

## X-C 6000/X-C 6250 Computer

### Battery and Display Operating Temperature Characteristics

This document explains the characteristics of X-C 6250 and X-C 6000 computer battery operation and display functions in and out of specified temperature ranges, and it provides guidelines for attaining the best performance from your battery and display.

The optimal operating temperature for the computer battery and display is around 20°C (68°F), with the specified operating range of -20°C to +60°C (-4°F to +140°F). At the optimal temperature, these components run at their peak efficiency. As the temperature moves to the outer limits of the specified operating ranges, the battery and display characteristics function differently as explained below.

#### Batteries

Both Nickel Cadmium and Nickel Metal Hydride batteries store and produce current by means of an electrochemical reaction that is affected by temperature. As the temperature moves farther from the optimum, the battery technology becomes less efficient at producing current and accepting a charge. To prevent possible damage to the battery, the computer does not allow the battery to charge if the internal temperature of the battery gets too low (< 5°C or < 41°F) or too high (> 55°C or > 131°F). Be aware of these charging characteristics, especially if the computer is left unattended in a closed vehicle.

The following table provides specific features concerning temperatures and charging activity.

Battery Temperature	Charging activity
< 5°C (< 41°F)	Will not charge.
> 5°C (> 41°F)	Fast charging occurs until 90 percent of full charge is achieved then switches to slow charge for final 10 percent. Fast charge requires up to 4 hours depending on the capacity level at the start of the charging process.
> 45°C (> 113°F)	Switches to slow charge mode (a charging method that puts current into the battery at a slower rate, taking up to 16 hours to fully charge a battery).
> 50°C (> 122°F)	Changes to maintenance charge (a charging method that puts very little current into the battery and basically keeps the capacity at its present level).
> 55°C (> 131°F)	Will not charge.

**IMPORTANT** It is difficult to quantify the amount of decrease in charge acceptance when batteries are operated in hot or cold temperatures. Battery characteristics will change depending on the current drawn, and individual batteries may operate differently.

## Display

The computer display, also referred to as a Liquid Crystal Display (LCD), produces the contrast that allows us to see the pixels by lining up many rod-shaped crystals suspended in liquid. This causes a polarizing effect that makes the pixels look dark. The crystals are lined up by applying current. The display is designed to automatically sense a change in temperature and compensate for it by adjusting this current.

As the temperature drops, the liquid in the display becomes thicker causing the display to be less responsive (slower) and the contrast to be reduced. Even with the built-in compensation, the display will eventually become slower and more difficult to read as the temperature drops below the specified operating range. Because the liquid in the display tends to thin out at higher temperatures, the crystals tend to align themselves, causing an overall darkening effect. The temperature compensation circuitry reduces this tendency, but eventually the display will become so dark, there will be no contrast between the dark and light pixels and the entire display will look black.

## To Get the Best Performance from Your Computer

- Avoid exposing the computer to temperatures outside the specified ranges.
- Charge the battery daily in a location with moderate temperatures between 15° to 25°C (60° to 70°F).
- Leave the display tilted open while the battery is charging to help prevent the battery from overheating.
- Turn off the computer when you leave the system but plan to resume working later.
- If your display is monochrome, turn off the backlight when you do not need it.