

Operating on Battery Power

This chapter contains the information you need to know to operate the notebook on battery power.

2.1 Battery Pack

Whenever possible, use the AC adapter. The battery will come in handy when you travel or during a power failure. It is advisable to have an extra fully-charged battery pack available for backup. The battery pack is installed in the power bay. Before removing the battery pack, make sure that you turn off the notebook and close the LCD display properly. Place the unit in an upside-down position and unlock the power bay lock to release the battery pack as shown in Figure 2-1.

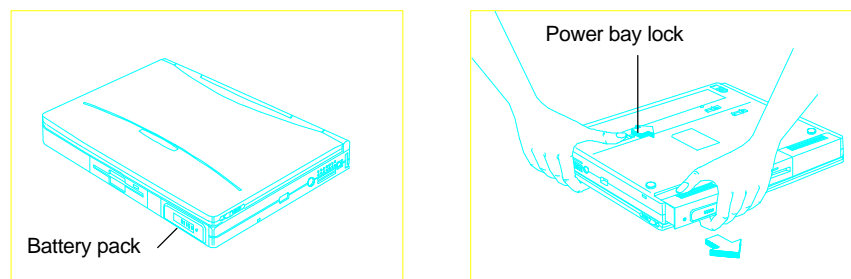


Figure 2-1 Removing the Battery Pack¹

¹ If a CD-ROM drive / battery pack unit is installed in the notebook, you need to remove the whole unit from the accessory and power bays. Then, detach the battery pack from the CD-ROM drive module.



Do not expose battery packs to temperatures below 0°C (32°F) or above 60°C (140°F). This may adversely affect the battery pack.


Currently, there is no defined standard for measuring battery life. Several factors have made it almost impossible to compare the battery life of different notebooks based on specifications alone. These factors include different implementations of power saving/management systems, applications in use, the user's "usage pattern", hard disk capacity and access frequency, LCD size and brightness, system form factor and weight.



If the system is to be stored for more than two weeks, we suggest that you remove the battery pack. Battery power (from a fully charged battery pack) depletes in roughly ten days with the notebook in standby mode. When the power switch is off, battery power depletes in one month.

2.1.1 Battery Pack Characteristics

The battery pack has the following characteristics:

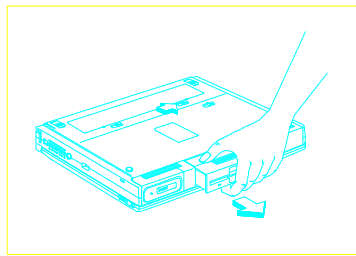
- *Battery pack self-discharge* Battery packs self-discharge slowly, which may result in a low battery power condition after being stored for weeks.
- *Memory effect* This is a phenomenon wherein charging finishes in one-third the normal charge time. This leaves the battery pack not fully charged due to inactive status after over-charging or long-term aging. This situation can usually be improved by conditioning the battery pack three times or more. Please refer to section 2.4.2 for details on how to condition the battery pack.
- *Battery-low indicator (icon)* When the battery level becomes low, the battery-low icon () on the status LCD appears. This informs the user that the battery power is critically low. You can correct this situation by recharging the battery pack.

2.1.2 Installing a Secondary Battery Pack

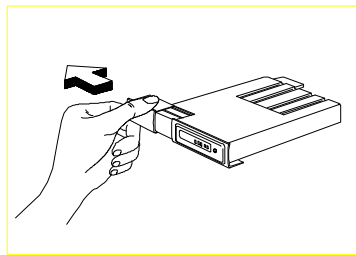
The notebook's modular design allows you to use two battery packs at the same time. The primary battery pack is inserted into the power bay and a secondary battery can be inserted into the accessory bay when you need it.

When the Accessory Bay Houses a Diskette Drive

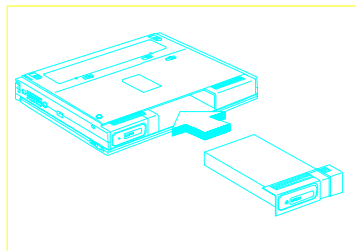
Follow these steps to install a secondary battery pack.



1. **Make sure the system power is off.** Remove the internal diskette drive by unlocking the accessory bay lock and pulling the drive out. Set aside the diskette drive.



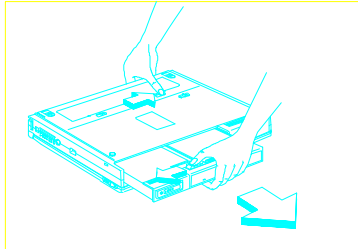
2. Extend the battery cover plate of the secondary battery pack (for NiMH battery packs).



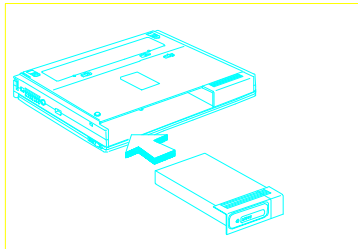
3. Insert the secondary battery pack into the accessory bay and click it into place.

When the Accessory Bay Houses a CD-ROM Drive

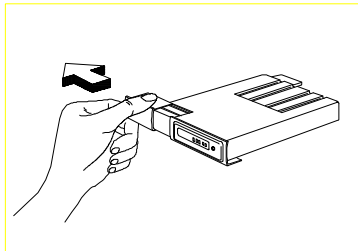
Follow these steps to install a secondary battery pack.



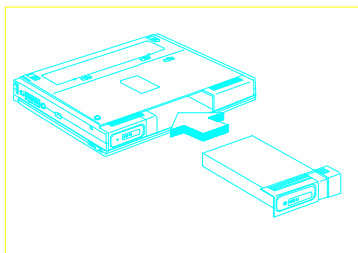
1. **Make sure the system power is off.** Remove the CD-ROM drive / battery pack unit by unlocking the accessory bay lock and CD-ROM drive lock. Then pull the drive out. Set aside.



2. Insert the primary battery into the power bay.



3. Extend the battery cover plate of the secondary battery pack (for NiMH battery packs).



4. Insert the secondary battery pack into the accessory bay and click it into place.

2.2 Charging the Battery

Place the battery pack inside the battery compartment and plug the AC adapter into the notebook and an electrical outlet.

The adapter has three charging modes:

- **Rapid mode**

The system uses rapid charging when the notebook (with a battery pack installed) is turned off and a powered AC adapter is connected to it. In rapid mode, a fully depleted NiMH battery gets fully charged in approximately two hours. The battery LEDs light up as it is being charged to indicate the level of charge.


- **Charge-in-use mode**

When the notebook is in use with the AC adapter plugged in, the notebook also charges the battery pack if installed. This mode will take longer to fully charge a battery than rapid mode.

- **Trickle mode**

When the battery is fully charged, the adapter changes to trickle mode to maintain the battery charge level. This prevents the battery from draining while the system is in use.


2.3 Checking the Battery Level

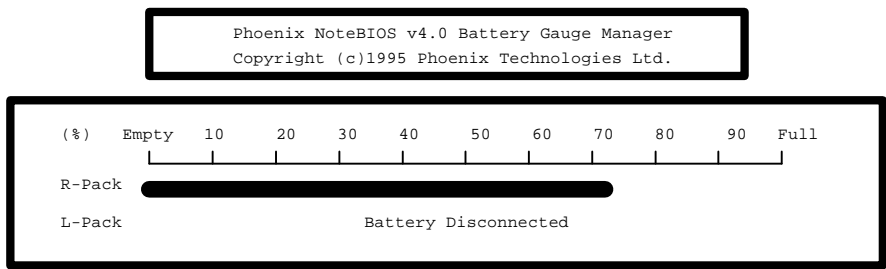
The system features battery-low warning signals that are both audible and visible. When the battery pack is low, the system emits warning beeps at regular intervals. You can turn off this feature by disabling the Battery-low Warning Beep parameter in the Setup utility (refer to section 4.6.5). In this situation, a battery-low icon () appears on the status LCD.

There are two ways to check the battery charge level:

- Onscreen battery gauge utility
- Battery-level LEDs on the battery pack

Using the Battery Gauge

To access the onscreen battery gauge, press -o. The following screen displays:

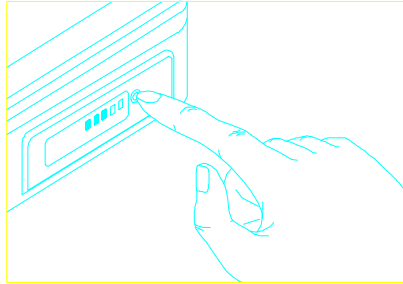


The onscreen battery gauge indicates the present battery level.

R-pack refers to the primary battery installed in the power bay, while L-pack refers to the secondary battery housed in the accessory bay.

Using the Battery LEDs

To check the battery using the battery LEDs:



Press the battery level button near the battery LEDs to check the charge level of the battery pack. The LEDs light up to indicate the battery level. Each LED signifies 20 percent. For example, if three LEDs light up, it means the battery has 40 to 60 percent of its maximum power. Refer to Table 2-1.

Table 2-1 is a battery-level chart.

Table 2-1 Battery-level Chart

Battery LEDs	LEDs Lit	Charge Level
	five	80%~99%
	four	60%~80%
	three	40%~60%
	two	20%~40%
	one	0%~20%



When the battery is fully charged (100 percent), the battery LEDs turn off automatically. If you press the battery level button, five LEDs light up.

2.4 Optimizing Battery Life

This section helps you get the most out of battery operation. Optimizing battery life prolongs the charge/recharge cycle and improves recharge efficiency.

2.4.1 Maximizing Battery Power

Follow these suggestions to maximize battery power:

- Purchase an extra battery pack.
- Use the system utility PHDISK to reserve hard disk space for the zero-volt suspend function once the system is installed with DOS.
- Use the AC adapter whenever possible so that the battery is reserved for on-the-go computing.
- Condition the battery pack to reduce the possibility of memory effect. Refer to section 2.4.2.
- Keep the battery pack in the notebook powered by an external power source (AC adapter or docking station).
 - When powered by the AC adapter, the constant trickle charge maintains the battery level to eliminate the battery self-discharge effect. The charge-in-use function also charges the battery pack.
 - When powered by a docking station, the battery pack can be recharged fully in approximately two hours. Check the battery level to verify.
- Disable the parallel and serial ports if no devices are connected to these ports. You can do this through Setup.
- Make use of the power-saving modes described in sections 2.5 and 2.6.

- Eject the PCMCIA card from the card slot when not in use, since the PCMCIA card draws extra power.

When using a network card, logout first before ejecting the card.

- Use the disk cache utility SMARTDRV (bundled with MS-DOS) or create a virtual disk (RAMDRIVE) to lessen the loading of the hard disk drive.
- Store the battery pack in a cool, dry place. The recommended storage temperature for battery packs ranges from 10 to 30 degrees C. The higher the storage temperature, the faster the battery pack self-discharges.
- The batteries can be recharged about 500 times when used as directed. Excess recharging decreases battery life.

2.4.2 Conditioning the Battery Pack

Conditioning the battery pack reduces the possibility of memory effect, common to most rechargeable battery systems. We recommend that you condition the battery pack at least once every month, preferably twice a month. A battery discharge utility helps you discharge the battery pack quickly.



Li-Ion battery packs do not need conditioning.

Follow these steps to condition the battery pack:

1. Connect the AC adapter.
2. Turn on the notebook (with the battery pack installed).

3. Enter Setup by pressing the no-reboot Setup button (F7). The discharge function is not available if you enter Setup using m during boot-up.

Phoenix NoteBIOS Setup - Copyright 1985-95 Phoenix Technologies Ltd.		
Power Management Mode	[Enabled]	Select Power Management Mode. Choosing modes changes system power management settings. To alter these settings, choose Enabled. To turn off power management, choose Disabled.
Hard Disk Standby Timer	[1 Minute]	
Display Standby Timer	[1 Minute]	
System Standby/Suspend Timer	[3 Minutes]	
Battery-Low Warning Beep	[Enabled]	
Standby/Suspend Upon Battery-Low	[Enabled]	
Password Check During Resume	[Disabled]	
LCD Panel Control		
Display Device	[Auto]	
LCD Expanded Mode	[Enabled]	
ESC Exit ↑↓ Select Item → ← Change Values F7 Battery Discharge		

4. Press r to activate the battery discharge function. This disables all power-management functions and uses up the battery power even if the AC adapter is connected. The following screen displays.

System is now installed with Battery	
Enter	Discharge battery now.
Esc	Cancel battery discharge.

Press e to discharge the battery or | to cancel the operation.

The battery pack begins discharging. The battery discharge function also deactivates the power-saving features.

After the utility has discharged the battery pack, the notebook power turns off. The AC adapter then charges the battery pack. As the battery is being recharged, the battery LEDs light up from one (0~20 percent) to five (80~99 percent) and turns off at one hundred percent.



We suggest that you perform this function by activating it at night before retiring, letting it discharge overnight before traveling. Also, connect an AC adapter to the notebook and to a power outlet when discharging. This ensures a fully charged battery for use the next day.

2.5 Power Management

This notebook has a built-in power management unit that monitors system activity. System activity refers to any activity involving one or more of the following devices: keyboard, mouse, diskette drive, hard disk drive, peripherals connected to the serial and parallel ports, and video memory. If no activity is detected for a specified period of time (called an inactivity time-out), the system switches to one of the power-saving modes to conserve energy. These power-saving modes are LCD standby mode, hard disk standby, and system standby/suspend mode.



The Setup utility allows you to specify the inactivity time-out.

The power management function does not work when the cursor is emulated by software such as Chinese system (ET v3.1), Japanese system (DOSV), Winword, etc.

2.5.1 LCD Standby Mode

Screen activity is determined by the keyboard, the built-in trackpad, and an external PS/2 mouse. If these devices are idle for the period specified by the LCD Standby Timer, the LCD shuts off until you press a key or move the trackpad or PS/2 mouse.



We strongly recommend you to enable the LCD Standby Timer with a shorter time interval to prolong your battery life.

2.5.2 Hard Disk Standby Mode

The hard disk drive enters the standby mode when there are no disk read/write operations within the period of time specified by the Hard Disk Standby Timer. In the standby state, the power supplied to the hard disk drive is reduced to a minimum. The hard disk drive returns to normal once the system accesses it.

2.5.3 System Standby Mode

The system consumes very low power in system standby mode. Data remain intact in the system memory.

When the system enters system standby mode, power is supplied only to the CPU, DRAM (memory), VGA controller and VRAM (video memory). Power is cut off to the rest of the system.



Unstored data is lost when you turn off the system power in system standby mode.

The necessary condition for the system to enter system standby mode is that the reserved disk space size for saving system and video memory allocated by PHDISK is insufficient so the system is unable to enter zero-volt suspend mode.

In this situation, there are three ways to enter system standby mode:

- Press the standby/suspend button (**Z**)
- Set a value for the System Standby/Suspend Timer in Setup. If the waiting time specified by this timer elapses without any system activity, the system goes into system standby mode.
- Enable the Standby/Suspend upon Battery-low parameter in Setup. If a battery-low condition occurs, the system goes into system standby mode. See section 2.7.

The following signals indicate that the system is in system standby mode:

- The buzzer beeps (when you press the standby/suspend button)
- The power LED blinks

To leave system standby mode and return to normal mode, press the system standby/suspend button (**Z**).

2.5.4 Suspend Mode

In suspend mode the system power shuts off. The system saves all system information onto the hard disk before it enters suspend mode. The system restores this information and resumes where you left off upon leaving suspend mode.


A necessary condition for the system to enter suspend mode is that the reserved space for saving system information on the hard disk must be larger than the combined system and video memory size. Under such conditions, the system standby/suspend button acts as the suspend button. See Appendix D for information on the PHDISK utility.

In this situation, there are three ways to enter system suspend mode:

- Press the standby/suspend button (**Z**)
- Set a value for the System Standby/Suspend Timer in Setup. If the waiting time specified by this time elapses without any system activity, the system goes into suspend mode
- Enable the Standby/Suspend upon Battery-low parameter in Setup. If a battery-low condition takes place, the system enters suspend mode in about five minutes. See section 2.7.

When the system enters suspend mode,

- the CPU switches off,
- the LCD switches off,
- the power going to the keyboard, mouse and disk drives shuts off,
- and the system powers off the parallel and serial ports

To exit system suspend mode, press the power switch () or the standby/suspend button (**Z**).



If the system is connected to a pocket ethernet adapter, note that the network does not resume its function after the system returns to normal operating mode.

2.6 Advanced Power Management (APM)

This notebook supports the APM standard designed to further reduce system power consumption. APM is a power-management approach defined jointly by Microsoft® and Intel®. An increasing number of software supports APM to take advantage of power saving features and allows greater system availability without degrading performance.

To use the APM feature under the Windows environment, run Windows Setup and select MS-DOS System with APM as your computer type in the System Information menu. Refer to the Windows user's guide for more information.

You can use the APM feature under the DOS environment by including the POWER.EXE command in the CONFIG.SYS file. See the MS-DOS manual for instructions on how to edit the CONFIG.SYS file. For more information about APM, type the following at the DOS prompt:

```
HELP POWER.EXE e
```




If you enable the Power Management Mode parameter in Setup without installing the APM under DOS or Windows, the system time and date do not display the correct settings after the system returns to normal operation from system standby or suspend mode. To update the time and date, reboot the system. Enable APM to avoid this problem.




Advanced Power Management greatly prolongs battery life. Use APM whenever possible.

2.7 Battery-low Warning

You never have to worry about battery power as long as you are using the AC adapter. However, when you operate the notebook on battery power, pay extra attention to the status LCD.

The battery-low icon () on the status LCD displays when the battery power is low. If a secondary battery pack is installed and the battery-low icon appears, the secondary battery pack is also running low on power.

The following signals indicate a battery-low condition:

- The buzzer generates four continuous beeps every minute, if you enabled the Battery-low Warning Beep parameter in Setup
- The battery-low icon () appears on the status LCD until battery power is depleted

When you receive a battery-low warning, you have about five minutes¹ to save your work. If you do not connect the AC adapter within five minutes, the system enters suspend mode if the Standby/Suspend upon Battery-low parameter in Setup is enabled and the following conditions exist:

- There is enough battery power left to save system information onto the hard disk.
- The reserved disk space for saving these data is larger than the combined system and video memory size.

Otherwise, the system enters system standby mode.



Connect the AC adapter or insert a charged battery pack into the notebook as soon as possible. Data is lost when system power is cut off during system standby mode.

¹ You may have less than five minutes if your battery is not fully charged.

Table 2-2 lists the recommended course of action when you encounter a battery-low condition.

Table 2-2 Course of Action for Battery-low Condition

Situation	Recommended Action
AC adapter and power outlet available	<ol style="list-style-type: none">1. Connect the AC adapter to the system.2. Save all necessary files.3. Resume work.4. Turn off the system if you wish to recharge the battery rapidly.
An extra fully-charged battery pack available	<ol style="list-style-type: none">1. Save all necessary files.2. Exit the application.3. Turn off the system.4. Replace the battery pack.5. Turn on the system and resume work.
AC adapter or power outlet not available	<ol style="list-style-type: none">1. Save all necessary files.2. Exit the application.3. Turn off the system.