

# WHITE PAPER

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## Commercial Notebook Batteries: Performance Optimization

### EXECUTIVE SUMMARY

The purpose of this White Paper is to communicate Compaq's solutions for notebook battery optimization. Detailed in the document are pre-use considerations and recommendations on battery calibration.

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### PRE-USE CONSIDERATIONS

Notebook batteries are shipped from the factory at approximately 30%-60% charge capacity in a low power state known as ship mode to minimize energy loss during shipment. Although the battery is not in use during shipment and storage, the control circuitry in the battery continues to draw power from the cells. Ship mode allows for a storage life of up to 1 year at room temperature ensuring that the battery is charged when it reaches the end user.

### BATTERY CHARACTERISTICS IN SHIP MODE

- The charge capacity status LED's on the battery will not indicate a charge.
- In "Power Options Properties" in control panel of windows initially indicates 0% charge when initially plugged into A/C power.
- If A/C power is not applied the battery will not power the notebook. **The customer should not mistake this for a defective battery.**

### REMOVING THE BATTERY FROM SHIP MODE

- Insert/attach the battery pack.
- Connect the computer to A/C power

Compaq recommends leaving the computer connected to A/C power until the battery light turns off, which indicates that the battery pack is fully charged.

**NOTE:** You can charge the battery pack while the computer is powered on or off.

After the battery pack has been fully charged, you can operate the computer; however, the battery gauge may not accurately report the amount of charge until the battery pack has been calibrated. It is, therefore, recommended that a new battery pack be calibrated soon after purchase. For more information on calibration please refer to the information provided below.

### **BATTERY CALIBRATION DEFINED**

With the advancement in technology, the battery industry continues to provide solutions aimed at improving methods of accurately measuring a battery's charge capacity. Inherent in today's battery chemistry, the ability to store energy diminishes with each charge cycle. The Fuel Gauge that measures charge capacity is not able to account for the gradual diminishment in capacity. As a result, over time the gauge's measurement becomes inaccurate. To maintain the measurement accuracy, Compaq recommends periodic calibration about every 90 days to reassess the energy storing capacity of the cells.

To complete the calibration of a battery, a full charge of the battery must be followed by a full un-interrupted discharge. Unless these two steps are completed together, proper calibration is not achieved and continued accuracy of the battery's Fuel Gauge cannot be assumed. The more frequently the battery is subjected to partial charges and discharges, the more frequently the battery should be calibrated.

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### ***IMPORTANT!***

*Although the Battery Calibration tab displays all batteries installed in the system including those in the ArmadaStation, only those batteries installed in the computer battery bay or MultiBay can be calibrated*

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The battery can be calibrated using one of the following methods:

- Compaq Power Management Suite (PowerCon32)
- Unattended Battery Calibration Utility
- Manual Calibration

### **CALIBRATION WITH THE COMPAQ POWER MANAGEMENT SUITE**

To meet the need for battery run time accuracy, Compaq is now pre-installing a Battery Calibration utility with the Compaq Power Management Suite (PowerCon32) on all Armada notebooks. The Compaq Power Management Suite is available for download at [www.compaq.com/support/files/notebooks/us/index.html](http://www.compaq.com/support/files/notebooks/us/index.html)

The Calibration utility simplifies the process by running all necessary actions (charge, discharge and recharge) in the background, allowing the computer to be used freely throughout the entire Calibration process. It includes a Graphical User Interface (GUI) that clearly identifies when the battery needs calibration, eliminating guesswork for the user.

The battery Calibration utility is incorporated in the Compaq Power Management suite (commonly referred to as PowerCon32) for Windows 95, Windows 98, Windows NT 4.0, and Windows 2000. To use the Battery Calibration utility, follow the instructions below for the appropriate OS.

#### **STEPS TO CALIBRATE UNDER WINDOWS 95 / WINDOWS 98 / WINDOWS NT**

(Using the Compaq Power Management Suite version 3.x and prior)

Attach AC Power Cord and do not remove until Calibration is complete. If removed, Calibration must be started over.

Go to:

- Start / Settings / Control Panel / Power Management / Battery Calibration tab (or use Fn-F7 if Hotkeys is installed)
- Under the Battery Calibration tab is located the battery status box
- Status of all batteries in the notebook is reported as either " Needs Calibration" or "OK"

Calibration process:

- Highlight the battery you desire to Calibrate
- Click on Start Calibration button - Status box reports "Calibrating"
- Allow system to run the Calibration process completely. The Calibration process may take up to 2-3 hours for a complete cycle depending on current battery state
- When complete, the Status box will indicate show "OK"
- Calibration is now complete

Notes about Calibration:

- Calibration runs in the background and system can be fully utilized during this process
- Calibration can be stopped with the same button that activates it
- System will offer to re-Calibrate about every 2-3 months, depending on usage
- The battery may be Calibrated overnight, unattended, if mobility is required during the day
- As noted in the Pre-Use Considerations section of this document, Compaq recommends calibrating each new battery, so that fuel level communication is accurate between the battery and the Operating System.

#### **STEPS TO CALIBRATE UNDER WINDOWS 2000**

Attach the AC Power Cord and do not remove until Calibration is complete. If removed, Calibration must be started over.

## COMMERCIAL NOTEBOOK BATTERIES: PERFORMANCE OPTIMIZATION *(cont.)*

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Go to:

- Start / Settings / Control Panel / Power Options / Compaq Power (or use Fn-F7 if hotkeys is installed)
- Under the Compaq Power tab is located the battery status boxes.
- Status of all batteries in the notebook is reported by percentage of charge and if Calibration is required, a Calibrate button is visible for each battery that requires Calibration

Calibration process:

- Go to Power Schemes tab and set Standby settings to never
- Go back to Compaq Power tab
- Highlight the battery you desire to Calibrate
- Click on Calibration button
- A Calibrate box opens and asks “Start Calibration” - click "Yes"
- Allow system to run the Calibration process completely. The Calibration process may take up to 2-3 hours for a complete cycle depending on current battery state
- When complete, Status box will show only percentage of charge. The calibration button is not visible until the battery requires Calibration again
- The user may return to Power Schemes and activate the type of power management setting they desire

Notes about Calibration:

- Calibration runs in the background and system can be fully utilized during this process
- Calibration can be stopped with the same button that activates it
- System will offer to re-Calibrate about every 2-3 months, depending on usage
- The battery may be Calibrated overnight, unattended, if mobility is required during the day
- As noted in the Pre-Use Considerations section of this document, Compaq recommends calibrating each new battery, so that fuel level communication is accurate between the battery and the Operating System.

### MANUAL CALIBRATION

To calibrate a battery on computers without a battery calibration utility, complete the following steps:

#### WINDOWS 95, WINDOWS 98, & WINDOWS NT 4.0

1. Remove the second battery, if present, so that only the battery needing calibration remains in the computer.
2. Dock the computer, or connect to AC power.
3. Turn on the computer.
4. Check the current battery capacity level by positioning the cursor over the battery icon in the system tray.
5. Allow the battery to charge to 100%. You may use the computer, but the recharging process will require more time.

#### WINDOWS 2000

1. Set the system to “drain” mode on the battery conservation settings by pressing **Fn+F7**, or select **Start > Settings > Control Panel > Power** (or **Compaq Power** in Windows NT).
2. Undock the computer or disconnect the computer from AC power.
3. Restart the computer in MS-DOS mode by clicking **Start > Shut Down > Restart the Computer in MS-DOS Mode > OK**.
4. Allow the computer to discharge until it shuts off.
5. Dock the computer or reconnect AC power.
6. Allow the computer to charge again to 100% as in Step 5.
7. You have now successfully calibrated the battery.

### FREQUENTLY ASKED QUESTIONS

Q: Why do I need to calibrate my battery?

A: Proper battery calibration will allow the computer to accurately report the amount of charge remaining. Improper reporting of charge may lead to false low-battery warnings, and result in a perceived short battery life

Q: How often should I recalibrate my battery?

A: The need for Battery Calibration is completely dependent on the individual usage of the battery and the frequency of subjected partial charges/discharges. Primarily users should gauge the need for Calibration on battery behavior. However, as a general rule the battery should be calibrated a minimum of once every 3 months for optimal reporting accuracy

Q: I am only getting one hour of battery life. Will calibrating improve this performance?

A: Battery life will vary based on configuration. Power settings, storage media intensive operations, or options that run off of the battery, such as PC Cards, MultiBay devices, or MultiBay Expansion Units and other factors can decrease battery life. Calibration can improve the accuracy of power reporting, which may result in improved perceived performance.

Q: What do you mean by "perceived performance"?

A: Although the battery can store a specific amount of power, certain power management events such as suspend and hibernation are triggered by the amount of remaining life reported by the battery. Misreported information can engage these power management states before it is necessary. For example, a computer is set to enter standby when the battery has 15% of life remaining. If an uncalibrated battery in the computer reports 15% when there is actually more battery life remaining, poor battery performance could be interpreted. Proper calibration would prevent premature triggering of power management events.

Q: Is there any other way to increase my battery performance?

A: Several battery conservation options are available through the Windows Control Panel. For more information about power management and batteries, refer to the online reference guide.

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