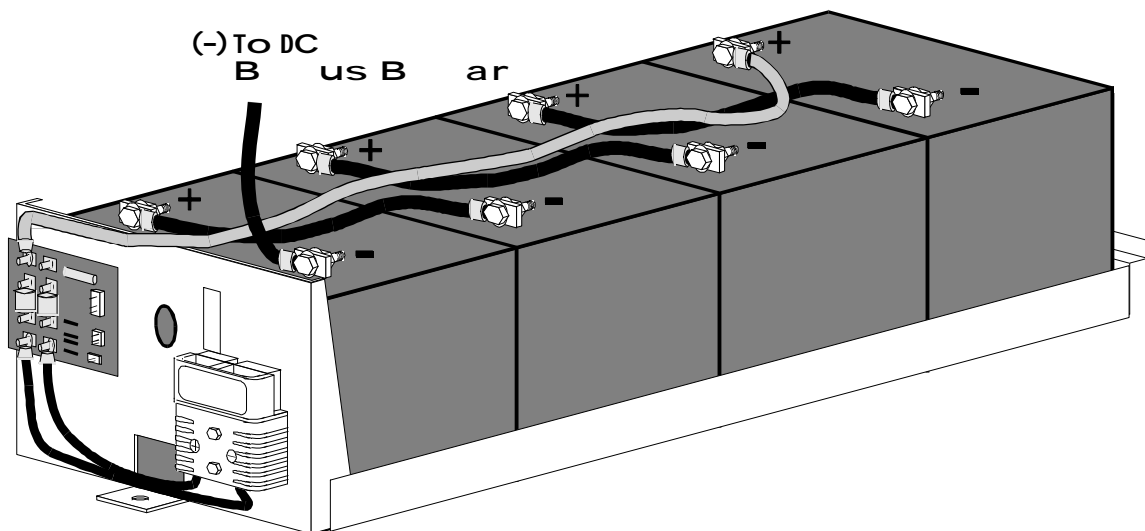


Figure 4: Battery Tray with Batteries

- 300-2. Slide the battery tray into the unit until only the front battery is exposed.
- 300-3. Attach the negative (-) battery cable to the first battery.



CAUTION

When pushing the battery tray into the unit, be careful not to pinch your fingers between the battery tray and the chassis.

- 300-4. Use the palms of your hands to push the battery drawer all the way into the unit.

- 300-5. If the unit has external batteries, connect the external battery cable (+) to the “+BATT” post at the top of the fuse board (see Figure 3). Reassemble in this order: cable, flat washer, split lock washer, nut **or** cable, flat washer, nut with attached star washer.
- 300-6. Switch on the DC disconnect switch on the external battery cabinet(s), if applicable.
- 300-7. **In the order listed**, reconnect the following. See Figure 3, on page 9, for connection locations.
- a. Connector to J1 on the fuse board.
 - b. Connector to J3 on the fuse board.
 - c. DC connector and bolt.
 - d. Fast-on connector to E5 on the fuse board. There may be a small spark.
 - e. Replace any tie wraps that were removed.
- 300-8. Remove the handle from the battery drawer and reattach it to the back of the unit.
- 300-9. Replace the bolt that secures the front of the battery tray to the floor of the chassis.
- 300-10. Replace the bottom narrow front panel(s). If you have a UT8K, also replace the front kick plate.
- 300-11. Replace the front ventilation panel and secure it with the screws.
- 300-12. **● If you powered down the UPS:**
- a. Switch on the DC disconnect switch on the external battery cabinets (if applicable).
 - b. Reapply AC line to the UPS.
 - c. Turn the UPS key switch to “AUTO.”
 - d. Reapply the loads.
 - e. You have completed the battery replacement procedure. The UPS should be running on line power with all of the load equipment applied. The **LINE LED** should be on, and the **BATTERY, BYPASS, and ALARM LEDs** should be off.

- **If you used battery maintenance mode:**

- a. Access parameter mode and enter the user password (377) as follows:
 1. Simultaneously hold down the [CANCEL] and [RUNTIME] keys for two seconds. Release them when the display reads P-00.
 2. Press [CANCEL]. The display should read 0.
 3. Use the [%LOAD] key or the [VOUT] key to change the display reading to 377.
 4. Press [RUNTIME]. The display should read 1.
 5. Press [CANCEL]. The display should read P-00.
- b. Take the unit out of battery maintenance mode by setting Parameter 63 (Battery Maintenance Mode) to “0” as follows:
 1. The display should read P-00. Use the [%LOAD] key or the [VOUT] key to change the display reading to P-63.
 2. Press [CANCEL]. The display should read 1.
 3. Press the [VOUT] key. The display should read 0.
 4. Press [RUNTIME]. The display should read 0.

➡ IMPORTANT

The BYPASS LED should be **off** and the LINE LED should be **on**.

If the BYPASS LED is on, the unit is still in battery maintenance mode. Repeat steps “a” and “b” above. If the BYPASS LED remains lit, call BEST Power Worldwide Service for technical assistance.

- c. Press [VLINE] twice to escape parameter mode.
- d. You have completed the battery replacement procedure. The UPS should be running on line power with all of the load equipment applied. The LINE LED should be on, and the BATTERY, BYPASS, and ALARM LEDs should be off.