Battery Handling Procedure for Cellocator Units

Cellocator Division
Pointer Telocation Ltd.

Proprietary and Confidential

Version 1.2

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POINTER

Pointer Telocation Ltd. 14 Hamelacha St., Rosh Ha'ayin 48091, Israel • Tel: 972-3-5723111 • Fax: 972-3-5723100 • www.pointer.com

Legal Notices

IMPORTANT

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2. This document should be retained for future reference.

3. Attachments, accessories or peripheral devices not supplied or recommended in writing by Pointer Telocation Ltd. may be hazardous and/or may cause damage to the product and should not, in any circumstances, be used or combined with the product.

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1 Introduction

1.1 Scope

Lithium-Ion (Li-Ion) / Lithium-Polymer (Li-Poly) batteries are characterized by small size, high capacity and extended life time. These characteristics have turned these battery types into a preferred choice for many applications. However, Li-Ion / Polymer demands applying a unique charging algorithm and handling precautions that should be followed precisely in order to lengthen the battery life time together with ensuring installer and user safety.

1.2 Purpose

This guide provides the necessary battery handling guidelines for backup battery maintenance in Cellocator devices equipped with Li-ion / Li-Poly backup batteries.

1.3 Abbreviations

Abbreviation	Description
Li-Ion	Lithium-Ion
Li-Poly	Lithium-Polymer

1.4 References

#	Reference	Description

1.5 Revision History

Version	Date	Description
1.0	12/12/2013	Initial version.
1.1	4/2/2014	Added *How to Remove a Battery from a CelloTrack Unit* section
1.2	15/9/2014	Add *Charging Multiple Devices* section

2 Battery Handling Guidelines

2.1 General

- Do not keep unused batteries for long periods of time, either installed in the product or in storage. When a battery has been unused for 6 months, check its charge status and charge it or dispose of it, if it cannot be charged to a sufficient charge level as outlined in the following sections.
- The typical estimated life time of a Lithium-Ion battery is up to 3 years or up to 500 charge cycles - whichever comes first. One charge cycle is a period of use from fully-charged, to fully-discharged, and fully charged again. Apply a 2-3 year life expectancy for batteries that do not run through complete charge cycles.
- Rechargeable Lithium-Ion batteries have limited life time and gradually lose their capacity to hold a charge. This loss of capacity (aging) is irreversible. As the battery loses capacity, the length of time it will power the product (run time) naturally decreases.
- Lithium-Ion batteries continue to slowly discharge (self-discharge) when not in use or while in storage. Routinely check the battery's charge status while in storage for long time periods. Best charge level of the battery while stored is 40-60% of maximum capacity, in which self discharge is minimal.
- A 1-year warranty is granted by Pointer for Li-ion / Li-Poly backup batteries installed in Cellocator devices (assuming battery was operated according to the manufacturer's instructions).

2.2 Handling Precautions

- Do not disassemble, modify, crush, or puncture the battery.
- Do not short the external contacts of the battery.
- Do not try to burn a battery or put it in a hot place
- Do not place the battery in water.
- Do not expose the battery to temperatures above 60 °C (140 °F).
- Do not expose the battery to very low temperatures - most Li-Ion / Li-Poly battery electrolytes freeze (irreversibly) at approximately -40 °C (-40^{0}F)
- Do not use a damaged battery.
- If a battery pack leaks, do not touch the fluid. Dispose of a leaking battery pack (see Section 2.8).
- In the event of eye contact with fluid, do not rub eyes. Immediately flush eyes thoroughly with water for at least 15 minutes, lifting upper and lower lids, until no evidence of the fluid remains. Seek immediate medical attention.
- Keep the battery away from children.

2.3 Storage

- Charge or discharge the battery to approximately 50% of capacity before storage.
- Charge the battery to approximately 50% of capacity (i.e. 3.7 V) at least once every six months.
- Remove the battery from the product and store it separately, or disconnect the battery installed in the product, following Pointer's instructions.
- It is recommended to store the battery at temperatures between 5 °C and 25 °C.

NOTE: The battery self-discharges during storage at temperatures above 25 °C. This reduces the effective storage lifetime of the battery.

2.4 Preparing New Li-Ion / Li-Poly Batteries for Use

- A new battery pack does not need cycling through charging and discharging before usage.
- Inspect the battery manufacturing date. Batteries in storage more than 2 years should be disposed of.
- Measure battery voltage and verify that it is above 3V level per cell. A battery under 3V should be disposed of. Otherwise, recharge the battery.

2.5 Charging

Always follow your product's documentation for detailed information about charging a backup battery inside a Cellocator device.

2.6 Charging Multiple Devices

Whenever it is required to charge multiple devices (such as CelloTrack Power units) overnight, whether before the initial installation or as part of battery maintenance procedures, it is recommended to use a mass power source that will allow the connection of several devices at once while providing sufficient current for each of the charged devices. An example for 30A power supply, which is capable of charging up to 15 devices, is provided in this link. In order to use power supply for multiple devices, the proper harness shall be prepared, providing VCC & GND lines to each of the devices' ports.

Note: Charging multiple devices is particularly relevant for CelloTrack Power units but might also be required for battery management for all 9-32V devices with an internal battery, such as Cello or CR variants. In this case the harness should also include an Ignition line.

2.7 Transportation

- Always check all applicable local, national, and international regulations before transporting a Li-Ion / Li-Poly battery.
- The battery temperature during transporting should not exceed the allowed storage temperature. Recommended transportation temperatures are 5 °C to 25 °C.
- Transporting an end-of-life, damaged, or recalled battery may, in certain cases, be specifically limited or prohibited. Please consult with your account manager at Pointer in such cases.

2.8 Replacement, Disposal and Recycling

- Do not transfer a used backup battery from one Cellocator device to another if the battery has been in use for more than 1 year. This process might affect capacity and cause low performance of the battery in its "second life cycle".
- It is highly recommended to replace backup batteries more than 2 years old as a standard maintenance procedure for Cellocator devices. This ensures high reliability and proper functionality in case of external power loss or disconnection.

- Replace a backup battery in Cellocator devices only with an approved model as specified by Pointer technical support.

WARNING: There is a serious risk of battery explosion if a battery of incorrect type is used in the device.

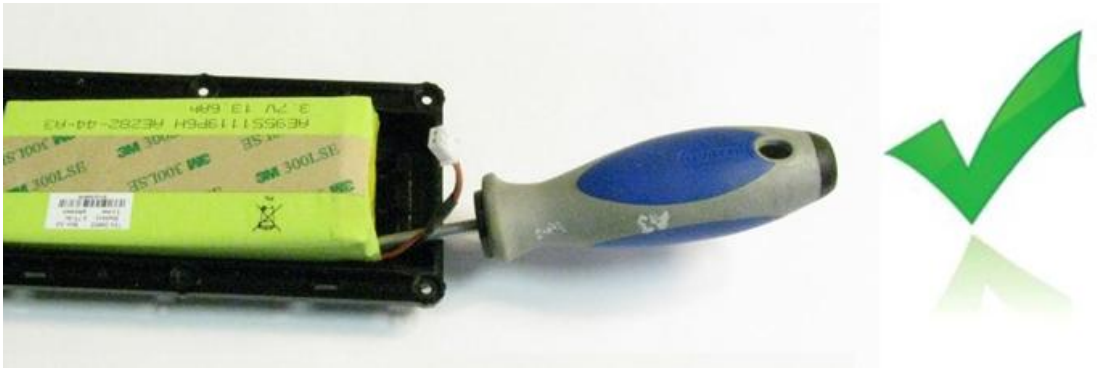
- Li-Ion / Poly batteries are subject to disposal and recycling regulations that vary by country and region. Always check and follow your applicable regulations before disposing of any battery. Contact Rechargeable Battery Recycling Corporation (www.rbrc.org) for U.S.A. and Canada, or your local battery recycling organization.
- Many countries prohibit disposal of waste electronic equipment in standard waste containers.
- Place discharged batteries in a battery collection container only. Use electrical tape or other approved covering over the battery connection points to prevent short circuits.

3 How to Remove a Battery from a CelloTrack Unit

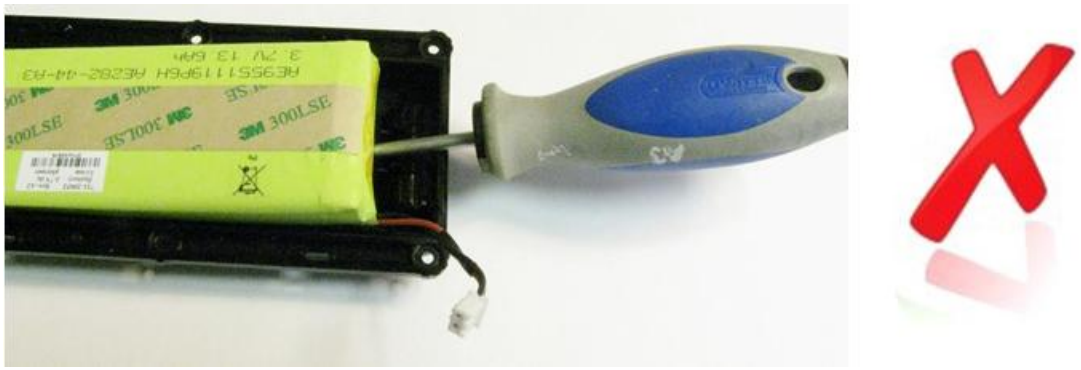
This section describes how to remove an old CelloTrack 13AH battery from a CelloTrack unit.

➤ **To remove a battery from a CelloTrack unit:**

1. Loosen the 6 screws and remove the back cover of the CelloTrack unit.
2. Using a Philips screwdriver (round cross and not flat), push the screwdriver under the battery as far as possible while lifting the screwdriver handle (it should be a continuous movement of pushing and lifting). Note that you should insert the screwdriver near the battery cable, as shown in the first image below, in order to prevent harming the battery pack on the protection circuit side.



Inserting the screwdriver under the center of the battery pack, as shown below, is forbidden.



3. See the previous sections for details on how to dispose or recycle the old battery.

WARNING: Failure to follow the instructions above may result in pressure being applied in the wrong location, which can result in connecting the battery plus and minus points, which, in turn, can cause explosions and fire hazards.
