

Motorola Solutions Technical Notification (MTN)

TITLE: Motorola batteries : Best practice guidelines

TECHNOLOGY: Batteries

SYMPTOMS: Batteries have a limited life which is defined by several factors as detailed in root cause section

MODELS / SYSTEM RELEASES / KITS / DATECODES AFFECTED:

SEVERITY RECOMMENDATION:

Low / Maintenance - Perform if system exhibits above symptoms

ROOT CAUSE / DEFINITIVE TEST:

Batteries have a limited life which is defined by several factors: the number of charge/discharge cycles, storage process, environment they are used in, and level of discharge/charge. Batteries with very large numbers of charge /discharge cycles may not hold a charge as well as newer ones. This extended usage may lead to impaired product performance but does not affect the safety performance of the device.

WORKAROUNDS AND CORRECTIVE ACTIONS:

Batteries should only be used in specified temperatures. Batteries are designed to optimally operate at room temperature; they will operate at cold and hot temperatures, however, not optimally.

Batteries should not be allowed to deep discharge. A battery can become deeply discharged if a load is applied to it for an extended period of time. Deep discharging occurs when the capacity reaches 0%.

There is protection circuitry in the device as well as in the battery that will reduce the chance of deep discharging, but not eliminate the possibility. Keep in mind that the battery also has a self-discharge rate that will continue to discharge the battery even without a load.

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Leaving a battery in a charger or charging cradle indefinitely will result in storing a battery with 100% charge. The battery will not be overcharged, but it will age more rapidly. If the device is not to be used for long periods of time, the device should not be stored in the charger or charging cradle.

RESOLUTIONS AND REPAIR PROCEDURES:

As batteries age, they lose capacity. Batteries should be replaced periodically as part of a scheduled maintenance program to ensure radios always achieve sufficient run-time.

Use only batteries approved for the device/application.

Batteries are best charged at room temperature.

Regardless of battery pack technology, batteries should ideally be first used within 1 month of delivery. The first charge should be performed for an extended period such as overnight. Typically it will take a number of charge/discharge cycles for batteries to reach their maximum capacity especially if they have been stored for extended periods.

In the case of IMPRES batteries it is strongly recommended that a recondition cycle is performed prior to first use, this will calibrate its internal data resulting in the radios providing the very accurate battery gauge that this technology provides.

Storage:

Store batteries when not in use in a: well ventilated; temperature (68F/20C to 86F/30C); and humidity (30%-60%) controlled environment.

Li-Ion Batteries:

The optimal battery storage condition for battery packs containing Li-Ion chemistry is in the 30%-50%* charge state. New batteries should be stored as delivered from Motorola Solutions. Used batteries should be charged or discharged to approximately 50% capacity.*

Batteries should be periodically checked every 6 months to maintain the charge between 30%-50%* charge state, if the storage conditions are not as described then the frequency of checks should be increased.

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Active circuit Li-Ion Batteries:

Intrinsically Safe batteries (IECEX/ATEX/CSA/TIA4950) contain additional active circuitry to meet specific regulatory requirements which increase the rate of self discharge. For best performance these batteries should be used within 1 month of receipt. However, if storage is required, the batteries should be charged to a 30%* charge state every 10 weeks. Intrinsically safe batteries include: NNTN8840 NNTN8750 NNTN8287 NNTN8386 NNTN8359 NNTN5510 NNTN7383 and PMNN4547A

* Note that the International Air transport Association (IATA) policy requires batteries to be shipped in bulk, by air at a state of charge of no more than 30% of their rated capacity. The charge state can be easily managed and accurately monitored using a Gen2 Impres charging system or accurately monitored using a Gen 1 system. If neither of these systems are applicable then charge state can be estimated using the radio charge indication.

NiMH Batteries:

The storage recommendations for Li-Ion also apply with the exception that when checking the state of charge maintained at the 90-100% state by fully charging.

Guidance on Lithium-Ion Battery Swelling

All prismatic Li-Ion cells swell slightly with normal use as they age. Under normal conditions, this swelling is on the order of 10 - 15% of the battery's original thickness, although it may vary from manufacturer to manufacturer.

Swelling on a larger scale can be seen if the battery/product is exposed to abnormal conditions. This is not, however, indicative of an imminent safety concern. This greater degree of swelling is typically caused by:

- high temperature storage (> 60 °C),
- overdischarge (storage below 2 V),
- overcharge (use of unauthorized charging system).

In order to minimize swelling, adhere to the guidelines in the Battery Tip Card and this document.

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Periodically upgrade Radio Firmware to insure that the batteries are charged with the latest charging algorithms.

Replace Batteries as part of a scheduled maintenance program.

Charger and Battery Maintenance.

All energy systems rely on there being a good electrical contact during the charging process. It is important that both the charger and battery contacts are cleaned periodically to ensure that batteries are charged both fully and consistently. Motorola Solutions recommends CAIG Laboratories DeoxIT® Gold G-Series Contact Enhancer, Conditioner & Protector. DeoxIT® Gold G-Series has been extensively evaluated by Motorola Solutions engineering and manufacturing teams for battery and charger contact conditioning. DeoxIT® Gold G-Series is the only approved contact conditioner for Motorola Solutions products.

IMPRES Charger and Battery Guidance.

The IMPRES system provides detailed information for battery asset management and provides typically both longer battery service life and a far superior radio indication of current charge state.

In order to take advantage of this advanced system, in addition to the regular cleaning of contacts it is important that the re-calibration process is allowed to complete.

The recalibration cycle is indicated on IMPRES chargers and should not normally be bypassed. In instances where it is bypassed a recalibration should be forced at the next convenient opportunity or a planned recalibration procedure implemented such as forcing a recalibration every 30 days.

It is strongly recommended that a recalibration cycle is performed prior to first use, this will calibrate its internal data resulting in the radios providing the very accurate battery gauge that this technology provides.

Battery Tip Card

A Battery tip card can be found on the Motorola Solutions website:

https://www.motorolasolutions.com/en_us/products/two-way-radio-accessories/batteries.html

PARTS REQUIRED (HARDWARE/SOFTWARE): none

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ADDITIONAL INFORMATION: n/a

REFERENCE THE FOLLOWING DOCUMENTS/PROCESSES FOR INSTALLATION PROCEDURES: n/a

WHEN TO APPLY RESOLUTION:

After reboot ___
After (re)installation ___
After upgrade ___
After power cycle ___
After database restoration ___
After failure ___
On FRU replacement ___
During maintenance _x_
Immediately ___
As instructed ___
Information only ___

For assistance with this bulletin please contact your MSI Technical Support Centre

In EMEA https://www.motorolasolutions.com/en_xu/support.html

In Asia http://www.motorolasolutions.com/en_xp/support.html

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