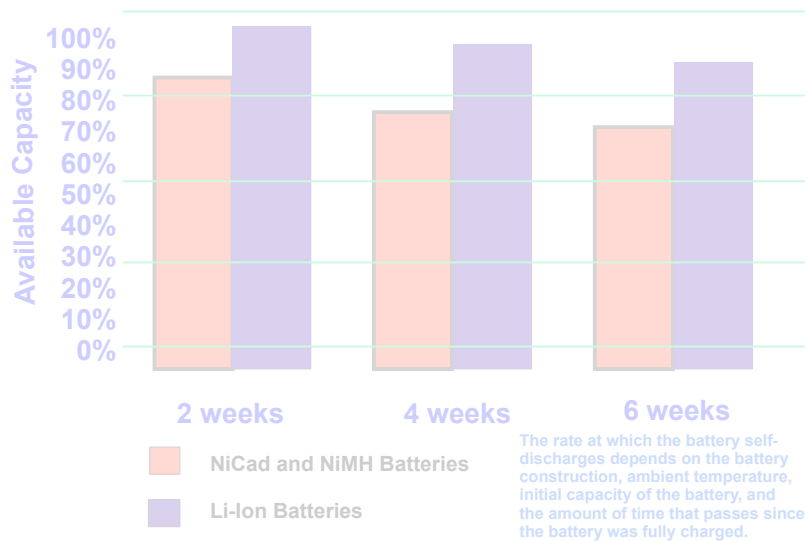


Getting The Most From Your Batteries

This document is directed toward battery management for batteries / multi-chargers / powered cradles used with LXE mobile devices with a Windows operating system.

A companion document *Getting the Most From the Batteries Used in LXE Legacy and DOS Devices* is available for those with obsolete or discontinued LXE battery powered terminals/computers. Battery management for obsolete LXE devices is not available in this document.

Self-Discharge : Battery Types



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E-INF-BATTERY-G

Notices – Please Read

Note to the Reader -- This document is intended to be informational only and is offered as a courtesy to purchasers of LXE battery powered products.

Most non-LXE battery charger/analyzer manufacturers include a product user manual with their battery charger/analyzer or batteries. Use the information in this guide as an additional source of information to the manufacturer's guide. **LXE strongly urges you to heed the cautions and warnings contained within the manufacturer's user guide.**

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The user is strongly cautioned to read Appendix C, "Regulatory Notices and Safety Information". Important safety cautions, warnings and regulatory information is contained in Appendix C.



Important: This symbol is placed on the product to remind users to dispose of Waste Electrical and Electronic Equipment (WEEE) appropriately, per Directive 2002-96-EC. In most areas, this product can be recycled, reclaimed and re-used when properly discarded. Do not discard labeled units with trash. For information about proper disposal, contact LXE through your local sales representative, or visit www.lxe.com.

Revision Notice

| | |
|---------------|--|
| Entire Manual | Added HX3 and MX8 battery, charger and powered cradle related information. Updated HX2 battery, charger and powered cradle related information Updated MX7 and MX8 powered cradle with spare battery charging capability information. Removed Legacy and DOS device information and placed it in a separate document titled <i>Getting the Most From the Batteries Used in LXE Legacy and DOS Devices</i> . |
|---------------|--|

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Chapter 1 Introduction

Overview

This guide discusses the rechargeable power supplies for LXE mobile devices with a Windows operating system. The primary audience for this document is anyone who uses nickel-metal-hydride (NiMH), lithium-ion (Li-Ion) and sealed lead-acid (SLA) batteries in LXE mobile devices.

LXE computers may have one or more types of batteries installed:

- The **main battery** is a removable battery (or battery pack) that can be charged in the computer using a charging dock or removed from the computer and charged using a battery charger/analyzer. The main battery powers the computer and provides normal operation. The battery powered RX2 is an exception. The main battery cannot be removed from the RX2 and is recharged in the unit.
- The internal **backup battery** is not removable by the user. The backup battery recharges using current from the main battery or recharges along with the main battery when the computer is docked in a powered cradle. The backup battery is designed to save certain information such as time and date in the event of a main battery power failure. Refer to the computer's reference guide for more details on the backup battery.
- An **auxiliary battery** provides an additional source of power, either for the computer or accessories. An MX5 uses an auxiliary battery worn on a belt to provide power for the MX5 heater.

This document uses the term “backup battery” to refer to the internal backup battery. Extra main batteries kept as backup for damaged or depleted main batteries are referred to as “spare batteries”.

Note: While the primary audience for this document is users of mobile devices with a Windows operating system, users of vehicle mounted devices may find interest in reviewing the power management sections, in order to conserve the life of the vehicle's battery.

This document is directed toward battery management for batteries / multi-chargers / powered cradles used with LXE mobile devices with a Windows operating system.

A companion document *Getting the Most From the Batteries Used in LXE Legacy and DOS Devices* is available for those with obsolete or discontinued LXE battery powered terminals/computers. Battery management for obsolete LXE devices is not available in this document.

When to Use this Guide

This guide is intended to be used as a supplement for the User's Guides and Reference Guides for LXE's Windows CE mobile devices. Use this guide as you would any other source book -- reading portions to learn about the batteries used in LXE's mobile devices, and then referring to it when you need more information about a particular subject.

This chapter, "**Introduction**" provides an overview of the different batteries for each computer, and a quick start guide to battery charging.

Chapter 2, "Battery Life" discusses the factors affecting battery life.

Chapter 3, "Using Battery Chargers/Analyzers" provides an overview of the different types of single and multi-unit chargers available.

Chapter 4, "Powered Docking Stations" provides an overview of the spare battery charging function available on some docking stations and cradles.

Appendix A, "LXE Part Numbers: Batteries and Chargers", lists the part numbers to use when ordering or re-ordering batteries and battery / analyzers.

Appendix B, "Battery and Charger/Analyzer Specifications", lists the main and backup battery specifications, charger/analyzers and powered docking stations available for each type of computer.

Appendix C, "Regulatory Notice and Safety Information" contains important safety and precautionary information for working with batteries and chargers.

Getting Help

LXE user guides are available on CD and they can also be viewed/downloaded from the LXE ServicePass and PartnerPass websites. Contact your LXE representative to obtain the LXE Manuals CD or access to these LXE websites. You can also check the LXE websites for the latest manual releases.

Note: Obsolete/archived equipment manuals are not available on the LXE Manuals CD. They are available for download from the ServicePass website only.

You can get help from LXE by calling the telephone numbers listed on the LXE Manuals CD, in the file titled "Contacting LXE". This information is also available on the LXE main website.

Explanations of terms and acronyms used in this guide are located in the file titled "LXE Technical Glossary" on the LXE Manuals CD and on the LXE website.

When the backup battery is to be replaced in the unit (most have a 2-5 year life), the unit should be shipped to LXE. Contact your LXE representative to obtain shipping information.

Please refer to the specific equipment's user guides for more information on the equipment-specific charger/analyzers and docking/charging stations.

Obsolete Equipment

The LXE Series 120, 200, 300, 1100, 1200, 2100, 2200 and 2300 Legacy units are obsolete. LXE DOS computers are obsolete. The VX4 and MX3-CE Windows computers are obsolete. The information contained in this document relating to obsolete/expired equipment has been made available as a courtesy to LXE's customers. Please contact your LXE customer support representative for assistance with these units.

Getting the Most From the Batteries Used in LXE Legacy and DOS Devices is available for those with obsolete or discontinued LXE battery powered terminals, computers, and docking stations.

Note: Charger, multicharger and cradle manuals for obsolete LXE equipment are available on the LXE ServicePass website (ServicePass / Documentation / Archives).

Related Manuals

Cradle Manuals

HX2 Cradle Reference Guide – HX2, HX3

MX3 Cradle Reference Guide – MX3, MX3-CE, MX3X

MX5 Cradle Reference Guide – MX5 PPC, MX5X

MX6 Cradle Reference Guide – MX6 PPC, MX6 WM

MX7 Cradle Reference Guide – MX7

MX8 Cradle Reference Guide – MX8

Charger Manuals

HX1 Multi-Charger User's Guide – HX1

HX2 Multi-Charger User's Guide – HX2, HX3

MX3 Multi-Charger Plus User's Guide -- MX3, MX3-CE, MX3X

MX5 Multi-Charger User's Guide – MX5 PPC, MX5X

MX7 Multi-Charger User's Guide – MX7

MX8 Multi-Charger User's Guide – MX8

Note: Information on the RX2 Battery Charger can be found in the RX2 Reference Guide. Information on the MX6 Multi-Charger can be found in the MX6 Reference Guide.

Battery Chargers and Analyzers

LXE offers several configurations of chargers, charger/analyzers and powered docking stations for NiCad, NiMH, Li-Ion and SLA batteries. Each battery station is pre-configured with the specific software and battery adapter designed for:

1. the type of battery to be maintained (NiMH, NiCad, Li-Ion or SLA) and
2. the mAh rating of the battery.

Only. Do not attempt to insert an incorrect battery into the charging well of a multi-charger or cradle designed for a different battery. Damage to the battery, the multi-charger or the cradle may result.

New Batteries and Stand Loss

When you receive new Li-Ion or SLA batteries from LXE, you should charge the batteries prior to use or storage.

SLA and Li-Ion batteries do not require conditioning. Conditioning shortens a Li-Ion battery's life. SLA batteries should only be stored with a full charge. However, please see the following "Battery Maintenance" section for special information on HX1 and MX6 batteries.

Battery Maintenance

NiMH and NiCad batteries should periodically be conditioned to maintain full capacity. Some LXE Windows CE mobile devices have a Battery Control Panel that enables discharging/recharging of NiMH and NiCad backup batteries (also known as a coin or button battery) in the mobile devices.

Some Li-Ion batteries (like those used in the HX1 and MX6) contain a "gas gauge" that monitors battery capacity and reports this to the mobile device and the battery charger. Because the charge routines may be conservative, over time the "calculated" capacity can differ from the actual capacity of the battery. The "gas gauge" is reset by the recalibration cycle (HX1 charger) or the analyze cycle (MX6 charger).

All batteries should be fully charged before storage. Periodically recharge batteries in long term storage.

Battery Construction Types

LXE offers three types of main batteries or Main Battery packs:

- Nickel-Cadmium (NiCad) batteries.
- Nickel-Metal-Hydride (NiMH) batteries.
- Lithium-Ion (Li-Ion) batteries.

The internal backup batteries are either Lithium, NiMH or NiCad, however, the backup battery (also known as a coin or button battery) is not user replaceable. The unit should be returned to LXE when the backup battery needs replacing.

Due to their size and weight, Sealed Lead-Acid (SLA) batteries are used as auxiliary batteries.

NiCad Batteries

Named for the Nickel-Cadmium construction.

Advantages:

- Considerable power
- Tolerance for wider range of operating temperatures
- Lasts for more charge/discharge cycles
- Shorter charge time

Disadvantages:

- “Memory effect” necessitates periodic discharge
- “Stand loss” can be significant
- Environmentally unfriendly due to toxic metals

NiMH Batteries

Named for the Nickel-Metal hydride construction. When the DC powered option is not selected, the RX2 is powered by an optional internal (non-user serviceable) NiMH battery pack.

Advantages:

- More capacity than NiCad batteries
- No poisonous metals
- Less prone to “memory effect”

Disadvantages:

- Higher “stand loss” than NiCad batteries
- Longer charge time than NiCad batteries

Li-Ion Batteries

Named for the Lithium-Ion construction.

Advantages:

- Higher energy density – less weight / more power
- No “memory effect”
- Less “stand loss”
- No poisonous metals

Disadvantages:

- Higher cost
- Longer charging cycles
- More sensitive to temperatures while charging

About Lithium-Ion Batteries

Li-Ion batteries (like all batteries) gradually lose their capacity over time (in a linear fashion) and never just stop working. *This is important to remember – most CE devices, like the HX2, MX3X, MX8, etc., are always 'on' even when in the Suspend state and draw battery power at all times.*

Use the following chart to determine when to replace the battery:

| Battery Number | Fits these LXE computers | 100% capacity (mAh) | 80% capacity (mAh) |
|----------------------------|--------------------------|---------------------|--------------------|
| HX1A477BATTERY | HX1 | 1700 | 1360 |
| HX2A301BATTSTD | HX2 / HX3 | 2000 | 1600 |
| HX2A302BATTEXT | HX2 / HX3 | 4000 | 3200 |
| MX3A378BATT MX3A379BATT | MX3X | 1800 | 1140 |
| MX3A380RFIDBATT | MX3-RFID | 1800 | 1140 |
| MX5A379BATT | MX5X | 2800 | 2240 |
| MX6A380BATT | MX6 | 2000 | 1600 |
| MX7A380BATT | MX7 | 2200 | 1760 |
| MX8A380BATT | MX8 | 3000 | 2400 |

Deciding when to replace the Main Battery pack in these Microsoft Windows CE powered devices is difficult to quantify because it is very application specific. 1000 mAh may be the cutoff for one customer who uses the computer frequently, while 300 mAh may be perfectly fine for a customer who only occasionally uses the computer. You need to determine the point at which battery life becomes unacceptable for your business practices and replace the Main Battery pack with a fully charged pack before that point.

SLA Batteries

Named for the lead plates and sulfuric acid based electrolyte – used in the auxiliary battery pack to provide power for the MX5 heater and the UPS battery pack for the VX5, VX6 and VX7.

Advantages:

- Lower rates of “stand loss”
- Provide large amounts of power for a short time
- Battery life span dependent on amount of discharge
- Low cost

Disadvantages:

- Batteries can lose capacity if kept discharged for long periods
- Longer charge time than NiCad batteries

About Sealed Lead-Acid Batteries

Although sealed lead-acid batteries experience a lower rate of stand loss than other battery types, it is important to fully charge sealed lead-acid batteries after use. When an SLA battery is left in a discharged (or partially discharged) state, chemical reactions, referred to as sulfation, occur. This reaction can reduce the capacity and lifespan of the battery over time. SLA batteries stored for an extended time should be recharged every six months when stored in a cool, dry place. Charging is required more frequently in warmer or cooler storage.

The number of cycles in the life span of a SLA battery is dependent upon the amount of discharge in the cycles. Unlike other battery types, the SLA battery’s lifespan is not determined by a set number of charge/discharge cycles. If only 50% of the SLA battery’s capacity is discharged in each cycle, the SLA battery’s lifespan increases compared to an SLA battery that is fully discharged in each cycle.

Uninterruptible Power Supply Battery Pack – VX5, VX6, VX7 only

The VX5, VX6 and VX7 have an optional Uninterruptible Power Supply (UPS) battery pack. It is designed to provide power to the computer for short periods of time when vehicle power is unavailable (such as when vehicle batteries are swapped). Fully charged, the UPS battery powers the computer for a minimum of 15 minutes at 25° C (77° F) ambient temperature.

The Power Status LED on the computer indicates the UPS battery status:










Green – Running on 12V – 80V power input

Solid Yellow – Running on UPS battery, battery is not low on power

Flashing Yellow – Running on UPS battery, battery is critically low.

Battery Types used in LXE Equipment

These are the main battery types recommended for use with LXE hand-held terminals and computers:

| LXE Product | Battery Type | |
|--------------------|---|--|
| HX2 / HX3 Computer | 2000 mAh (Li-Ion)  | 4000 mAh (Li-Ion)  |
| MX3X Computer | 1800 mAh (Li-Ion)  | |
| MX3-RFID Computer | 1800mAh (Li-Ion)  | |
| MX5X Computer | 2800 mAh (Li-Ion)  | |
| MX6 Computer | 2000 mAh (Li-Ion)  | |
| MX7 Computer | 2200 mAh (Li-Ion)  | |
| MX8 Computer | 3000 mAh (Li-Ion)  | |
| HX1 Computer | 1700 mAh (Li-Ion)  | |

See Also

See Appendix A “LXE Part Numbers: Batteries and Chargers” for a listing of LXE approved batteries and battery chargers for these LXE products.

Quick Start

This section's instructions are **abbreviated** and based on the assumption that your new battery charger/analyzer is pre-configured for the appropriate battery type and requires only a power source.

Note: Your battery charger/analyzer may have different options or naming conventions than is represented below. Please refer to the information in the following chapters for charger specific information.



Figure 1-1 Identify Components

- 1 Battery Charging Well
- 2 Retaining Clip
- 3 Battery Charging Contacts in Charging Well

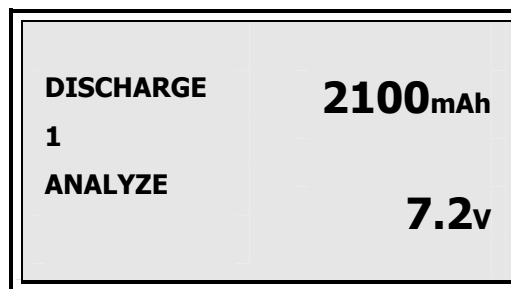
How To

1. Insert the battery into the charging well with the charging contacts touching the battery contacts.
2. If you wish to simply charge the battery, install a battery in a charging station and touch nothing.
3. The charge process begins, and the Charge LED comes on with a steady glow. The charger continuously charges a battery as long as the battery is connected.
4. The Charge LED extinguishes and the Ready LED illuminates when the battery is fully charged and ready for use.

Periodically check the battery mAh rating against the manufacturer's optimum mAh rating to determine the condition of the battery. Charger/Analyzers with LED screens display the last measured capacity of the battery during several mode function operations.

| Use This Mode | When You ... |
|----------------------|---|
| Condition | Prepare a new battery for use or restore a deficient battery to maximum available power. |
| Charge | Want to fast charge a battery and maintain its full charge capacity via trickle charge until needed. |
| Analyze | Need to measure a battery's capacity. This process first discharges then charges the battery. The measured result can be compared against the battery specifications. |
| Discharge | Want to verify the performance of another battery charger or check for excessive "stand-loss". |

The Volts and mAh Messages



Note: Visible on the LCD Information Center only.

The "V" or volts message continuously displays the measured battery voltage. This measurement should increase through the charging cycles and decrease during the discharge cycles.

The mAh display will continuously track the depleted energy or capacity of the battery. The message will display the capacity in increasing 11 mAh increments, during the discharge cycles.

Extending Battery Life

Regardless of the type of battery being used, LXE offers the following suggestions for extending battery life:

- Immediately replace batteries in LXE devices with the appropriate, fully charged battery when LXE equipment battery warnings are issued/heard/displayed.
- Fully charge a new Li-Ion or SLA battery before using.
- Remove batteries from unused units or units that will be unused longer than a day.
- Periodically recondition HX1 batteries for maximum capacity.
- Periodically analyze MX6 batteries for maximum capacity.
- Place discharged batteries in battery charger/analyzers as soon as possible. Do not store SLA batteries that are discharged or partially discharged.
- Store batteries in locations that maintain an ambient temperature of approximately 25°C (77°F).
- Discard defective, shorted or end-of-life batteries.
- Any battery that is over a year old is considered an old battery.
- Replace all batteries more than a year old with new batteries.

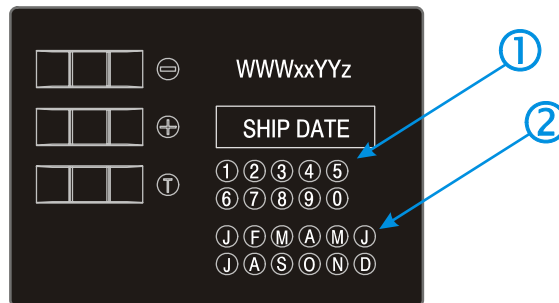


Figure 1-2 Determine Age of the Battery

- 1 Year the battery was shipped from LXE. If the number is less than or equal to the current year (assumed to be 2006 for the purposes of this guide) the assumption is the year is 200_. If the number is greater than the current year, the assumption is the year is 199_.
- 2 The month the battery was shipped from LXE.

To determine the age of the battery, check the LXE ship date on the side of the battery. The ship date is punched out and shows the year and the month that the battery was shipped. The first field (labeled 1-0) is the year the battery was shipped. The second field (labeled J, F, M, A, etc.) is the month. So if the 6 and the F are punched out, the battery was shipped in February of 2006.

To determine the actual shipping date, use the serial number on the battery to determine the ship date. Contact your LXE representative for assistance.

Battery Warning Messages on Computers

Many LXE battery operated units have been programmed to either display a warning message and/or emit distinctive beeps when battery capacity has fallen to a pre-determined level.

The warning messages displayed on the screen may be similar to the following:

```
Low Battery Warning  
Replace Battery Now  
Critically Low  
System Will Power Off In n Seconds
```

Do not ignore the warnings. The messages are displayed to warn you that the battery must be replaced or data will be lost.

Follow the instructions displayed on the screen or listed in the respective equipment's user guide. The instructions are directed toward proper unit shutdown and battery replacement.

Battery Replacement

Battery replacement instructions for LXE computers are fully documented in the user and reference guides delivered with the units. Please refer to the manuals for complete instruction. If the computer supports "hot swapping" the main battery, the instructions follow.

In general, the battery replacement procedures consist of the following steps:

1. If the unit is powered on, save any work, and close running programs.
2. Place the unit in suspend (Windows CE equipped devices).
3. Open the battery access panel or cover and remove the depleted battery.
4. Insert an appropriate fully charged battery, aligning the positive and negative contacts on the battery with the metal contacts in the unit.
5. Close the battery access panel or cover.
6. Turn the unit on or resume the unit from suspend mode.

Place the depleted battery in the appropriate battery charger/analyzer.

Hot Swapping the Battery

If you are using an LXE CE mobile device that supports “hot swapping” the main battery, the main battery may be replaced without having to power the computer off. LXE recommends placing Windows CE devices in Suspend before hotswapping the main battery pack. Refer to the computer’s user or reference guide for complete details.

The general procedure for hot swapping the main battery consists of the following steps:

1. Save any work, and close running programs.
2. Place the computer in suspend or standby mode.
3. Open the battery access panel or cover and remove the depleted battery. The computer enters critical suspend mode when the main battery is removed.
4. The backup battery maintains data such as time and date for at least 5 minutes but does not provide power for computer operation. If the hot swap is not completed before the backup battery is depleted or the off timer expires, the computer powers off and must be rebooted after a fully charged main battery is installed.
5. Insert the correct fully charged battery, aligning the positive and negative contacts on the battery with the metal contacts in the battery well in the unit.
6. Close the battery access panel or cover. Secure to the mobile device e.g. screws, locking tabs, etc.
7. The computer then returns to the suspend state. Follow the appropriate action to return to the on-state and the computer is ready for use. There may be a slight delay if the radio needs to re-establish an RF connection.

RX2 and Battery Power

The RX2 has an optional internal battery. When this option is ordered, a 4000 mAh NiMH main battery is installed in the RX2. The RX2 battery is not user serviceable.

When the RX2 battery is depleted:

- The unit must be removed from service and attached to an RX2 Battery Charger until the main battery is charged, or
- DC power must be provided for the RX2.

Note: The RX2 battery is not charged when the RX2 is attached to DC power. The battery is only charged by the RX2 Battery Charger.

Set Up a Battery Maintenance Routine

Put the information in this document to work for you by incorporating a battery usage routine. Managing your batteries with a battery maintenance routine is intended to ensure:

- You get as much battery life as you can.
- You need fewer batteries per shift.
- Every shift has fully charged batteries.
- There is a battery slot on the charger for each battery at the end of every shift.
- All unused batteries are placed in a charger at the end of every shift.
- The computer's backup battery (if equipped) has sufficient capacity to maintain the computer if the main battery fails until a fresh main battery can be installed.

Note: It is not necessary to place spare batteries in chargers; lay the battery pack contact-side up in a protected environment.

Battery Identification

Label batteries with an identification number, symbol, or color. Base the identification scheme on the type of equipment that uses the battery, the type of battery (NiCad, NiMH, Li-Ion or SLA) and, if necessary, the specific charger/analyzer that accepts the battery type.

Note: The outside of the battery charger/analyzer may look the same, but the internal programming and algorithms, as well as the charger cup configuration, are the factors that determine the type of battery that can be maintained in each particular battery charger/analyzer.

Place a blank label, such as a mailing label, on the battery for recording the date and capacity reading (spare batteries too). Do not cover the battery's charging terminals with the label. Record on the battery the date and capacity reading each time it is analyzed.

Note: You may use a log sheet instead of a label for tracking capacity readings. However, the labels ensure that the necessary information concerning each battery is always with that battery.

Analysis Scheduling

Periodically check the battery mAh rating against the manufacturer's optimum mAh rating to determine the condition of the battery. Charger/Analyzers with LED screens display the last measured capacity of the battery during several mode or function operations.

HX1 Only

The HX1 battery charger includes a recalibration routine. This routine should be performed on the HX1 battery pack at least once per month to maintain maximum battery capacity.

MX6 Only

The MX6 battery charger includes an analyze routine. This routine should be performed on the MX6 battery pack periodically to maintain maximum battery capacity.

A Simple Battery Usage Routine

A color coding routine used for a large or small operation that uses the same kind of battery in all computers:

- First** Color code all batteries by shift:
- | | |
|---------|--------------|
| Shift 1 | Blue |
| Shift 2 | Red |
| Shift 3 | Green |
- Second** Charge all batteries according to color. For example, all blue coded batteries should be charged during shifts 2 and 3.
- Third** Operators place all batteries into chargers at the end of every shift.
- Fourth** As appropriate, condition (NiMH and NiCad), recalibrate (HX1) or analyze (MX6) all batteries once a month according to the color code on the battery.
- Designate a specific time to analyze each group of color coded batteries. See the sample log sheets for battery maintenance that follow.
- Fifth** Track battery capacity readings by recording the date and capacity reading for each battery on the label (or log sheet).
- Sixth** The computer's internal backup battery (if equipped) may need to be discharged and recharged once or twice a year for maximum life. LXE computers with such an internal battery include a discharge utility for the backup battery. Refer to the computer's reference guide for details.

Sample Log Sheets for Battery Maintenance

MX3X Main Battery

Charger/Analyzer: MX3 Charger Plus **Charger Identification:** (Serial Number)

Placed in Service: (Date) **Battery Type:** Li-Ion 1800 mAh

| Battery Serial Number / Date Placed in Service | Shift | Date Charged | Date Analyzed | Final Capacity Reading |
|---|-------|-----------------|------------------|---------------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Coin (Backup) Battery Maintenance

Equipment: MX3X **Serial Number:** (on exterior label)

Placed in Service: (Date) **Backup Battery Type:** 50 mAh

| Backup Battery | Shift | Date Discharged | Date Recharged | Final Capacity Reading |
|----------------|-------|--------------------|-------------------|---------------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Chapter 2 Battery Life

Overview

To get the most from your batteries, you must be aware of the conditions and devices that use battery energy and shorten the time between original purchase and end-of-life disposal and replacement. This chapter covers the factors that affect battery life and helps you determine if you are getting reasonable battery life.

There are several factors that can affect battery life:

- Memory effect (NiCad and NiMH only).
- Amount of rated capacity used (SLA only).
- Message rate and number of transmissions.
- Battery storage.
- Temperature, time idle, and capacity.
- Peripheral devices.
- Power Management Features .
- Display Timers.

Factors Affecting Battery Life

Refer to the following list of estimated battery life for the following batteries:

| LXE Product | Battery Type and Rating | Minimum Battery Life (Before Replacement) |
|------------------------------|------------------------------------|---|
| HX1 | Li-Ion 1700 mAh | 500 charge/discharge cycles |
| HX2 / HX3 | Li-Ion 2000 or 4000 mAh | 500 charge/discharge cycles |
| MX3X / MX3-RFID | Li-Ion 1400 mAh Li-Ion 1800 mAh | 500 charge/discharge cycles |
| MX5 | Li-Ion 2800 mAh | 500 charge/discharge cycles |
| MX5 Belt Battery | SLA 9Ah | 200-300 charge/full discharge cycles ¹ |
| MX6 | Li-Ion 2000 mAh | 500 charge/discharge cycles |
| MX7 | Li-Ion 2200 mAh | 500 charge/discharge cycles |
| MX8 | Li-Ion 3000 mAh | 500 charge/discharge cycles |
| RX2 | NiMH 4000 mAh | 500 charge/discharge cycles |
| VX5/VX6/VX7 UPS Battery Pack | SLA 2500 mAh | One year |

¹ The SLA battery lifespan greatly increases when the battery is not fully discharged in each cycle.

Memory Effect

Memory effect occurs when batteries are recharged before they are fully discharged.

Over time, the portion of the NiCad battery that is not allowed to discharge becomes inactive, resulting in shortened battery life. New NiCad and NiMH batteries must first be conditioned.

Li-Ion batteries will continue to recharge to full capacity without being affected by “memory effect.” However, the HX1 and MX6 batteries contain an internal “gas gauge”. Over time, this gauge may report less than actual battery capacity. This internal gauge can be reset via the recalibration cycle (HX1 charger) or the analyze cycle (MX6).

SLA Battery Lifespan and Power Drain

The SLA battery is rated for 200 to 300 cycles when completely drained in each use before recharging. If the battery is used for only 50% of its rated capacity, the life span is approximately 500 cycles. If the battery is used for only 30% of its rated capacity, the life span is approximately 1000 cycles.

Message Rate and Transmissions

Message rate is the number of messages transmitted per hour. For example, if you transmit 15 messages per hour, your message rate is 15. As the message rate increases battery life decreases. Transmitting a message

- requires energy from the battery.
- can require the backlighting to come on in your mobile device.

Battery Storage

When a battery is not in use, lay the battery pack contact-side up in a protected environment. Do not store charged batteries in an unpowered multi-charger or charging cradle.

Note: Battery packs may leak up to 1 mA current through the battery contacts when left in an unpowered battery well.

SLA Batteries

SLA batteries should always be fully charged before storing. If stored for extended periods, SLA batteries should be periodically recharged. When stored in a cool, dry location SLA batteries should be recharged after six months of storage. Significantly hotter or cooler locations may require more frequent charging.

Storing an SLA battery in a discharged or partially discharged state can result in loss of battery capacity and shorter battery life due to chemical reactions within the battery.

Temperature, Time, and Capacity

The temperature at which you operate your equipment affects how batteries perform. You should charge all batteries, when possible, at or near 25°C (77°F).

Refer to the following table on how room temperature directly affects the life of a NiCad battery in a 2280 terminal transmitting 360 messages each hour:

| Room Temperature | Available Battery Life |
|------------------|------------------------|
| -30°C (-22°F) | 34% |
| -20°C (-4°F) | 64% |
| -10°C (14°F) | 80% |
| 0°C (32°F) | 88% |
| 25°C (77°F) | 100% |
| 50°C (122°F) | 90% |

Ambient temperatures affect batteries differently. NIMH battery life decreases when stored in low temperature areas, Li-Ion battery life decreases when stored in high temperature areas and NiCad battery life decreases when stored in low temperature areas.

Self-Discharge

Batteries should be stored at temperatures close to 25°C (77°F) because higher temperatures cause batteries to self discharge faster than lower temperatures.

All batteries begin self-discharging after receiving a charge. The rate at which the battery self-discharges depends on the battery construction, temperature, initial capacity of the battery, and the amount of time that passes since the battery was charged.

Refer to the following table on how the capacity of different battery types is affected by the amount of time that passes after a battery is charged:

| Time Since Charge | NiCad and NiMH Available Capacity | Li-Ion Available Capacity | SLA Available Capacity |
|-------------------|-----------------------------------|---------------------------|------------------------|
| 2 Weeks | 80% | 95% | 98% |
| 4 Weeks | 70% | 90% | 96% |
| 6 Weeks | 65% | 85% | 94% |

Note: This table is based on ideal storage conditions. Temperatures significantly above 25°C (77°F) increase the self-discharge rate of all batteries.

Peripheral Devices

LXE hand-held and vehicle mount CE devices have COM ports for the attachment of peripheral devices.

Be aware that the way you use peripheral devices affects the drain on your batteries.

Number of Devices and Time in Use

Note: Use peripheral devices only when necessary to avoid needless drain on your battery life.

Peripheral devices affect your battery life in the following ways:

- The number of peripheral devices you use affects the drain on your batteries.
- The length of time you use the peripheral devices affects the drain on your batteries. Using a device for 6 hours per shift drains your batteries more than using a device for 4 hours per shift.
- Scanning bad barcode labels with your peripheral devices can increase the drain on your batteries significantly. You should ensure that your barcode labels are in good condition to prevent unnecessary drain.
- Using a heater greatly reduces battery life. For this reason, the MX5 has an optional battery belt with an auxiliary battery. The heater is not operational without the auxiliary battery.

LXE Scanner Current Requirements

The following table lists the current that the scanner uses (either tethered or integrated) while you scan:

Note: The more current a scanner requires while in use, the more it drains the life of your battery.

| Scanner | Current |
|----------|---------|
| SE824 | 137 mA |
| SE923 | 68 mA |
| SE955 | 86 mA |
| SE1200LR | 65 mA |
| SE1524 | 210 mA |
| SE2223 | 230 mA |
| SE4400 | 200 mA |
| HHP5380 | 70 mA |
| EV-15 | 110 mA |

Note: Scanners not in use require only a small amount of current. Specifications shown are typical current draw, peak draw may be higher.

LXE Windows Computer Power Management Features

LXE computers running Microsoft Windows (such as Windows CE, XP, 98 or 2000) utilize standard Windows power management options. Power Management features are generally accessed via the Windows control panel. For handheld computers running Microsoft Windows CE, options vary depending on hardware type. Not all options are present on all computers:

- **Power Off (or Suspend)** – The user can configure the period of inactivity required before the computer powers off (or enters the suspend state).
- **Display Backlight** – The user can configure the amount of time that must elapse before the display backlight is turned off.
- **Display Blanking** – The user can configure the period of inactivity before the display is turned off. Note that some vehicle mounted computers can be configured to blank the display when the vehicle is moving. This is not configured via power management, but does conserve vehicle battery power.

On many of these computers, unique time intervals can be specified when the computer is operating on battery power or when operating on an external power source. Some computers also allow the user to specify which primary events wake the computer, display or display backlight. Please refer to the computer's reference guide for more details on power management options and settings.

It is important to remember – LXE handheld CE devices are always 'on' even when in the Suspend state and draw battery power at all times.

For vehicle mounted computers with a Windows operating system, power management may be desired to conserve the life of the vehicle's battery. Standard power management features include the ability to shut off the display and hard drives after a specified period of inactivity. Options may also be provided for system standby and configuration. The keyboard backlight for some vehicle mounted computers must be manually turned on and off. Please refer to the computer's reference guide for more details on power management options and settings.

Extended temperature VX6 and VX7 computers have a heated touchscreen. Some VX6 and VX7 allow the touchscreen heater to be turned off when not needed. Turning off the touchscreen heater decreases the power consumption of the VX6 and VX7. For information on which units support this feature and detailed instructions, please refer to the "VX6 Reference Guide" or the "VX7 Reference Guide."

Chapter 3 Using Battery Chargers/Analyzers

Overview

This chapter first discusses the types of battery charger/analyzers available, the life cycle of a battery, and then explains the actions that make up a battery optimization cycle (i.e. analyze, discharge, charge, etc.). The final section of this chapter contains instructions on using a battery charger/analyzer.

Note: This chapter covers only chargers and charger/analyzers. Powered docking stations that also recharge computer batteries are covered in Chapter 4, “Powered Docking Stations”.

Types of Battery Charger/Analyzers

LXE offers several battery chargers and analyzers. The type you use depends upon the type of battery required by LXE equipment.

| LXE Equipment | Charger/Analyzer Type Specified By ... | |
|---|---|---------------|
| HX1 Computer | 1700 mAh battery | Li-Ion |
| HX2 and HX3 Computer | 2000 (standard) mAh or 4000 (extended) mAh battery | Li-Ion |
| MX3X Computer MX3-RFID Computer | 1800 mAh battery | Li-Ion |
| MX5 Computer (Main Battery) (Auxiliary Battery) | 2800 mAh battery 9 Ah battery | Li-Ion SLA |
| MX6 Computer | 2000 mAh battery | Li-Ion |
| MX7 Computer | 2200 mAh battery | Li-Ion |
| MX8 Computer | 3000 mAh battery | Li-Ion |
| RX2 | 4000 mAh battery (internal) | NiMH |

The outside of the battery charger/analyzer may look the same, but the internal programming and algorithms, as well as the charger cup configuration, are the factors that determine the type of battery that can be maintained in each particular battery charger/analyzer.

All LXE battery chargers are powered by AC power. Most LXE battery charger/analyzers can hold more than one battery at a time.

The Life Cycle Of A Battery

A new NiCad or NiMH battery should be conditioned before it is used for the first time. Conditioning brings the battery up to its optimum energy capacity. All batteries experience *stand loss*, a term used to describe how a battery self-discharges over time even when unused and stored at satisfactory temperatures.

All new Li-Ion or SLA batteries should be fully charged before being used for the first time.

Note: Do not condition SLA or Li-Ion batteries. This shortens the battery's life.

After conditioning or charging the new battery, the battery is then used by the appropriate mobile computer until either a “battery low” warning is received or a pre-determined period of time has elapsed (for example, some battery usage routines replace batteries after a specified number of battery-intensive operations have been completed).

The battery then begins its life cycle countdown by being placed in a charger/analyzer, fully discharged and then recharged to full capacity and placed back in service. Batteries usually have a manufacturer's rating of a minimum number of charge/discharge cycles before end-of-life is reached.

Charger/Analyzer Functions

Most LXE battery chargers will at a minimum, discharge and charge the appropriate battery type. Some of the following mode functions may not be included in your battery station. Please check the user manual for your specific battery station for complete information.

Analyze Mode

When a battery is placed in the appropriate battery cup in the battery station, the analyzer first “analyzes” the battery – measures the capacity, stated in mAh or Ah and registers the data.

The battery station will initially charge the battery to a fully-charged state. It then automatically discharges the battery, tracking the energy it deducts during this process. When the battery has been fully discharged the battery is again fully charged.

This final charge prepares the battery for use at the end of the analyze cycle.

Discharge Mode

The Discharge Mode discharges the battery (without a preliminary charge like that in the Analyze Mode) and measures its capacity. This function discharges the battery to the manufacturer's recommended 1 volt per cell. The Discharge Mode can be used to check another charger/analyzer's performance.

Charge Mode

Use the Charge Mode to fast charge a battery. This function will continue to charge the battery and measure the battery voltage until the battery reaches full charge. The station then maintains the full charge state until the battery is removed from the charger cup.

Condition Mode

Use the Condition Mode to restore a deficient battery to its highest potential capacity. This is known as “conditioning the battery”. During this process, the battery is fully charged and fully discharged three times in succession. The final step is to charge the battery and maintain the fully-charged status until the battery is removed from the charger cup.

Recalibration and Relearn Modes (HX1 Only)

The HX1 battery pack should be recalibrated once per month. The HX1 charger can display the number of times the battery pack has been charged since the last recalibration cycle. The recalibration cycle consists of a full discharge followed by a full charge.

If the HX1 charger cannot read the “maximum capacity” register from the battery, the charger automatically performs a relearn function on the battery. The relearn cycle consists of a complete discharge followed by a complete recharge, however the process is repeated again for the relearn cycle.

Power Off

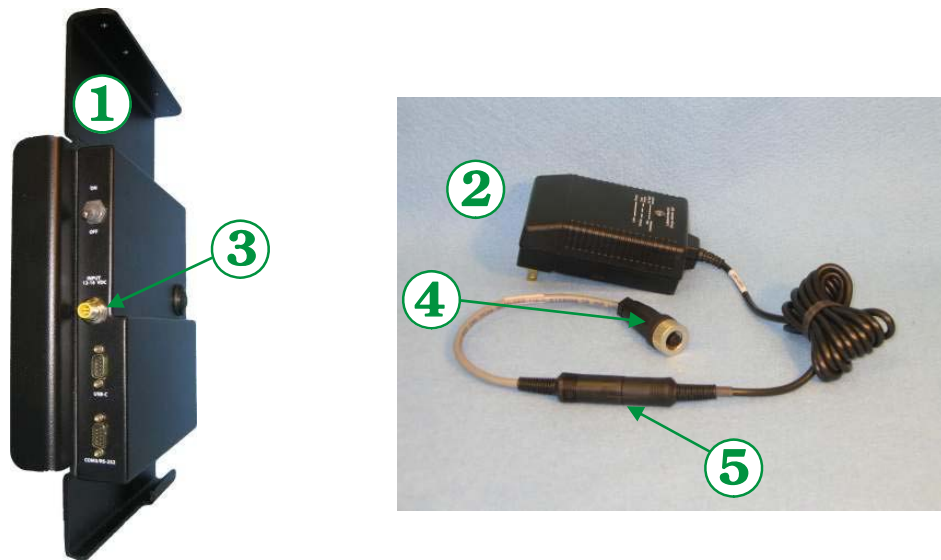
Note: Remove all batteries from the charger/analyzer before turning the unit off or removing the power plug from the AC source.

Charger/analyzers sustain no damage when powered on for extended periods. Press the Power Switch to the Off position (On “I”, Off “O”). Do not disconnect the power supply cord. In emergency situations the fail-safe power disconnect is the power supply cord. Pull the plug!

Single-Unit Chargers

How To: RX2 Battery Charger

The RX2 Battery Charger can charge an internal RX2 battery in less than six hours. The battery charger cable contains a break away connector to prevent damage to the RX2 or Battery Charger in the event the vehicle with the RX2 is moved while the battery is charging.



- 1 RX2 (Battery Powered)
- 2 RX2 Battery Charger
- 3 RX2 Power Connector
- 4 To RX2 Power Connector
- 5 Break Away Connector

Figure 3-1 RX2 Battery Charger and Cables

The RX2 Charger LED indicates status as follows:

- **Red** LED fast blinking – Battery deeply Discharged
- **Red** LED on solid – Rapid Charge
- **Red** LED slow blinking – Charge Complete, trickle charge

How To: MX5 External Power Supply

The MX5 has an available external power supply, which plugs into either of the D26 pin connectors on the bottom of the MX5. Options are available for AC or DC (vehicle) power.



Figure 3-2 MX5 Battery Charging LED

The LED indicates the status of the charging process:

- Slow **green** flashing – Battery is charging
- Solid **green** – Battery is fully charged
- Quick **green** double flashing – Charge/battery fault

Troubleshooting

Issue

MX5 cold resets and loses data and custom programs almost every other day.

Explanation and Solution

Li-Ion batteries (like all batteries) gradually lose their capacity over time (in a linear fashion) and never just stop working. This is important to remember -- the MX5 is always 'on' even when in the Suspend state and draws power from the batteries at all times.

The MX5 backup battery receives a trickle charge only when the MX5 (with a main battery pack installed) is connected to an external power source e.g. powered cradle, AC adapter. The main battery pack is charged first, then the main battery pack charges the backup battery – as long as the MX5 is connected to an external power source.

If the main battery has been out of the MX5 for an extended period of time or becomes fully discharged or dead, a fully charged backup battery will last for up to 24 hours.

When the main battery and backup battery are dead, the MX5 will cold reset the next time power is applied from either AC power or a charged main battery. A cold reset will cause loss of data and custom programs.

Always store unused MX5's with a fully charged main battery pack installed and connect an MX5 to an external power source as frequently as possible.

How To: MX5 Belt Battery Charger

The MX5 Belt Battery requires an external charger operating on 110-120V AC.

How to Charge

1. **Disconnect the MX5 from the Belt Battery Cable!**
2. Place the battery charger on a flat, stable surface.
3. Verify the temperature of the belt battery is between 0°C and 40°C (32°F and 100°F) before charging. If the belt battery is outside this range, allow the temperature to stabilize in this range before charging.
4. Insert the two-prong plug on the Battery Charger AC plug into a 100V-120V US plugged, stable AC outlet.
5. Insert the cigarette lighter end of the Belt Charger AC cable into the Charging Bay on the Belt Battery Assemble.
6. A **red** LED on the Belt Battery Charger indicates the unit is charging the Belt Battery.
7. When the battery reaches the predetermined voltage, the digital control circuit cuts the charging circuit and the **red** LED goes off. When the voltage drops below the predetermined voltage, the **red** LED illuminates.
8. While the Belt Battery Charger and the Belt Battery are connected to an AC power source, the Belt Battery voltage is continually maintained.
9. A blinking **red** LED is expected at the end of the cycle. When the **red** LED is off for at least ten seconds between blinks, the Belt Battery is fully charged. Disconnect the Belt Battery Charger from the Belt Battery.

Multi-Unit Charger/Analyzers

LXE has several multi-unit charger/analyzers available. Each one is pre-programmed specifically for the type of battery (NiCad, NiMH or Li-Ion) to be used in the battery station. The external design of each battery station is different and is based on the type of charging the unit performs.



For complete information and instructions on using specific LXE Charger/Analyzers, please refer to the documentation delivered with the unit.

How To: HX2 Multi-Charger

The LXE HX2 Multi-Charger is designed to simultaneously charge up to six standard HX2 Rechargeable Lithium Ion Battery Packs in less than four hours, depending upon battery pack temperature and conditions. The Extended battery packs require less than eight hours to charge. HX2 batteries are used by both the HX2 and the HX3.

Note: Li-Ion batteries are especially sensitive to temperature while charging. Batteries that are too hot or cold before the charging process begins should be brought to the correct temperature range before attempting to charge.

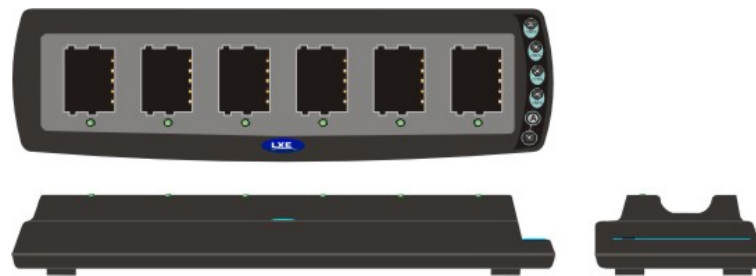



Figure 3-3 HX2 Multi-Charger

The Multi-Charger has an LED indicator at the base of each charging pocket. These LEDs are interpreted as follows:

| LED  | Indication | Description |
|---|-----------------------------|---|
| Off | No Battery/power | Battery pack not plugged in or no power applied. |
| Green | Charged | Battery pack fully charged. |
| Red | Charging | Battery pack charging. |
| Yellow | Standby | Battery pack temperature out of range. |
| Flashing Red on any station | Fault | Battery pack fault or failure. |
| Flashing Red on any station | Timeout | Battery analyzer's 4.5 hour timeout period expired. |
| Flashing Red on all stations. | Charger/Analyzer Failure | Battery analyzer fault or failure. |

Analyze/Charge Pocket


The analyze/charge pocket is the one closest to the HX2 Multi-charger label and the Analyze dome switch. The analyze/charge pocket can be used to:

- Charge a standard battery pack in less than 4 hours.
- Charge an Extended battery pack in less than 8 hours.
- Analyze a standard battery pack, ending with the battery pack fully charged, in less than 12 hours.
- Analyze an extended battery pack, ending with the battery pack fully charged, in less than 32 hours.

Analyze Dome Switch

Press the Analyze dome switch within 15 seconds of inserting the battery to start the analysis process. If the analyze dome switch is not pressed in time, the battery is charged, but not analyzed.

The LEDs above the Analyze Dome Switch indicate the percentage of battery capacity.

| Percentage of Battery Capacity | | Between 90% and 100% | Between 80% and 90 % | Between 70% and 80% | Between 50% and 70% |
|--------------------------------|--|---|----------------------|---------------------|---------------------|
| Analyze Progress LED Status |  | ● On | ● Off | ● Off | ● Off |
| | | ● On | ● On | ● Off | ● Off |
| | | ● On | ● On | ● On | ● Off |
| | | ● On | ● On | ● On | ● On |
| | | When all LEDs are off, the battery capacity is less than 50%. | | | |

How To: MX3 Multi-Charger Plus

The MX3 Multi-Charger is a 5 unit charger, capable of charging the Li-Ion batteries in less than 4 hours. Charge only 2381A376BATT, MX3A378BATT, MX3A379BATT or MX3A380RFIDBATT Rechargeable Lithium Ion Battery Packs in this charger. Other batteries or battery packs may burst causing injury or property damage.

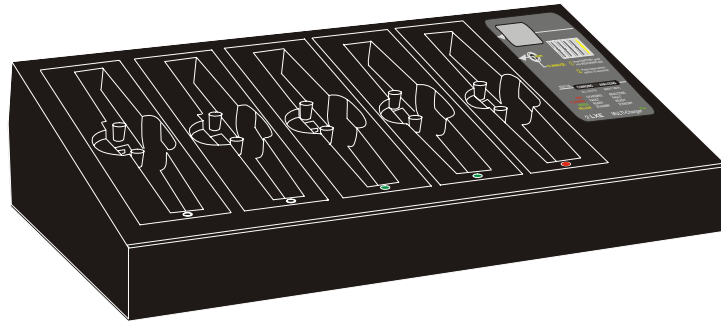


Figure 3-4 MX3 Multi-Charger Plus

The MX3 Multi-Charger Plus has five charging pockets. Four pockets are used for charging only, the pocket next to the label is used for charging and analyzing a battery. When a battery pack is inserted into the charger/analyzer pocket, press the analyze dome switch within 15 seconds to start the battery pack analysis. The analysis process ends with the battery fully charged. If the dome switch is not pressed, the battery pack is charged, but not analyzed.

The LCD screen indicates the status of the charger/analyzer pocket. During battery analysis, the LCD screen displays the word “ANALYZE” plus an indication of the progress of the analysis (CHARGE, DISCHARGE or READY). If the battery is only being charged, the LCD screen only displays “CHARGE” or “READY”.

The charge/analyze pocket can be used to:

- Charge a battery pack in less than four hours.
- Analyze a battery pack, ending with the battery pack fully charged, in less than ten hours.

Analyze Dome Switch

Press the Analyze dome switch within 15 seconds of inserting the battery to start the analysis process.

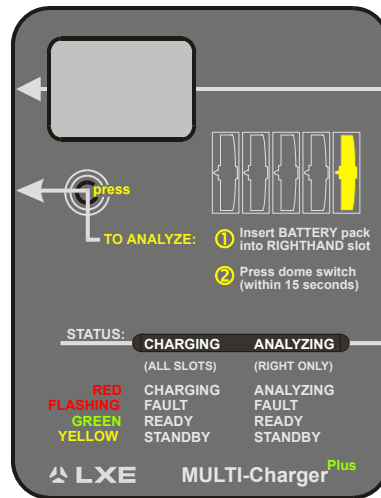


Figure 3-5 LCD Display and Dome Switch

If the dome switch is not pressed, the battery will be charged, but not analyzed. When the switch has been pressed, the LCD will display “ANALYZE” plus an indication of the progress of the analyze process.

The Multi-Charger Plus indicates the status of a battery pack with an LED located below each pocket. In addition, the charge/analyze pocket has an LCD screen providing additional information on the battery in that pocket.

Interpreting the LEDs

Note: On initial power-up, all five pocket LEDs will light yellow for a few seconds.

| | |
|---------------------------------------|--|
| Solid Red on any pocket - | Battery pack - Charging (any charge pocket). Charging or analyzing (charge/analyze pocket). |
| Flashing Red on any pocket - | Battery pack fault or failure. Battery charger timeout period expiration. |
| Flashing Red on every pocket - | Battery charger fault or failure. |
| Solid Green on any pocket - | Battery pack charge complete - Ready. |
| Solid Yellow on any pocket - | Battery pack temperature is out of range - Standby. |
| A single LED is unlit - | No battery pack installed. Defective or damaged battery pack or charger. Refer to Troubleshooting Guide. |
| All LEDs unlit - | No battery packs installed. No power applied to the Multi-Charger Plus. |

Important MX3 Battery Charger Version Information

| Device | Main Battery | Cradle | Charger |
|----------|----------------------------|--|---------------|
| MX3X | MX3A378BATT MX3A379BATT | 2381A002DESKCRADLE MX3RA002DESKCRADLE 2381A003VMCRADLE MX3RA003VMCRADLE 9000A005VMCRADLE19KB 9000A005VMCRADLE19KB-R | 9000A377CHGR5 |
| MX3-RFID | MX3A380RFIDBATT | | 9000A377CHGR5 |



**MX3 Multi-Charger Plus
9000A377CHGR5**

Use LXE V1.01 Upgrade Kit



**MX3 Multi-Charger
MX3A378CHGR6
(Obsolete July 2003)**

Use LXE V1.20 Upgrade Kit

The MX3X main battery will be incompatible with MX3 Battery Chargers that have not been upgraded to V1.20 or V1.01. To successfully charge the mobile device Battery Pack, pre-existing MX3 Battery Chargers must be returned to LXE for a software upgrade.

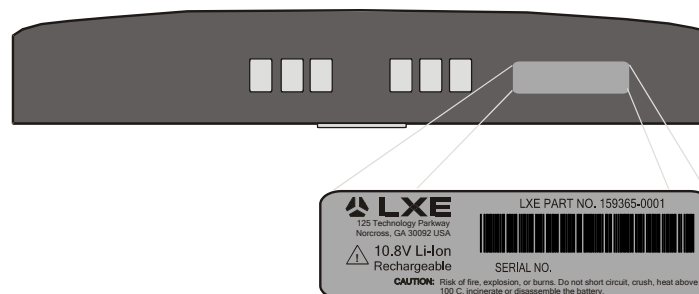
Using a Multi-Charger Plus Battery Charger with the Mobile Device's Battery Pack

The mobile device is designed to use a 2.2Ahr main battery to achieve 8+ hours of continuous operation.

If the battery pack is inserted into a MX3 Multi-Charger Plus (*without the V1.01 upgrade*) bay, the battery may not become fully charged in the charger's 4 hour time limit and a **red** LED illuminates after 4 hours have elapsed indicating a Battery Problem.

Remove and reinsert the battery pack into the same charging bay. This will reset the timer and allow the charger to complete the charge cycle for the mobile device's main battery in approximately 2 hours.

The mobile device battery pack has a silver label (as opposed to the white labels on LXE's MX3 and MX3-CE battery packs).



How To: MX5 Multi-Charger

The MX5 Multi-Charger is a 6 unit charger, capable of charging the Li-Ion batteries in less than 4 hours. Charge only MX5A379BATT Rechargeable Lithium Ion Battery Packs in this charger. Other batteries or battery packs may burst causing injury or property damage.

Note: Li-Ion batteries are especially sensitive to temperature while charging. Batteries that are too hot or cold before the charging process begins should be brought to the correct temperature range before attempting to charge.



Figure 3-6 MX5 Multi-Charger

The Multi-Charger has an LED indicator at the base of each charging pocket. These LEDs are interpreted as follows:

| | |
|--|---|
| A single LED is yellow - | Battery pack is charging. |
| A single LED is flashing yellow - | Battery pack is out of temperature range, standby |
| A single LED is solid red - | No or incorrect battery communication. |
| A single LED is flashing red - | Battery pack fault or failure or the timeout period has expired. |
| All LEDs flashing red - | Battery charger failure. |
| A single LED is green - | Battery is charged. |
| A single LED is unlit - | No battery in charge pocket or the battery is damaged or defective. |
| All LEDs unlit - | No power available to charger or no battery packs installed. |

How To: MX6 Four Bay Charger / Analyzer

Note: For best results, battery packs should be at room temperature before recharging them; temperature has a marked effect on charging. The recommended temperature range is 50° to 95° F (10 ° to 35 °C).



Figure 3-7 MX6 Four Bay Charger / Analyzer

The four bay Multicharger has four slots that fully charge a main battery in four hours. The charging slots work independently to control the charging of individual battery packs.

The last slot on the right also functions as a battery analyzer/charger. It resets and re-calibrates a battery, then displays its resulting capacity. The process monitors changes in temperature, current, and voltage. The slot senses when a battery pack is fully charged and automatically switches to maintain the battery at full capacity indefinitely.

How To Charge a Spare Battery Pack

1. Insert the end of the battery without the locking tab into the charging slot.
2. Snap the battery into place with a hinging motion.
3. Once the battery is inserted, observe the Status LED to monitor the charging process.

How To Charge/Analyze a Spare Battery Pack

1. Insert the end of the battery without the locking tab into the right hand charge/analyze slot.
2. Snap the battery into place with a hinging motion.
3. Once the battery is inserted, press the Analyze button. Observe the Indicator LEDs to monitor the charge/analyze process.

LEDs

Charging

As soon as a battery pack is placed in any slot, charging begins and the Status LED illuminates.

Green Charge cycle completed and battery is ready for use.

Orange Charge cycle is progressing.

Red Battery or charge slot encountered an error during the recent charge cycle.

Battery Capacity Indicator

The Battery Capacity Indicator LEDs are located along the right side of the Charge/Analyze slot. The LEDs illuminate after the completion of the Analyze cycle. Upon the completion of the final charge, the LEDs display the measured capacity of the battery. Battery capacity is displayed as a percentage of measured capacity/rated capacity. Each LED equates to 10% battery capacity.

Analyzing

Note: Because the multicharger is accumulating battery pack information during the entire Analyze cycle, it is important not to remove the battery until the cycle has been completed.

When this slot is being used to analyze a battery, the Status LED functions as follows:

Solid Green Has completed the Analyze cycle.

Flashing Orange Is being analyzed.

Solid Red Encountered an error during the Analyze cycle.

How To: MX7 Four Bay Charger / Analyzer

The LXE MX7 Multi-Charger is designed to simultaneously charge up to five MX7 Rechargeable Lithium Ion Battery Packs in less than four hours, depending upon battery pack temperature and conditions.



Figure 3-8 MX7 Five Bay Charger / Analyzer

The MX7 Multi-Charger has five charging pockets. Four pockets are used for charging only, the pocket next to the label is used for charging and analyzing a battery. When a battery pack is inserted into the charger/analyzer pocket, press the analyze dome switch within 15 seconds to start the battery pack analysis. The analysis process ends with the battery fully charged. If the dome switch is not pressed, the battery pack is charged, but not analyzed.

The LCD screen indicates the status of the charger/analyzer pocket. During battery analysis, the LCD screen displays the word “ANALYZE” plus an indication of the progress of the analysis (CHARGE, DISCHARGE or READY). If the battery is only being charged, the LCD screen only displays “CHARGE” or “READY”.

The charge/analyze well can be used to:

- Charge a battery pack in less than four hours.
- Analyze a battery pack, ending with the battery pack fully charged, in less than twelve hours.

Analyze Dome Switch

Press the Analyze dome switch within 15 seconds of inserting the battery to start the analysis process.

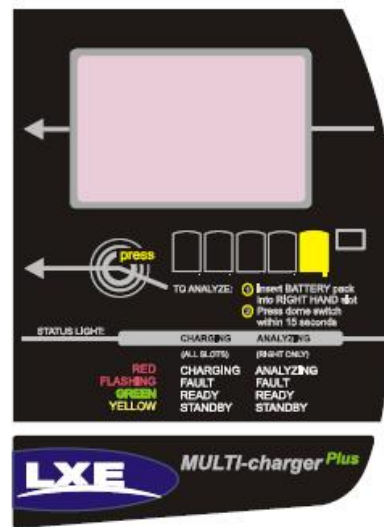


Figure 3-9 LCD Display and Dome Switch

If the dome switch is not pressed, the battery will be charged, but not analyzed. When the switch has been pressed, the LCD will display “ANALYZE” plus an indication of the progress of the analyze process.

The LCD displays

| Indicator | Function | Description |
|------------|-----------------------|--|
| ANALYZE | Analyzing the Battery | Battery pack cycling through Charge, Discharge, Charge. |
| CHARGE | Charge | Battery pack charging. |
| DISCHARGE | Discharge | Battery pack discharging. |
| BAT. FAULT | Battery Fault | Battery pack fault or failure. |
| READY | Analysis Complete | Battery pack analyzed and ready for use with displayed capacity. |
| XXXX mAh | Display Capacity | Capacity measured during discharge cycle. |
| XX VDC | Display volts | Battery volts measured during charge and discharge cycle. |

The Multi-Charger indicates the status of a battery pack with an LED located below each pocket. In addition, the charge/analyze pocket has an LCD screen providing additional information on the battery in that pocket.

Interpreting the LEDs

Each pocket on the Multi-Charger has an LED. The LED located at the base of each pocket communicates the status of the charge operation.

Note: On initial power-up, all five pocket LEDs will light yellow for a few seconds.

RED - on any pocket

Battery pack charging (any charge pocket). Charging or analyzing (charge/analyze pocket).

RED FLASHING – on any pocket

Battery pack fault or failure. Battery charger timeout period expiration.

RED FLASHING - on every pocket

Battery charger fault or failure.

GREEN - on any pocket

Battery pack charge complete - Ready.

YELLOW - on any pocket

Battery pack temperature is out of range - Standby.

NO LIGHT - on a pocket

No battery pack installed.

Defective or damaged battery pack or charger. Refer to Troubleshooting.

NO LIGHT - on every pocket

No battery packs installed.

No power applied to the Multi-Charger.

How To: MX8 Four Bay Charger

The LXE MX8 Multi-Charger is designed to simultaneously charge up to four MX8 Rechargeable Lithium Ion Battery Packs in less than five hours, depending upon battery pack temperature and conditions.



Figure 3-10 MX8 Four Bay Charger

The MX8 Multi-Charger has four charging pockets. Battery packs do not need to be fully discharged between charge cycles.

The external Power Supply for the multi-charger is shipped with the multi-charger. If there is no AC cable, please contact your LXE representative. The multi-charger power supply is intended for use with the MX8 Multi-Charger *only*.

Interpreting the LEDs

Each pocket on the Multi-Charger has an LED. The LED located at the base of each pocket communicates the status of the charge operation.

Note: On initial power-up, all LEDs will illuminate red, yellow, green for 1 second before turning off. When the LEDs are off, the multi-charger is ready.

| LED | Indication | Description |
|-----------------------------|------------------|--|
| Off | No Battery/power | Battery pack not plugged in or no power applied. |
| Green | Charged | Battery pack fully charged. |
| Red | Charging | Battery pack charging. |
| Yellow | Standby | Battery pack temperature out of range. |
| Flashing Red on any station | Fault | Battery pack fault or failure. |

How To: HX1 Four Bay Charger

The HX1 Multi-Charger is a 4 unit charger. Each bay of the charger can be used to charge or recharge an HX1 battery pack.



Figure 3-11 HX1 Four Bay Charger

There are five LEDs on the Multi-Charger, one Power LED and a Status LED for each of the four charging bays.

Power LED

The Power LED is illuminated **solid green** when power is supplied to the charger. If the LED does not light when power is applied, check the power source. If the power source is good, contact LXE Customer Support.

Status LED

There is one status LED for each of the four charging bays. The status LED indicates the activity in the respective charging bay.

| Status LED | Indicates... |
|------------------------|--|
| Solid Yellow | Battery is being charged |
| Blinking Yellow | Battery is being recalibrated |
| Solid Green | Battery has stopped charging and is ready for use |
| Solid Red | The charger has detected a fault condition |
| Off | The bay is empty or the Multi-Charger is not connected to AC power |

Display

There is one display window for each of the four charging bays. The display gives additional information on the status of the battery in the bay.

| Display shows | Indicates... |
|---|--|
| 2 digit number (00 – 99) | <p>A two digit number is displayed for the following reasons:</p> <ul style="list-style-type: none"> • % Charge – During a normal charging cycle, the display indicates the percentage of the charge in the battery from 00% to 99%. • Charge Cycle Counter – After momentarily pressing the recalibration button, the display shows the number of times the battery has been recharged in the Multi-Charger since its last recalibration. • Maximum Capacity – When the recalibrate button is held down while inserting a battery, the display shows the maximum charge potential in mAh. <p style="text-align: center;"><i>Note: Since the capacity is a four digit number, the display shows the first two digits for 2 seconds then the last 2 digits for two seconds.</i></p> |
| 1c or 2c | Either 1 (1c) or 2 (2c) recalibration cycles |
| Blank | No battery is present |
| -- | The charger was unable to establish communications with the battery. This can be due to a damaged battery or dirty contacts. Inspect the battery contacts and ensure they are not damaged. Clean battery contacts (on the battery and charger) with a cotton swab and alcohol. If the problem persists, contact LXE Customer Support. |
| Off | The bay is empty or the Multi-Charger is not connected to AC power |
| FP , Fq or FL | The battery is not charging properly. Contact LXE Customer Service for assistance. |
| Hi or Lo | The battery is above (Hi) or below (Lo) the temperature for charging. After it reaches room temperature, the battery starts charging. |
| C | The charger has determined the “maximum capacity when full” register in the battery is not valid. Place the battery into the recalibration cycle (as described earlier in this section) to reset the register. The charger selects the 2c recalibration mode. |

Chapter 4 Powered Docking Stations / Cradles

Overview

The HX2, HX3, MX3X, MX5, MX6, MX7 and MX8 have optional powered docking stations. These docking stations offer two main functions:

- They provide a communications link between the mobile device and another device such as a personal computer or printer
- They provide power to operate the mobile device while docked and to recharge the battery in the mobile device if an external power supply is attached.

Only the functions and indicator lights pertaining to battery charging are discussed in this section. For more information on the other functions of the docks, please refer to the reference guide for the docking station.

Note: Docks provide battery charging functions only. Additional battery functions such as conditioning, analyzing or discharging are not included in the docks. See Chapter 3, “Using Battery Chargers/Analyzers” for details on these functions and the equipment that offers these functions.

Note: Some docks may be passive; securing the mobile device in the dock without requiring a power source connection.

Non-powered docking and non-charging docks or docking stations are not discussed here.

Related Manuals

HX2 Cradle Reference Guide – HX2, HX3

MX3 Cradle Reference Guide – MX3, MX3-CE, MX3X

MX5 Cradle Reference Guide – MX5 PPC, MX5X

MX6 Cradle Reference Guide – MX6 PPC, MX6 WM

MX7 Cradle Reference Guide – MX7

MX8 Cradle Reference Guide – MX8

HX2 Desktop Cradle

The HX2 Desktop Cradle is powered by an AC adapter. When connected to an AC power source, the desktop cradle can power the HX2 while charging the tethered battery and a spare battery in the dock's battery charging wells. It also stores the tethered ring scanner while the HX2 is docked.

The HX3 mobile device is compatible with the HX2 cradle, tethered batteries, ring scanners and accessories.

The cradle LEDs are on the front of the cradle.

| | |
|---|--|
| B1 LED – Back left battery charging bay | Normal State is Off . With battery and AC power, normal state may be any state listed in <i>Cradle LEDs</i> . |
| PWR LED - HX2 Docked / On / Receiving Power bay | Normal State is Off . With HX2 in, turned On and AC power, normal state is On. |
| B2 LED – Back right battery charging bay | Normal State is Off . With battery and AC power, normal state may be any state listed in <i>Cradle LEDs</i> . |

Cradle PWR LED

| When PWR LED is ... | It means |
|---------------------|---|
| Off | No AC/DC power supplied to the cradle and/or No HX2 in the charging bay and/or HX2 is not properly seated in charging bay and/or if this is the first time the HX2 has been inserted, the HX2 is properly seated and has not been powered On. |
| Green | HX2 is On, is properly seated in the charging bay and is receiving external power through the cradle. |

B1 and B2 LED

| When B1 and/or B2 LED is ... | | It means |
|------------------------------|---------------------------|--|
| Off | No battery or no AC power | No spare battery in the battery bay(s) or no AC/DC power is being applied to the cradle. |
| Green | Charged | Spare battery pack fully charged. |
| Red | Charging | Spare battery pack charging. |
| Amber | Standby | Spare battery pack temperature out of range. |
| Flashing Red | Fault | Spare battery pack fault or failure. |

MX3 Cradles

The MX3 has two single docking stations; one is a desk top mount, the other is a vehicle mount. Unlike other docking stations, the MX3 docks only have a power LED. All the charging indicators are on the MX3.

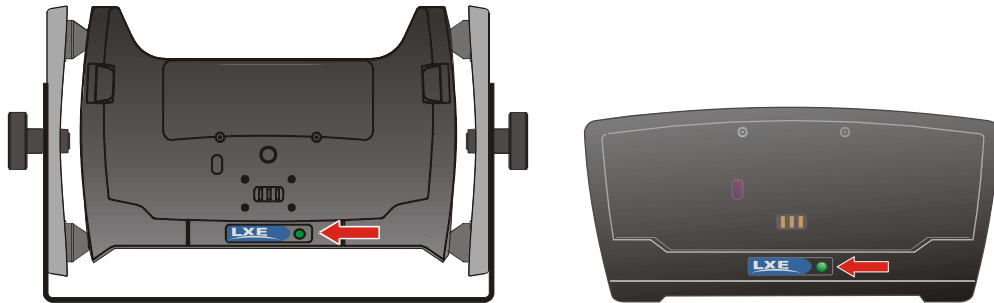


Figure 4-1 MX3 Vehicle Mount and Desktop Docking Cradle LED

Both docking stations have only one LED. The vehicle mount cradle is different in appearance, but has the same status LED as the desktop docking cradle illustrated above. The LED is:

- **Orange** when power is connected to the station.
- **Green** when an MX3 is docked in a powered cradle.
- **Red** when the IR port is in use.

Other indicators are on the MX3 computer:

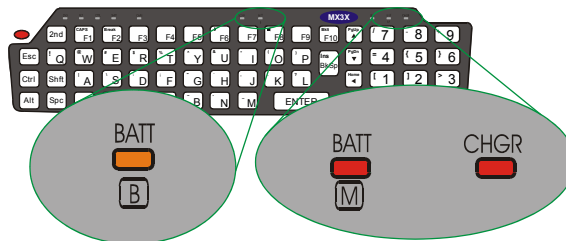


Figure 4-2 MX3 LED Indicators

- BATT B: **Orange** when the backup battery is charging and unlit when the backup battery is charged.
- BATT M: **Red** when the main battery is low on power, unlit otherwise.
- CHGR: **Red** when the main battery is charging, **green** when the main battery is charged. If **orange**, a problem has occurred (contact LXE customer support). If the LED is not lit, the MX3 is not seated in a dock or the dock does not have a power source connected.

MX5 Cradles

The MX5 has a single docking station with a vehicle mount. Unlike other docking stations, the MX5 dock only has a power LED built into the power supply. The charging indicator is on the MX5.

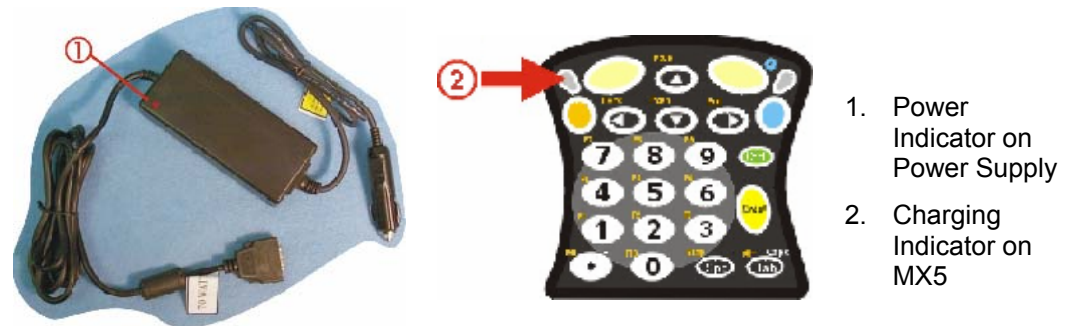


Figure 4-3 MX5 Cradle Power Supply and Charging Indicator

When the MX5 is charging, the LED slowly flashes **green**. When fully charged, the LED is steady **green**. If a battery/charge fault occurs, the LED flashes **green**, but the flashing is quicker and a double flash.

Allow a minimum of four hours for a new main battery to charge. Main batteries recharge in three to four hours in the cradle. Allow up to seven hours for a new backup battery to charge.

Important: The cradles are not designed to secure an MX5 with a protective padded case. The vehicle cradle is not designed to secure an MX5 with a trigger handle. The desktop cradles will secure mobile device's with handstraps or trigger handles.

MX5 docking cradles give the MX5 the ability to communicate with a host computer and other devices. In addition, using wall AC adapters or DC/DC converters, the cradle charges the main battery. The MX5 can be either On or in Suspend mode while in the cradles.

LXE offers three desktop cradles and one vehicle cradle:

Standard Desktop Cradle requires AC power before main battery charging can commence. This cradle does not have an active LED on the front housing. MX5A002DESKCRADLE

Enhanced Desktop Cradle requires AC power before main battery charging can commence. It will charge both the main battery in the MX5 and another MX5 Battery Pack at the same time. MX5A003EDESKCRADLE

Enhanced Desktop Cradle with Ethernet Port requires AC power before main battery charging and host/client communications can commence. It will charge both the main battery in the MX5 CE. NET device and another main battery pack at the same time. MX5A004ETHDESKCRADLE

Vehicle Mount Cradle requires AC/DC power before main battery charging can commence. MX5A001VMCRADLE

MX6 Cradles

The docking cradles give the MX6 the ability to communicate with a host computer and other equipment. The MX6 can be either On or in Suspend mode while in the cradles.

Using wall AC adapters or DC/DC converters, the docking cradle transfers power to the internal charging circuitry of the MX6 and, in turn, the MX6 recharges the main battery. The desktop docking cradle recharges both the MX6 main battery and an auxiliary battery at the same time.

The vehicle docking cradle uses a 12V cigarette lighter adapter or a bare wire 12-48V power supply to transfer power to the internal charging circuitry of the MX6 and, in turn, the MX6 recharges the main battery. A powered docking cradle gives the MX6 the ability to communicate with a host computer and other equipment.

A complete battery charge of the main battery pack and an extra battery pack using the desktop docking cradle takes less than four hours. The vehicle cradle completely charges the main battery in the MX6 is less than four hours.

The cradles require an external power source, before communications or battery charging is available.

When the desktop and vehicle cradles are receiving external power and the MX6 is properly seated in the charging bay, the DOCK LED is **green**. When the battery in the MX6 is charging the DOCK LED is **green**.

MX6 Cradle Indicators and LEDs

Powered Desktop Cradle

| | | |
|--------------------|--------------------|---|
| DOCK | Solid Green | MX6 is properly seated in the charging bay and the main battery in the MX6 is charging. |
| AUX Battery | Orange | The spare battery is charging. |
| | Green | The spare battery has completed charging and is ready for use. |
| COMM w/serial port | Red | Serial data is being sent to the MX6 from the host. |
| | Green | Serial data is being sent from the MX6 to the host. |
| | Orange | Serial data is being sent at high data rates. |
| COMM w/USB port | Green | USB connection is established with the host. |

Powered Vehicle Cradle

| | | |
|--------------------|--------------------|---|
| DOCK | Solid Green | MX6 is properly seated in the charging bay and the main battery in the MX6 is charging. |
| COMM w/serial port | Red | Serial data is being sent to the MX6 from the host. |
| | Green | Serial data is being sent from the MX6 to the host. |
| | Orange | Serial data is being sent at high data rates. |

MX7 Desktop Cradle

The MX7 Desktop Cradle is powered by an AC adapter. When connected to an AC power source, the desktop cradle can charge the main battery in a docked MX7 plus charge a spare battery in the charging pocket.



Figure 4-4 MX7 Desktop Cradle

A spare battery in the charging pocket charges in approximately four hours. Charging time for a battery installed in a docked MX7 varies depending on the Power Management settings of the MX7 (a unit in suspend charges faster than a unit that is on).



Figure 4-5 MX7 Desktop Cradle Front Label

MX7 Docked LED

| When Docked LED is ... | It means |
|------------------------|--------------------------------------|
| Off | MX7 not inserted or no power applied |
| Red | MX7 docked and power applied. |

Spare Battery LED

| When Spare LED is ... | It means |
|-----------------------|---|
| Off | Battery pack not inserted or no power applied |
| Green | Battery pack fully charged |
| Red | Battery pack charging |
| Yellow / Amber | Battery pack temperature out of range |
| Flashing Red | Battery pack fault or failure |

MX7 Mobile Device System Status LED

The MX7 System Status LED is located at the top left of the keypad, above the Scan button. Use the System Status LED to determine the status of the MX7 while it is in the desktop cradle.

| When the LED is . . . | The Status is . . . | Comment |
|-----------------------|---------------------|---|
| Blinking Red | Power Fail | Replace the main battery with a fully charged main battery. Or Connect the MX7 to external AC power to allow the internal charger to charge the main battery e.g. dock in a powered cradle. |
| Steady Red | Main Battery Low | Low Battery Warning. Replace the main battery with a fully charged main battery. Or dock the MX7 in a powered cradle. |
| Blinking Green | Display Off | No user intervention required. |
| No Color | Good | No user intervention required. |

Important

The desktop cradle is shipped with the cradle adapter cup pre-installed.

- To charge an MX7 **with a rubber boot**, the adapter cup must be removed.
- To charge an MX7 **without a rubber boot**, the adapter cup must be installed.

Please refer to the “MX7 Cradle Reference Guide” for details on installing or removing the cup.

MX8 Desktop Cradle

The MX8 Desktop Cradle is powered by an AC adapter. When connected to an AC power source, the desktop cradle can charge the main battery in a docked MX8 plus charge a spare battery in the charging pocket.



Figure 4-6 MX8 Desktop Cradle

A spare battery in the charging pocket charges in approximately four hours. Charging time for a battery installed in a docked MX8 varies depending on the Power Management settings of the MX8 (a unit in suspend charges faster than a unit that is on).



Figure 4-7 MX8 Desktop Cradle Front Label

MX8 Docked LED

| When Docked LED is ... | It means |
|------------------------|--------------------------------------|
| Off | MX8 not inserted or no power applied |
| Red | MX8 docked and power applied. |

Spare Battery LED

| When Spare LED is ... | It means |
|-----------------------|---|
| Off | Battery pack not inserted or no power applied |
| Green | Battery pack fully charged |
| Red | Battery pack charging |
| Yellow / Amber | Battery pack temperature out of range |
| Flashing Red | Battery pack fault or failure |

MX8 Mobile Device System Status LED

The MX8 System Status LED is located at the top left of the keypad, above the Scan button. Use the System Status LED to determine the status of the MX8 while it is in the desktop cradle.

| When the LED is . . . | The Status is . . . | Comment |
|-----------------------|---------------------|---|
| Blinking Red | Power Fail | Replace the main battery with a fully charged main battery. Or Connect the MX8 to external AC power to allow the internal charger to charge the main battery e.g. dock in a powered cradle. |
| Steady Red | Main Battery Low | Low Battery Warning. Replace the main battery with a fully charged main battery. Or dock the MX8 in a powered cradle. |
| Blinking Green | Display Off | No user intervention required. |
| No Color | Good | No user intervention required. |

Important

The desktop cradle is shipped with the cradle adapter cup pre-installed.

- To charge an MX8 **with a rubber boot**, the adapter cup must be removed.
- To charge an MX8 **without a rubber boot**, the adapter cup must be installed.

Please refer to the “MX8 Cradle Reference Guide” for details on installing or removing the cup.

Troubleshooting Cradles and Docking Stations

The Computer Does Not Fit Into the Station

Check to be sure the correct docking station is being used for the computer. Also, check the computer or docking station reference guide to be sure the computer is placed in the docking station correctly. As a general rule, the keypad and display face out or up when in the dock.

If the computer has a protective boot or is in a carrying case, remove the protective boot or carrying case and try again.

The Power Indicator Is Not Lit

If the POWER or PWR light is not on, verify that the docking station is receiving power from the appropriate source.

The Charging Indicator Is Not Lit

If the CHG, CHARGE, READY (MX2/2325) or BATTERY CHARGE light does not light or the status light does not change from **orange** to **green** on the MX3 dock, be sure the computer or spare battery being charged is inserted correctly in the dock. Also, be sure no foreign objects are keeping the computer from fitting correctly in the dock.

The CHRNG Light is Orange (MX3 Only)

This indicates a problem has occurred in the charging process. Contact LXE Customer Support for assistance.

No Battery Pack in the Battery Well but the LED is On

Dirt or foreign objects may be in the battery well. Unplug the cradle from the AC outlet and remove any dirt or foreign objects. If the LED continues to stay on, contact your LXE representative.

The Docked LED Is Not Lit

Verify that the computer is correctly docked in the charging well and the docking station is receiving power from the appropriate source.

Appendix A LXE Part Numbers: Batteries, Cradles and Chargers

Battery Listing and Part Numbers

Please consult your LXE representative to verify the appropriate battery for your device and location. Some part numbers listed may be obsolete.

| Computer | Main Battery | | Backup Battery 2 |
|---------------|--|----------------------------------|------------------|
| HX1 | 1700 mAh Li-Ion | HX1A477BATTERY | |
| HX2/HX3 | 2000 mAh (standard) / 4000 mAh (extended) Li-Ion | HX2A301BATTSTD HX2A302BATTEXT | 50 mAh NiCad |
| MX3/MX3X | 1400 mAh Li-Ion | 2381A376BATT1600 | 50 mAh NiCad |
| | 1800 mAh Li-Ion | MX3A378BATT | |
| MX3-RFID | 1800 mAh Li-Ion | MX3A380RFIDBATT | 50 mAh NiCad |
| MX5 | 2800 mAh Li-Ion | MX5A379BATT | 450 mAh NiMH |
| MX6 | 2000 mAh Li-Ion | MX6A380BATT | NiMH |
| MX7 | 2200 mAh Li-Ion | MX7A380BATT | 50 mAh NiCad |
| MX8 | 3000 mAh Li-Ion | MX8A380BATT | 160 mAh NiMH |
| VX5, VX6, VX7 | UPS Battery Pack | 9000A378UPSBATTPACK | Li-Ion |

² Not user replaceable. Replaced by LXE Repair Services (approximately 5 years until end of life).

Battery Chargers and Docking Stations

Please consult your LXE representative to verify the appropriate dock and battery charger for your device and location. Some part numbers listed may be obsolete. Only docking stations that charge batteries are listed.

| Computer | Cradles, Docking / Charging Stations | Chargers and Analyzers |
|------------------|--|--|
| HX1 | -- | 4 Unit Charger / Analyzer HX1A376CHGR HX1A378CHGRWW |
| HX2/HX3 | HX2/HX3 Desk Cradle HX2A312DESKCRADLEUS HX2A313DESKCRADLEWW | 6 Unit Charger / Analyzer HX2A310CHGR6US HX2A311CHGR6WW |
| MX3X MX3-RFID | Desktop Cradle 2381A001DESKCRADLE MX3RA002DESKCRADLE Vehicle Mount Cradle 2381A003VMCRADLE MX3RA003VMCRADLE 9000A005VMCRADLE19KB | 6 Unit Charger 2381A377CHGR6 5 Unit Charger / Analyzer 9000A377CHGR5US 9000A377CHGR5WW |
| MX5 | Vehicle Mount Cradle MX5A001VMCRADLE Desktop Cradle MX5A002DESKCRADLE Enhanced Desktop Cradle MX5A003EDESKCRADLE Enhanced Desktop Cradle w/Ethernet MX5A004ETHDESKCRADLE | 6 Unit Charger MX5A385CHGR6US MX5A385CHGR6WW Battery Belt Charger MX5A383BATTBELTCHGR |
| MX6 | Desktop Cradle MX6A005DESKCRADLEUS MX6A006DESKCRADLEWW 4-bay Docking Cradle MX6A012MULTIDOCKUS MX6A013MULTIDOCKWW 4-bay Docking Cradle w/ Ethernet MX6A010NETCRADLEUS MX6A011NETCRADLEWW Vehicle Cradle for MX6 w/o Handle MX6A007VMCRADLE Vehicle Cradle for MX6 w/Handle MX6A008WHVMCRADLE | 4-unit Charger /Analyzer MX6A383CHGR4US MX6A384CHGRWW |

| Computer | Cradles, Docking / Charging Stations | Chargers and Analyzers |
|-----------------|--|--|
| MX7 | Desktop Cradle w/spare battery bay MX7A388DESKCRADLEWW Vehicle Mount Cradle MX7A008ACTIVEVMCRADLE | 5 Unit Charger / Analyzer MX7A385CHGR5US MX7A386CHGRWW |
| MX8 | Desktop Cradle w/spare battery bay MX8A002DESKCRADLE | 4-unit Charger MX8A385CHGR4US MX8A386CHGR4WW |
| RX2 | -- | Battery Charger RX2A381CHGRUS |



Appendix B Battery and Battery Charger/Analyzer Specifications

HX1 Hands-Free Voice Device

HX1 Rechargeable Battery

| | | |
|---------------|---|---|
| Main | 16.8V, 4 cell, 1700 mAh Li-Ion battery pack | Externally Chargeable |
| Backup (CMOS) | Internal Nickel-Cadmium (NiCad) | Automatically charges from Main Battery during normal operation Keeps MX7 operational for 5 minutes (depending upon usage) when Main Battery is depleted |

HX1 Multi-Charger

Electrical Specifications

| Parameter | Min | Typical | Max. | Comment |
|--|-------|---------|--------|----------------|
| Power Supply Input Voltage (V _{AC-IN}) | 90VAC | | 264VAC | Auto-switching |
| Power Supply Input Frequency (freq) | 47Hz | | 63Hz | |

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|-------------|---------------|--|
| Operating | 0°C (32°F) | +45°C (113°F) | Battery packs shall only be charged when their temperature is between 0°C (32°F) and 45°C (113°F). |
| Preferred | 20°C (68°F) | 25°C (77°F) | For best results, operate the charger at room temperature, 20°C (68°F) and 25°C (77°F). |
| Charging | 0°C (32°F) | +45°C (113°F) | Battery packs will not charge if their temperature is outside this range. |

HX2/HX3 Wearable

HX2/HX3 Rechargeable Batteries

| | | |
|-----------------------------|--|--|
| Main, Standard and Extended | 7.2V, 2000 mAh (standard) or 4000 mAh (extended) Li-Ion battery pack | In-Unit Chargeable or Externally Chargeable |
| Backup (CMOS) | Internal Nickel-Cadmium (NiCad) | Automatically charges from Main Battery during normal operation Keeps memory operational for up to 24 hours when Main Battery is depleted |

HX2/HX3 Multi-Charger

Electrical Specifications

| Parameter | Min | Typical | Max. | Comment |
|--|--------|---------|--------|----------------|
| Power Supply Input Voltage (V _{AC-IN}) | 100VAC | | 240VAC | Auto-switching |
| Power Supply Input Frequency (freq) | 47Hz | | 63Hz | |

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|--------------|---------------|---|
| Operating | -20°C (-4°F) | +40°C (104°F) | Battery packs shall only be charged when their temperature is between 10°C (50°F) and 40°C (104°F). |
| Charging | +10°C (50°F) | +40°C (104°F) | Battery packs will not charge if their temperature is outside this range. |
| Storage | -20°C (-4°F) | +70°C (158°F) | Unit is off. |

MX3X and MX3-RFID Mobile Device

Li-Ion Rechargeable Battery

| | | |
|---------------|---|---|
| Main | 10.8V, 3 cell, 1400 or 1800 mAh Li-Ion battery pack (N/A on MX3-RFID) 1800 mAh Li-Ion battery pack (MX3-RFID only) | In-Unit Chargeable or Externally Chargeable |
| Backup (CMOS) | Internal Nickel-Cadmium (NiCad) 5.7V max. | Automatically charges from Main Battery during normal operation Keeps MX3 operational for 5 minutes (depending upon usage) when Main Battery is depleted |

MX3 Multi-Charger Plus

Electrical Specifications

| Parameter | Min | Typical | Max. | Comment |
|--|--------|---------|------------------|----------------|
| Power Supply Input Voltage (V_{AC-IN}) | 88VAC | 110VAC | 132VAC | Auto-switching |
| Power Supply Input Voltage (V_{AC-IN}) | 176VAC | 220VAC | 264VAC | Auto-switching |
| Power Supply Input Frequency (freq) | 47Hz | | 63Hz | |
| Maximum Charge Current (I_{MAX}) | | 1A | 1.25A | |
| Cutoff Voltage (V_{OUT}) | | | 12.3V \pm 50mV | 4.1V per cell |
| Charge Termination Current (I_T) | | | 50mA \pm 20mA | |

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|--------------|---------------|--|
| Operating | 0°C (32°F) | +50°C (122°F) | Battery packs shall only be charged when their temperature is between 10°C (50°F) and 35°C (95°F). |
| Charging | +10°C (50°F) | +35°C (95°F) | Battery packs will not charge if their temperature is outside this range. |
| Storage | -20°C (-4°F) | +70°C (158°F) | Unit is off. |

MX5X Mobile Device

Li-Ion Rechargeable Battery and SLA Auxiliary Battery

| | | |
|--------------------------|--|--|
| Main | 7.4V, 2800 mAh Li-Ion battery pack | In-Unit Chargeable or Externally Chargeable |
| Backup (CMOS) | Internal Nickel-Cadmium (NiCad) 5.7V max. | Automatically charges from Main Battery during normal operation Keeps MX5 operational for 5 minutes (depending upon usage) when Main Battery is hot swapped, maintains memory for 48 hours after Main Battery is depleted |
| Auxiliary (Battery Belt) | 12V, 9 Ah SLA battery | Required for MX5 heater, Belt Battery requires a specific Belt battery charger. |

MX5 Multi-Charger

Electrical Specifications

| Parameter | Min | Typical. | Max. | Comment |
|--|--------|----------|--------|----------------|
| Power Supply Input Voltage (V _{AC-IN}) | 88VAC | 110VAC | 132VAC | Auto-switching |
| Power Supply Input Voltage(V _{AC-IN}) | 176VAC | 220VAC | 264VAC | Auto-switching |
| Power Supply Input Frequency (freq) | 47Hz | | 63Hz | |

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|--------------|---------------|---|
| Operating | 0°C (32°F) | +60°C (140°F) | Battery packs will only be charged when their temperature is between 0°C (32°F) and 45°C (113°F). |
| Charging | 0°C (32°F) | +45°C (113°F) | Battery packs will not charge if their temperature is outside this range. |
| Storage | -20°C (-4°F) | +70°C (158°F) | Unit is off. |

MX5 Battery Belt Charger

| Parameter | Min | Typical. | Max. | Comment |
|--|--------|----------|--------|--------------------------|
| Power Supply Input Voltage (V _{AC-IN}) | 110VAC | | 120VAC | 2 Amp, automatic shutoff |

Belt Batteries should only be charged when their temperature is between 0°C (32°F) and 40°C (100°F).

MX6 with Windows Mobile OS

Li-Ion Rechargeable Battery

| | | |
|---------------|---|---|
| Main | Li-Ion battery pack 7.4V 14.8Ah | In-Unit Chargeable or Externally Chargeable |
| Backup (CMOS) | Internal Nickel Metal Hydride (NiMH) 5.7V max. | Automatically charges from main battery during normal operation. MX6 must be connected to an external power supply when backup battery charging is required. Memory operational for 40 hours when main battery is depleted |

MX6 Four Bay Charger/Analyzer

| | |
|-------------------------|---|
| Operating Temperature | 14°F to 122°F (-10°C to 50°C) |
| Storage Temperature | -4°F to 158°F (-20°C to 70°C) |
| Charging Temperature | 32°F to 113°F (0°C to 45°C) |
| Weight | 18 oz (510 g) |
| Dimensions | Length 11.7 in x Width 5.2 in x Height 1.5 in Length 29.7 cm x Width 13.2 cm x Height 3.8 cm |
| Capacity | 1 to 4 battery packs |
| Power Supply Input | 90-265V, 47-63Hz |
| Power Supply Output | 12VDC, 3A |
| Input Connection | 2 position IEC 320-C8 |
| Charging Mode: Standard | 100% charge in 4 hours |
| Charging Mode: Analysis | Charges/discharges/resets/calibrates battery in 14 hours |

MX7 Hand-Held

MX7 Rechargeable Battery

| | | |
|------------------|---|---|
| Main | 7.2V, 2 cell, 2200 mAh Li-Ion battery pack | In-Unit Chargeable or Externally Chargeable |
| Backup (CMOS) | Internal Nickel-Cadmium (NiCad) | Automatically charges from Main Battery during normal operation Keeps MX7 operational for 5 minutes (depending upon usage) when Main Battery is depleted |

MX7 Multi-Charger

Electrical Specifications

| Parameter | Min | Typical. | Max. | Comment |
|---|--------|----------|--------|----------------|
| Power Supply Input Voltage (V _{AC-IN}) | 100VAC | | 240VAC | Auto-switching |
| Power Supply Input Frequency (freq) | 47Hz | | 63Hz | |

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|--------------|---------------|--|
| Operating | 0°C (32°F) | +50°C (120°F) | Battery packs shall only be charged when their temperature is between 0°C (32°F) and 45°C (113°F). |
| Charging | +10°C (50°F) | +40°C (100°F) | Battery packs will not charge if their temperature is outside this range. |
| Storage | -20°C (-4°F) | +70°C (158°F) | Unit is off. |

MX8 Hand-Held

MX8 Rechargeable Battery

| | | |
|---------------|---|--|
| Main | 3.7V, 3 cell, 3000 mAh Li-Ion battery pack | In-Unit Chargeable or Externally Chargeable |
| Backup (CMOS) | Internal Nickel Metal Hydride (Ni-MH) 2.4V max. | Automatically charges from Main Battery during normal operation. Requires AC power for re-charging. Minimum life expectancy is 2 years. |

MX8 Battery Multi-Charger

Electrical Specifications

| Parameter | Min | Max. | Comment |
|--|---------|--------|----------------|
| Power Supply Input Voltage (V _{AC-IN}) | 100 VAC | 240VAC | Auto-switching |
| Power Supply Input Frequency (freq) | 47Hz | 63Hz | |

Note: Battery packs may leak up to 1mA current through the battery contacts when left in an unpowered multi-charger battery well.

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|--------------|---------------|--|
| Operating | 0°C (32°F) | +50°C (120°F) | Battery packs will only be charged when their temperature is between 10°C (50°F) and 40°C (100°F). |
| Charging | 10°C (50°F) | +40°C (100°F) | Battery packs will not charge if their temperature is outside this range. |
| Storage | -20°C (-4°F) | +70°C (160°F) | Unit is off. |

RX2 Vehicle Mounted RFID Tag Reader

In-Unit Rechargeable Battery

| | | |
|------|-----------------------|--|
| Main | 4000 mAh NiMH battery | Optional. Not user accessible. In-Unit Chargeable. |
|------|-----------------------|--|

RX2 Battery Charger

Electrical Specifications

| Parameter | Min | Typical. | Max. | Comment |
|---|--------|----------|--------|----------------|
| Power Supply Input Voltage (V _{AC-IN}) | 100VAC | | 240VAC | Auto-switching |

Operating Temperature Ranges

| | Minimum | Maximum | Comment |
|-----------|------------|---------------|---------|
| Operating | 0°C (32°F) | +40°C (104°F) | |

Appendix C Regulatory Notices and Safety Warnings



Precautions When Using Charger/Analyzers and Batteries



Before you plug in and operate any LXE Charger or Analyzer, please read and understand this section. The following advice is given in the interest of safety and reliability. LXE strongly urges you to heed the cautions and warnings contained within the manufacturer's user guide.

Use For Correct Battery Type Only

Your LXE Charger or Analyzer must only be used to charge, analyze and condition NiCad, NiMH or Li-Ion batteries it was designed for. Any attempt to charge other types of batteries may cause an explosive reaction, fire or chemical burns. Please do not assume that the physical form of another battery qualifies it for use in the LXE Charger or Analyzer. Please read the battery label.

Hot or Cold Batteries

NiMH batteries cannot be repaired once they are damaged by over-temperature and under-temperature charging. Therefore you should bring all NiMH batteries to room temperature before charging or maintaining that battery. The System 90 Universal Charger temperature circuits will prevent the charge if you install a battery that is too hot or cold. In this instance an error code will appear. (E01 or Battery Fault LED).

Li-Ion batteries are also sensitive to temperature while charging. The Multi-Charger designed for the Li-ion batteries monitors the battery's temperature during the charge process. Best results are obtained if the battery is allowed to reach the proper room temperature before inserting it in the Multi-Charger. The battery may take a much longer time to reach the proper temperature installed in the charger and can cause the charger to discontinue the charging process if the battery temperature remains out of the safe range for an extended period of time.

Sealed Lead Acid (SLA) batteries should only be charged when the battery is within the proper temperature range described in this publication. If the battery is hotter or colder than the specified temperature range, allow the battery to adjust to the proper temperature before charging.

Battery Handling and Disposal

Never dispose of a battery in a fire. This may cause an explosion. Do not replace individual cells in a battery pack. The imbalance in the battery pack will result in poor performance.

Old or damaged batteries should be disposed of promptly and properly. The best way to dispose of used batteries is to recycle them. The battery recycling facilities recover the Nickel, Lithium or Lead from old batteries to manufacture new batteries.



Important: This symbol is placed on the product to remind users to dispose of Waste Electrical and Electronic Equipment (WEEE) appropriately, per Directive 2002-96-EC. In most areas, this product can be recycled, reclaimed and re-used when properly discarded. Do not discard labeled units with trash. For information about proper disposal, contact LXE through your local sales representative, or visit www.lxe.com.

Electrolyte Burns

Be careful when handling NiCad, NiMH, Li-Ion or SLA batteries. If a battery is broken or shows signs of leakage do not attempt to charge it. Dispose of it!

Lead and Nickel-based cells contain a chemical solution that burns skin, eyes, etc. Leakage from cells is the only possible way for such exposure to occur. In this event, rinse the affected area thoroughly with water. If the solution contacts the eyes, get immediate medical attention.

Electrical Burns

NiCad, NiMH, Li-Ion and SLA batteries are capable of delivering high currents when accidentally shorted. Accidental shorting can occur when contact is made with jewelry, metal surfaces, conductive tools, etc., making the objects very hot. Never place a charged battery in a pocket or case with keys, coins, or other metal objects.

Revision History

Revision A: Initial Release, June 2002

Revision B: August 2003

| | |
|---------------|---|
| Notices | Updated copyrights, notices and trademarks. |
| Entire Manual | Added Sealed Lead Acid to all sections discussing battery types. Added MX1-IS and MX5 to all sections discussing equipment. |

Revision C: January 2005

| | |
|---------------|--|
| Entire Manual | Updated battery pack and battery charger/analyzer sections for new products (MX3X, MX3-RFID, MX6, and VX5/VX6/VX7 UPS Battery Pack). |
|---------------|--|

Revision D: March 2006

| | |
|---|--|
| Inside cover | Removed all safety warnings to Appendix C, Regulatory Notices and Safety Warnings. Added reference to Appendix C. |
| Entire Manual | Added WEEE statement. Updated battery pack and battery charger/analyzer sections for MX7. |
| Appendix C – Regulatory Notices and Safety Warnings | Created new appendix with safety information removed from inside front cover. |

Revision E – November 2006

| | |
|---|---|
| Entire Manual | Updated battery pack and battery charger/analyzer sections for HX1. Updated all battery, docking cradle and charger part numbers to include current offerings. |
| Chapter 2 – Battery Life | Revised “LXE Scanner Current Requirement”. |
| Appendix C – Regulatory Notices and Safety Warnings | Added revision history. |

Revision F – May 2007

| | |
|---------------|--|
| Entire Manual | Updated battery pack and battery charger/analyzer sections for HX2 and RX2. Updated sections to include the MX7 Desktop Cradles with spare battery charging capability. |
|---------------|--|

